

Filozofická fakulta Univerzity Palackého

**English pronunciation of student interpreters:
Acoustic analysis of speech production
(Bakalářská práce)**

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English pronunciation of student interpreters: Acoustic analysis of speech production

(Bakalářská práce)

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V Olomouci dne 14.12.2016

Tereza Berná

*“Hope” is the thing with feathers
That perches in the soul
And sings the tune without the words
And never stops - at all
Emily Dickinson, 314*

I would like to thank my supervisor Mgr. Šárka Šimáčková, PhD. for her help, encouragement and indispensable comments in the process of writing. I would also like to express the warmest thanks to Markus Ekström who supported me even in bleakest and darkest times and who always saw the silver lining in every word put on paper.

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Abstract

This thesis focuses on Czech student interpreters and their acquisition of English front vowels /i/, /ɪ/, /ɛ/ and /æ/. A study was carried out gathering data from students of English for Translation and Interpreting programme. The students were divided into two groups, first and third year students, with the third year students presumably more advanced in their English proficiency.

The data shows that the students did not distinguish in production spectrally between English /ɛ/ and /æ/ based on F1 and F2 measurements, although they employed differences in vowel duration where /æ/ was produced longer than /ɛ/. The English vowel pair /i/ and /ɪ/ proved to be significantly different based on the F1 and F2 values, as well as vowel duration. No significant differences were found between the two groups of students, suggesting that the additional phonetic courses and interpreting training did not contribute to lowering the degree of their foreign accent.

Key words

foreign accent, vowel, vowel quality, vowel quantity, Czech, English, interpreting

Anotace

Tato práce se zaměřuje na české studenty tlumočení a jejich míru získání anglických předních samohlásek /i/, /ɪ/, /ɛ/ a /æ/. Studie zaměřená na akustickou analýzu předních samohlásek byla provedena na datech získaných od studentů oboru Angličtina se zaměřením na komunitní tlumočení a překlad. Tito studenti byli rozděleni do dvou skupin na základě jejich jazykové způsobilosti a pokročilosti studia. Tyto skupiny obsahovaly studenty prvního ročníku bakalářského studia a studenty třetího ročníku.

Získaná data ukázala, že studenti nerozlišují v produkci mezi anglickými samohláskami /ɛ/ a /æ/ na základě akustických vlastností, prvního a druhého formantu, ale pouze na základě délky samohlásky. Samohláska /æ/ byla naměřena jako delší než samohláska /ɛ/. Dvojice anglických samohlásek /i/ a /ɪ/ se ukázaly být signifikantně rozdílné ve formantových frekvencích jedna i dvě a taktéž v délce samohlásek. Žádný signifikantní rozdíl nebyl potvrzen mezi dvěma zvolenými skupinami studentů. To naznačuje, že specializované fonetické předměty či tlumočnický trénink nijak nenapomohl studentům ke snížení cizího přízvuku.

Klíčová slova

cizí přízvuk, samohláska, vokalická kvalita, vokalická kvantita, čeština, angličtina, tlumočení

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1. Introduction

The profession of an interpreter has been prominent and highly valued throughout civilised history. Ever since languages divided different nations, their leaders utilised interpreters to further their goals in trade, religious missions, conquest, wars and in establishing peace. It is therefore understandable that with the rise of the scientific approach to gathering and mapping knowledge, interpreting eventually received the same treatment.

How to assess the quality of interpreting is the key question interpreting experts, researchers and teachers of trainee interpreters ask most often. However this topic is very broad and can be approached in many ways since many factors contribute to a good interpreting performance. One of the main aspects to mention is the required high language proficiency. Herbert (1952, 61) says that “Interpreters have an obligation to be authorities on the language they speak.” Bilingualism is therefore almost required to becoming an adequate interpreter and with it we can assume many expectations on the interpreter himself.

This particular requirement usually entails mastery of the language on all linguistic levels with particular emphasis on the lexicon, semantics and pragmatics. When literature mentions the requirements on the interpreter’s speech and delivery, most experts focus on the rhetoric, fluency or a “non-disruptive” and “neutral” expression (Herbert 1952, Jones 2014). However, not much attention is devoted to the actual interpreters’ pronunciation and the presence of a foreign accent.

It is clear that this aspect of interpreting is being overlooked based on the assumption that interpreters should only interpret from their second language (L2) into their first language (L1), but in practice this rule cannot be strictly followed. This problem arises especially for interpreting from languages with a small population of speakers, as is the case for the participants in the study which is the basis of this thesis who are all Czech nationals.

Pronunciation deserves not to be overlooked completely as it is a factor contributing to the perception of fluency as well as neutrality. Importantly, intelligible pronunciation is undoubtedly the basis of effective interpreting.

Trainee interpreters are often instructed to improve their pronunciation to some degree, but as was stated earlier, this particular part of interpreting instruction does not have as much allotted time in the curriculum as instruction in note-taking, memory training or split attention practice.

I believe that pronunciation and phonetic training deserves more attention in interpreter training programmes than it is usually given and that interpreting students would greatly benefit from classes focusing on foreign accented speech and pronunciation practice.

Foreign accent (FA) has been studied in depth for decades including description of factors contributing to FA and its connection to comprehensibility and intelligibility of non-native speech. The research on the attitudes towards foreign accented speech of native (as well as non-native) listeners is important for our considering of foreign-accentedness of interpreters. We can expect that the features of Czech accented English, such as consonant substitutions or different realisations of vowel qualities, are no exception to impacting intelligibility and comprehensibility and they can also invoke various stereotypes in the listeners. The influence of interpreter's native Czech on their second language English is also reflected in monotonous speech, misplacing stresses resulting in irregular and non-native rhythm of speech. Although FA is also often reported by listeners to impede comprehensibility, according to Munro and Derwing (1999) heavy accent does not necessarily mean drastically lowered intelligibility and comprehension. The accent does on the other hand require more processing on the side of the listener.

My thesis hopes to contribute to the description of Czech accented English by examining pronunciation of English front vowels by Czech interpreting students. Those can be found in words such as BEAT, BIT, BED, BAD. The corresponding Czech vowels can be found in words such as BÍT, BYT, SED.

The first clear difference is that the number of Czech front vowels does not correspond to the one of the English front vowels. This and other differences in the front vowels are discussed in the section 2.5.5. Czech and English front vowels in Chapter 2. The literature review also includes a discussion of the foreign accent phenomenon, aspects affecting the degree of foreign accent, and typical features of Czech accent in English. The following Chapter 4 Methods

discusses the methodology of the study carried out with student interpreters at Palacký University. The gathered data is then analysed in Chapter 4 Results and discussed and Chapter 5 Discussion.

2. Review of Literature

2.1. Foreign accent

Foreign accent is a well observed phenomenon among almost all second language learners, but is not as easy to define as it is to naively observe. Before starting with a definition of foreign accent, accent in general merits its own explanation. Accent is a reflection of our upbringing and experiences in life which shape not just the segmental, but also suprasegmental features of our speech. A person's accented speech therefore not only conveys intended uttered information, but also extralinguistic information about their social class, level of education, place of origin and many more aspects of their life. (Moyer 2013)

The same is true for a second language (L2), but the learner faces other difficulties a monolingual does not. Already in early childhood a child develops important skills in using their mother tongue or first language (L1). This state of knowing one language possibly poses a problem to L2 learners. In the case of acquiring phonetics of L2 the learners are said to identify sounds in L2 as new, different phones from or similar phones to their L1 sounds based on perceived qualities (Flege 1987b). This interference of L1 in learning L2 is one of the main reasons why foreign accents occur.

L2 speakers often differ in how strong their FA is. Evaluating the strength of foreign accent is not at all straightforward. Many researchers opt to use global listener ratings, a method where the L2 pronunciation of the study participants is rated by native listeners. Such accent rating studies differ in choosing listeners, ranging from professionals in the field, people trained in phonetics, phonology and in phonetic transcription, or naïve listeners. The number of listeners also varies highly from just one to eighty-five (Piske, MacKay, and Flege 2001). A highly varied factor is the rating itself. The most commonly used tool is the Likert scale, although the gradients on the scale can range from three to ten (Jesney 2004).

Another option often used to evaluate speakers with respect to FA strength is acoustic analysis. The duration of voice onset time (VOT), "interval between the release of a closure and the start of the voicing" (Ladefoged and Johnson

2014, 151), is commonly used as an acoustic measure of FA. Another property often compared across foreign-accented speakers is the quality of vowels, specifically the formant measurements of vowels.

Studies measuring the degree of foreign-accentedness also differ in how samples of non-native speech are acquired. In some studies participants read out sentences, paragraphs or words, other studies opt to elicit a more natural speech via picture descriptions or recounting personal experiences. Other frequently used method involves direct or delayed repetition tasks. (Piske, MacKay, and Flege 2001)

2.2. Factors affecting foreign accent

Factors affecting foreign accent have been studied in the immersion condition where L2 learners, usually immigrants, face a situation where most of the population in their everyday life does not speak their mother tongue, therefore the need to learn the L2 is high. Several factors affecting the degree of foreign accent have been identified and became the focus of research. Among the most studied are age of onset of learning, length of residence, instruction in language learning, language use, language learning aptitude, motivation and gender (Piske, MacKay, and Flege 2001).

2.2.1. Age of Onset and Critical Period Hypothesis

Age of onset (AO), also referred to as age of learning (AOL) or age of arrival (AOA) is often presented as a deciding factor for the degree of foreign accent in L2 speakers. *The younger a person starts learning a language the better* is often repeated, especially in regards to acquiring phonology. Flege et al. summarise the effect of age based on previous research as follows:

If L2 learning commences by the age of roughly 7 years, the L2 is spoken without a detectable accent by at least some individuals who have used the

L2 as their primary language for many years. Beyond that age of learning (AOL) the second language, the degree of perceived foreign accent increases with AOL up to early adulthood. Few if any individuals with AOLs greater than 15 years manage to speak their L2 without a detectable foreign accent. (Flege, Munro, and Mackay 1995)

This statements suggests that a critical period for acquiring native-like pronunciation exists. Lenneberg (1967) posits that language acquisition happens during the cerebral growth and after its end around puberty the neural plasticity declines. He supports his claim by evidence of children being able to completely recover from aphasia, whereas adults are not able to.

The critical period hypothesis (CPH) seems to be regarded by some as a fitting biological description why foreign accent occurs and why adult L2 learners seem to perform worse than child L2 learners. Unfortunately CPH explanation for non-nativeness is not as straightforward as was previously believed. Flege (1987a) and more recently Moyer (2013) review the hypothesis and try to compare research empirically supporting the existence of CPH with the research with no conclusive evidence in favour of the CPH.

To summarise these reviews, neurobiological research does not yet seem to support the hypothesis that declining neuroplasticity is causally linked to problems with second language acquisition (SLA). Present in research are outlier studies which observe adult learners outperforming child learners of L2 and even more represented are studies which do not observe any clear divide after the posited end of the critical period, only a linear increase of the degree of FA. The effects also do not apply universally since some highly motivated adult learners manage to be judged as sounding native-like (Bongaerts et al. 1997). Young immigrants are also immersed in the L2 speech community in a wholly different way than adults are. These young L2 learners attend school, make native friends and their identity is shaped in a different context than if they immigrated later in life. Therefore there might be other factors influencing L2 speech learning at play, like motivation, instruction in learning and language use.

Due to these discrepancies some researchers suggest to use a broader term *sensitive period* instead. Flege (1987a) describes sensitive period in the following way as

A period of heightened responsiveness that is preceded and followed by periods of lesser responsiveness, or a 'period of competence' for specific exchanges with the environment. Shifts in responsiveness to various environmental stimuli may co-occur with the 'progressive elaboration of structures or schemata' which may affect how the organism engages the environment. Flege (1987a)

2.2.2. Length of residence

Length of residence (LOR) has also been widely represented in literature on acquisition of L2 phonology. LOR can be defined as length of stay in a community where L2 is a predominantly spoken and used language (Piske, MacKay, and Flege 2001). However, comparing results of research using LOR as a main factor determining the degree of foreign accent seems to produce some discrepancies. The main problem with LOR is that it does not directly correlate with L2 experience, therefore it is in some cases hard to compare between speakers.

As with AO, other factors are also at play. Many speakers acquire a significant amount of new skills at the beginning of learning, whereas already proficient speakers do not improve drastically over a period of time. It is therefore not surprising that not every study has shown a significant effect of LOR on the degree of foreign accent. (Piske, MacKay, and Flege 2001)

2.2.3. Instruction in language

Formal instruction in the second language seems to be an important factor in language acquisition at least regarding grammar. In regards to phonology the findings of several studies are not as straightforward. As Piske, MacKay, and

Flege (2001) found by comparing studies including instruction in language, this factor improves the learners' L2 performance, but the difference is not staggering, amounting to only 5%, or it does not appear to be significant at all.

This might be due to the fact that L2 teaching in most foreign language classrooms does not devote much time to pronunciation practice. In case of special pronunciation or phonology classes the effect seems to be more significant. Among the participants in Bongaerts et al. (1997) study, a group of participants were rated as having a native-like pronunciation. All of these participants received extensive training in Received Pronunciation (RP), suggesting that this intensive focus on pronunciation was an important influencing factor.

2.2.4. Motivation

Many studies paying attention to the learners' motivation present some evidence pointing to motivation being one of the factors affecting the degree of FA, although it does not prove to be a very important variable. The common motivation is professional, the need to fit in or the desire to sound native-like. According to Moyer (1999) the desire to sound native-like might be only rarely one of the main goals of already highly proficient learners who are instead focusing on morphosyntactic and lexical accuracy over developing their phonological skills.

The previously mentioned study by Bongaerts et al. (1997) seems to point to motivation being a contributing factor to a low or barely existent degree of FA in the study's participants. The participants in that study were all except for two teachers of English at a Dutch university and all highly motivated to sound native-like due to the nature of their profession. Five of eleven participants did receive ratings equal to the native control group.

2.2.5. Language use

The degree of use of L1 compared to L2 seems to also be a factor worth considering when assessing the presence of FA in L2 learners. Flege, Frieda, and Nozawa (1997) matched groups of native Italians living in Canada since childhood based on their self-assessed use of Italian compared to English in their everyday life. Although all participants still retained a degree of FA even later in life and years spent in the English speaking country, the results seem to point towards high L2 use being an important factor influencing the degree of FA compared to the group with lower L2 use.

Based on the review by Piske, MacKay, and Flege (2001) other studies also point to language use being an influencing factor.

2.3. Attitudes towards non-native accents

The research on attitudes towards FA has been carried out mostly in countries which receive a large amount of immigrants, especially focusing on the stigma arising from sounding foreign accented (Gluszek and Dovidio 2010). As was stated earlier speech does not only carry the intended meaning of the speaker, but also includes information about the person's background, social class and other external information. This is particularly important for foreign accented speech where a person's accent immediately reveals their non-native status. Gluszek and Dovidio (2010) summarise the research conducted on this topic where stereotypes and prejudice is targeted at the speakers with FA.

Other research shows that native speakers tend to assign negative personality traits to the foreign accented speakers compared to natives (Tsurutani 2012). Lev-Ari and Keysar (2010) observed that FA can also lead to reduced credibility of the speaker.

2.4. Transfer and interference

“Transfer involves the influence of a source language (typically, the native language of a learner) on the acquisition of a target language, the “second” language regardless of how many languages the learner already knows.” (Odlin 1989) After being established L1 is always present and therefore can heavily impact any further perception or production pertaining to language. We can therefore think of our L1 as a ‘filter’ through which the L2 input has to pass. This is not a strictly bad influence.

On the other hand this filtering causes interference on all levels – lexicon, grammar and also segmental and suprasegmental phonological features (Moyer 2013). With this knowledge we can analyse features of both L1 and L2 and compare and contrast features, which might be difficult for L2 learners to master. This process is called *contrastive analysis*.

Transfer is not the only reason for the existence of FA. In case of phonology some speech sounds are harder to master than others which can be easily observed in naturally developing children. These developmental processes are assumed to act independently since they stem from universal characteristics of human speech. Even late learners are subject to these developmental learning constraints, sometimes acting completely independently from any predicted transfer errors. (Flege and Davidian 1984)

2.5. Typical features of Czech accented English

As was explained earlier any bilingual or multilingual speaker experiences some form of influence of their native language which is apparent in how they use their other later-learned languages. An influence of L1 on L2 is not the only way learned languages interact with each other. Research (Antoniou et al. 2011) shows that a learned L2 can also influence the pronunciation of the speaker’s L1. This bidirectional interaction was observed mostly on different VOT duration in L1, closer to the L2 VOT duration.

For an L2 learner group with a particular L1 background we can find problematic phenomena by conducting contrastive analysis of the languages in question as well as by observing and analysing learners' speech production. The problematic areas can be identified on both segmental and suprasegmental level.

The features the contrastive analysis is looking for are not necessarily the features most different in L2 compared to the L1. As Flege (1993) describes, sounds with no clear counterparts are more likely to be acquired accurately compared to other sounds which have a similar counterpart in L1. Therefore we can expect that identifying very different phonetic categories would be easier for learners than distinguishing between two categories resembling each other. This problem also extends to subsequent production of the L2 sounds in question.

2.5.1. Suprasegmentals

L2 phonetic interference is present on all levels. Suprasegmental features might not be as well covered in L2 learning as common mispronunciations, but they nevertheless deserve time to recognise common problematic areas.

Intonation is a typical feature which is not easy to imitate for learners of L2 and obvious interference of the L1 intonation can be present even in advanced learners who already have a very good grasp of L2 lexicon or syntax (Mennen 1998). Learners whose intonation and rhythm of speech are non-native are often judged negatively on their personality traits (Volín, Poesová, and Skarnitzl 2014).

Stress in Czech is placed on the first syllable of a word whereas in English stress can occur almost anywhere in the word given certain rules are followed. Stress in English also directly affects pronunciation where unstressed vowels get significantly reduced compared to their stressed counterparts (Ladefoged and Johnson 2014). Czech speakers often misplace stress in English words which can become apparent in words where stress differentiates between parts of speech such as the word **present** with the noun ['preznt] and the verb [pri'zent]. In this case Czech speakers can lose the difference marked by stress and place stress on the first syllable.

Another problem is not reducing unstressed syllables, such as in the words **even** [ˈi:vən] and **event** [ɪˈvent] where **event** can therefore end up being pronounced by a Czech speaker as *[ˈi:vent]. This can result in a different and non-native rhythm of speech, which in English is closely tied to occurrence of full vowels compared to reduced vowels. Cruttenden (2014) states “The one simple rule of English rhythm is the Borrowing Rule whereby a syllable with a reduced vowel ‘borrows time’ from any immediately preceding syllable containing a full vowel.” This is not the case in Czech where all vowels are generally not reduced and the duration of vowels has a different purpose in the language. This is addressed in a later section 2.5.3. *Vowels in Czech and English*.

2.5.2. *Phonological rules*

Another source of cross-language differences are different phonological rules in Czech and English.

Assimilation, the change of a phoneme based on the influence of another, functions differently in Czech and English. Czech voicing assimilation affects two or more obstruents together. These become voiced or voiceless based on the last obstruent in the cluster. An example can be the words **vůz popojel** pronounced [vu:s popojel], where voiced [z] in [vu:z] turns into its voiceless counterpart [s] (Cvrček 2015). This regressive assimilation gets often applied in English incorrectly to voiceless pair consonants /p, t, k, s, ʃ, tʃ/. A phrase **black dog** [blæk dag] is pronounced *[blæg dag].

Word final obstruents in Czech are devoiced, in English they retain their voicing and also prolong the duration of the preceding vowel (Ladefoged and Johnson 2014). Czech speakers therefore often apply the Czech final devoicing rule to English, where **bag** [bæg] will be pronounced as *[bæk], the correct pronunciation of the word **back**. As the example demonstrates this can potentially cause confusion for the listeners.

In English syllable initial consonants /p, t, k/ is pronounced with noticeable aspiration, whereas consonants /b, d, g/ have no aspiration. This poses a problem to Czech speakers who often cannot imitate the aspiration and include an additional /h/ instead.

2.5.3. Consonants

The most obvious differences involve L2 phonemes which do not have any close equivalent in L1. One such example when comparing Czech and English consonants are the dental fricatives /ð/ and /θ/. These are often substituted for the closest perceived variant in Czech, which is not always the same and varies from a learner to learner. The most common substitutions are /s/, /f/, /t/ or even /ts/ for /θ/. /ð/ is most commonly substituted with /d/ or /dz/ and sometimes even /v/ or /z/ (Volín 2000a). Another phoneme missing in the Czech inventory is the approximant /w/ which gets frequently substituted with the labiodental fricative /v/.

Another substitution occurs in the case of the English velar nasal /ŋ/ which is graphically represented by the spelling **ng**. In this case /ŋ/ exists as a distinct phoneme in English distinguishing meaning as in words **sing** and **sink**. For Czech /ŋ/ occurs only as a variant of the alveolar /n/ when preceded by /k/ or /g/, as in case of the word **banka**, pronounced /baŋka/. The problem here arises from Czech phonotactics and therefore the words **sing** and **sink** (with the addition of the final devoicing rule in Czech) can end up being pronounced as /sɪŋk/. (Volín 2000b)

Another difference between English and Czech involves different pronunciation of a phoneme, which appears in both languages. This is apparent with the different pronunciation of the rhotic phoneme. Since in Czech it is realised as a trill, i.e. /r/, this can get carried over to English and replace the approximant /r/. The glottal fricative /h/ is a voiced phoneme in Czech and Czech learners of English use it instead of the English voiceless one. This is obvious especially in word initial positions where /h/ becomes mute, as are the words **heir** or **hour**.

The glottal stop /ʔ/ is recognisably a speech sound although not present as a phoneme in either Czech or English, serving a different purpose in each language. In Czech it is commonly present in speech and prevents linking of vowels with other vowels or preceding words, helping with distinguishing word boundaries. For comparison see the word *sova* [sova] and *s ovocem* [sʔovocem], which shows

the glottal stop separating the vowel from a preposition. English has mostly imperceptible word boundaries and does not use the glottal stop for the same purpose as Czech. Problems in linking stemming from this phenomenon can therefore be observed in Czech accented speech. (Volín 2003)

2.5.4. Vowels in Czech and English

Czech and English are indisputably languages differing in many ways. This thesis focuses particularly on the differences in the production of a subset of vowels. The Czech system of vowels is, compared to some other languages, rather simple, with ten monophthongs and three diphthongs. Duration is employed to differentiate between five short and five long monophthongs. There are no front rounded vowels like in Scandinavian languages, and no back unrounded vowels like in Japanese. Nasalized vowels are not used like in Polish or French. There is no difference between lax and tense vowels like in English.

The ten monophthongs can be also described as five pairs differing in their quantity with barely noticeable differences otherwise. An exception to this statement is the high front close vowels /i:/ and /ɪ/ which can also differ significantly in their spectral quality, with /ɪ/ being shorter and centralised than the longer, more closed and front /i:/ (Skarnitzl, Šturm, and Volín 2016). The recent research also shows, that /u/ and /u:/ might be also differing spectrally more than was assumed earlier (Skarnitzl and Volín 2012).

An important factor of Czech vowels is the abovementioned quantity or length since it does differentiate words with different meaning and forms minimal pairs. The traditional description (Palková 1994) states that longer vowels are of twice the length as their corresponding short vowels. According to newer research (Skarnitzl and Volín 2012) this does not seem to be entirely true. The ratio between long and short vowels seems to more correspond to 1.7:1 to 1.8:1 in case of /a/, /ɛ/ and /o/ vowel pairs. For /u/ vowels the observed ratio was smaller, being 1.6:1, probably reflecting the previously mentioned slight divergence in spectral quality. The biggest difference was observed between /i:/ and /ɪ/ where /i:/

probably due to larger spectral differences was only about 30% longer (Skarnitzl, Šturm, and Volín 2016).

The spectral difference between /i:/ and /ɪ/ seems to not be relied upon to the same degree in all parts of Czech Republic. According to Podlipský, Skarnitzl, and Volín (2009) who conducted an experiment using synthesized sentences with differing spectral and temporal qualities of the observed vowels, the listeners from Bohemia relied more on spectral cues rather than on temporal cues, whereas the listeners from Moravia relied on temporal and then spectral cues.

Czech also contains three falling diphthongs [ou̯], [au̯] and [ɛu̯], where [ou̯] is the only one present in native vocabulary. [au̯] and [ɛu̯] are both present in words of foreign origin, but [ɛu̯] is not necessarily always realised as a diphthong based on differing word to word perception and also based on individual speaker differences.

The English vowel system is somewhat more complex than the Czech system of vowels. Received Pronunciation, the British English standard, includes 11 monophthongs /i, ɪ, ε, æ, ɑ, ɒ, ɔ, ʊ, u, ʌ, ɜ/ and 9 monophthongs /eɪ, əʊ, aɪ, aʊ, ɔɪ, ɪə, ɛə, aə, ju/. The standard American English includes 10 monophthongs /i, ɪ, ε, æ, ɑ, ɔ, ʊ, u, ʌ, ɜ/ and 9 diphthongs /eɪ, oʊ, aɪ, aʊ, ɔɪ, ɪr, ɛr, aɪr, ju/ (Ladefoged and Johnson 2014). There are similarly to Czech no front rounded vowels, no back unrounded vowels and no nasalized vowels. English does employ the difference between tense and lax vowels. The lax vowels are [ɪ, ε, æ, ʊ, ʌ] cannot for example appear in stressed open syllables compared to tense vowels. Differences in duration are dependent on the phonemes surrounding the vowel.

2.5.5. Czech and English front vowels

This thesis focuses on front vowels. Czech contains three front vowels, /i/, /ɪ/ and /ε/ ranging from high to mid, compared to English where the same space is occupied by four vowels, /i/, /ɪ/, /ε/ and /æ/. To put these into perspective of language, these vowels appear in words BÍT, BYT, SED for Czech and BEAT, BIT, BET and BAD in English. Although these vowels are represented by the same IPA symbols (with the exception of /æ/ only present in the English vowel

inventory), they are not direct equivalents and therefore a further comparison is needed.

One such comparison is measured values of the first (F1) and second formants (F2) shown in Table 1. The table shows two sets of formant values for Czech to further compare how Czech pronunciation developed since the earlier research conducted by Hála (1962). Skarnitzl and Volín (2012) sought to update these earlier measurements for current pronunciation of young speakers of Czech. The previously mentioned spectral differences between Czech /i/ and /ɪ/ are clearly visible from Table 1.

	Hála		Volín, Skarnitzl		Cruttenden	
/i:/	F1 326	F2 2230	F1 282	F2 2255	F1 280	F2 2249
/ɪ/	F1 355	F2 2120	F1 415	F2 1943	F1 367	F2 1757
/ɛ/	F1 572	F2 1660	F1 566	F2 1519	F1 494	F2 1650
/ɛ:/	F1 510	F2 1750	F1 576	F2 1578		
/æ/					F1 690	F2 1650

Table 1: Formant frequencies of Czech and English front high and central vowels measured for male speakers according to Hála (1962), Skarnitzl and Volín (2012) and Cruttenden (2014).

As Table 1 shows there are considerable differences between Czech and English front vowels based on their acoustic qualities. Other differences can be observed in articulation, which is overall different in case of all the vowels discussed here.

According to Skaličková (1974) for /i/, /ɪ/ and /ɛ/ the place of articulation in English is further back in the mouth. In Czech the tongue rests behind the lower teeth, whereas in English the tongue assumes a neutral position pointing forward. The difference in articulation between /ɪ/ and /ɛ/ is much smaller in English than in Czech.

Skaličková (1974) also compares Czech long /ɛ:/ with English lax /æ/ as the closest possible equivalents. As was mentioned earlier, the spectral differences between long and short vowels in the case of Czech /ɛ/-/ɛ:/ are not large. We can

therefore for our purposes treat /ɛ/ as equivalent to /ɛ:/ and extend the comparison to include both Czech vowels to compare against English /æ/.

The Czech vowel pair /ɛ/-/ɛ:/ and English /æ/ differ substantially more compared to the previously mentioned vowels /i/, /ɪ/ and /ɛ/ and their equivalents. Acoustic differences are shown in Table 1, other differences also lie in articulation. The English /æ/ is more open, the tongue is again not resting behind the teeth and the lips are further apart.

2.6. Research questions

Based on the previous research summarised by Moyer (2013), it is possible to create new phonetic categories for sounds not present in the speaker's L1. According to Flege (1993) sounds with no clear counterparts are more likely to be acquired accurately compared to other sounds which have a similar counterpart in L1. As was mentioned in the section describing vowels, Czech contains only one vowel /ɛ/ occupying a large phonemic area which in English encompasses both /ɛ/ and /æ/. In this situation English lax /æ/ is perceived by most Czech learners as "similar" to Czech /ɛ/. Based on the equivalence classification (Flege 1987b) we can assume that Czech learners will have a problem perceiving and producing the contrast between the words BED and BAD, using the Czech /ɛ/ in both cases.

The regional differences in pronunciation of vowels /i/ and /ɪ/ in Czech Republic somewhat complicate the possible predictions of how learners would pronounce the equivalent vowels in words BEAT and BIT. As mentioned previously in section 2.5.3. Bohemian speakers rely both on duration and vowel quality to distinguish between /i/ and /ɪ/ and we can therefore assume the same difference will be applied to English vowels. On the other hand in Moravia speakers rely mainly on duration to distinguish between short and long vowels in a vowel pair. Therefore we might expect Moravian speakers to use this distinction in production and perception of English vowels /i/ and /ɪ/ and not employing spectral differences to differentiate between vowels.

The speech production study carried out in this thesis compares two groups of Czech learners of English, students of English for Translation and Interpreting

programme at Palacký University. These students are, unlike participants in most earlier mentioned studies, not in the immersion situation.

Other factors influencing their degree of FA also need to be taken into account. The learners participating in the study are highly motivated and when enrolling into the English programme for translators and interpreters they are already fairly advanced learners at a minimum level B2 of The Common European Framework of Reference for Languages. Over the course of their studies they are required to reach level C1 and are instructed in phonetic courses. These speakers are also immersed in English culture and often communicate in English with their colleagues and English speaking friends. All these factors could potentially affect the degree of FA over a shorter period due to more focused instruction in learning.

The students were therefore divided into two groups, first and third year Bachelor's students, to draw a comparison between their degree of FA and if it was at all influenced by the special instruction in phonetics, other courses focusing on raising language proficiency or their motivation.

The main questions of this thesis are these:

Will the speakers differentiate between /ɛ/ and /æ/ in English or will they have only one vowel category?

Will the speakers differentiate between /i/ and /ɪ/ based on the spectral differences or will they rely on temporal differences?

What differences, if any, can be found in the pronunciation of first year students of interpreting compared to third year students?

3. Methods

3.1. Participants

The study was carried out at Palacký University in Olomouc and the participants were students of the English for Community Interpreting and Translation Bachelor's programme. The students were fairly advanced learners of English, the entrance exam to the programme involves an English exam at minimum level B2 of The Common European Framework of Reference for Languages. Throughout their studies the students are also required to attend courses which prepare them for a level C1 English exam, which the students are required to take before the end of their studies.

The data was gathered from 20 participants aged 19-27 all of whom were women. The participants were sorted into two groups according to their year of study in their Bachelor's programme, 9 first year students and 11 third year students. All of the participants were native speakers of Czech language with English as their second language. Some participants also reported being fairly proficient in a third language.

3.2. Stimuli

The experiment in this thesis was part of a larger study where the stimuli consisted of 88 short sentences for each of the three conditions – English only, Interpreting and Code-switching. The study in this thesis focuses on the English only condition, using 40 short sentences of similar length including vowels /i/, /ɪ/, /ɛ/ and /æ/ in target words. Target words used to elicit these vowels were monosyllabic with the pattern CVC – vowel preceded and followed by a consonant. The consonants were of varied manners and places of articulation.

Six target words were set for vowel /i/, six for /ɪ/, four target words were set for vowel /ɛ/ and four for /æ/. Every target word was included in two short sentences, once occurring as sentence initial and once as sentence final in the

short sentences. To insure the measured vowel duration was not influenced by pre-fortis clipping, half the target words ended in a voiceless obstruent and half with a voiced obstruent. All target words, which are shown in Table 2, were open class words.

Vowels	Target words
/i/	cheese, lead, leave, heat, cheat, niece
/ɪ/	big, give, dig, fish, thick, sit
/ɛ/	beg, bed, neck, bet
/æ/	bag, badge, back, match

Table 2: The table shows all target words included in the short sentences containing the vowels /i/, /ɪ/, /ɛ/ and /æ/.

The short sentences and a prompt question “*What should you say?*” were read by 3 native speakers, one woman, an American English speaker, and two men, one British English speaker and one American English speaker.

3.3. Recording

The recording was carried out in a sound proofed booth at Palacký University in Olomouc in two sessions separated by at least 24 hours. The English only condition was always separate from the other session containing Interpreting and Code-switching. Nine participants started with the English only session and eleven participants with the other session combining Interpreting and Code-switching. Because this thesis focuses on the English only condition, the methodology of the other two conditions will not be explained in detail.

The English only condition was overseen by a native speaker or a bilingual teacher at the Palacký University, and English was kept as the sole language for communication between the participant and the experimenter. The experimenter explained the nature of the task and familiarised the participant with the recording studio, the experiment itself took approximately 10 minutes to complete.

The delayed repetition task was used as to elicit 88 short sentences. The participants heard a short sentence and a prompt question “*What should you say?*”. The recorded material from the participants included the participant saying “*I should say*” followed by repeating the short sentence she heard. An example (1) is shown below to demonstrate the nature of the task.

The order in which the different speaker prompts and short sentences appeared was randomised as to not influence the participants’ pronunciation and to avoid monotony of the task.

The pace of the experiment was controlled by the experimenter who pressed play for each prompt. The prompt could be repeated at the request of the participant or if the experimenter assessed the repeated short sentence was unusable for the purpose of the study. Replaying a prompt happened most commonly when the participant did not understand the sentence or the target word clearly, or forgot to include the preceding sentence “*I should say.*”

- (1) *Prompt: “We started to beg. What should you say?”*
 Participant: “I should say: We started to beg.”

The portable digital recorder Zoom H4n was used to record the data and the participants were using circumaural headphones.

3.4. Data analysis

The data was recorded in .wav format and only the 40 short sentences including the target vowels /i/, /ɪ/, /ɛ/ and /æ/ were analysed. The data was manually annotated by the author of this thesis.

The F1 and F2 frequencies in Hertz and vowel duration in ms were extracted based on the annotated data via Praat software and a custom made script for the purposes of this study. The data was examined and the mean values of F1, F2 frequencies and vowel duration were analysed by Statistica 13.1 software. The method used was Repeated Measures ANOVA with a subsequent post hoc Tukey HSD test.

The dependent variables were the F1 and F2 mean values in Hertz and vowel duration in ms. The within subject factor tested was Vowel, where a key word representation of tested vowels (FLEECE, KIT, DRESS, TRAP) was chosen. The between subject factor tested was year of study of the participants of this study. The first year students were represented by Year of Study 1 (YOS1) and the third year students by Year of Study 3 (YOS3).

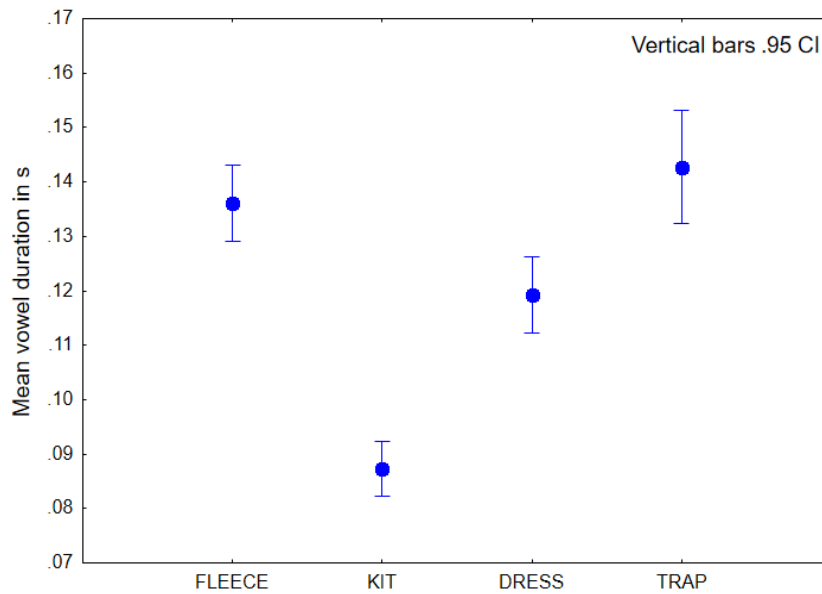
4. Results

The dependent variables, mean F1, F2 and duration, were submitted to three Repeated Measures ANOVA and tested for one within-subject factor Vowel (FLEECE, KIT, DRESS, TRAP) and two between-subject factors Year of Study (YOS1, YOS3). Where relevant a subsequent post hoc Tukey HSD (Honest Significant Difference) test was performed. Table 3 summarises all the results tested by RM ANOVA.

	FLEECE	KIT	DRESS	TRAP
Vowel duration in ms	136	87	119	143
F1 in Hz	384	467	710	743
F2 in Hz	2604	2237	2012	1971

Table 3: Shows overall mean values of vowel duration in ms, F1 and F2 in Hertz for all participants of the study.

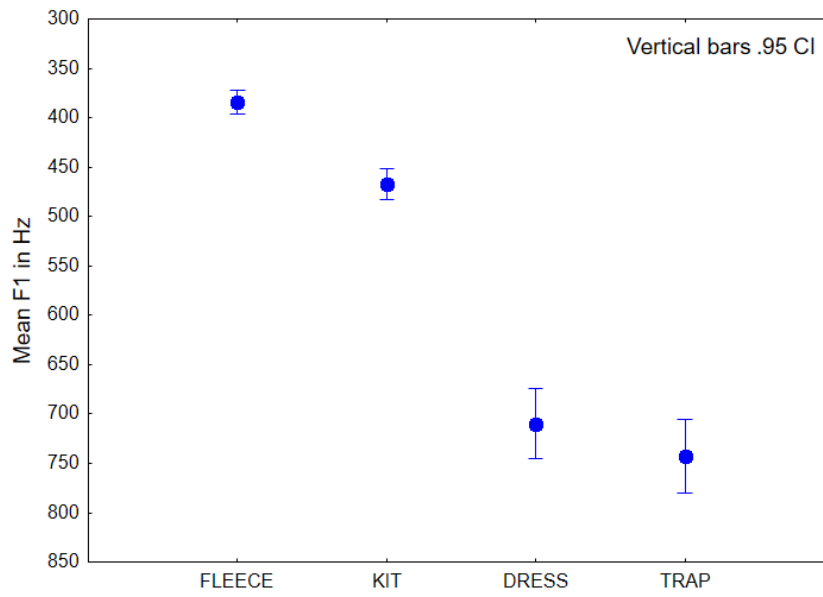
The RM ANOVA found the factor Vowel to have a significant effect on vowel duration ($F(3, 54) = 134.20, p < .001$). Graph 1 shows results of the analysis of the mean vowel duration for the selected vowels. There was no significant effect of Year of Study on vowel duration.



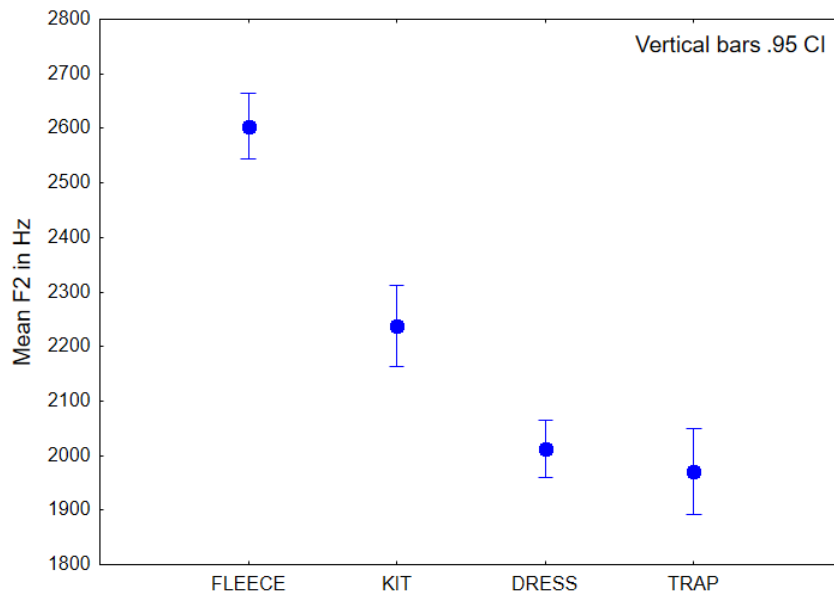
Graph 1: Shows mean vowel duration in seconds for vowels FLEECE, KIT, DRESS and TRAP.

RM ANOVA with mean F1 as the dependent variable showed a significant effect of the Vowel ($F(3, 57) = 309.14, p < .001$). Subsequent post-hoc Tukey test showed that the vowels FLEECE and KIT differed significantly ($p < .05$). The vowels DRESS and TRAP did not prove to have any significant difference ($p > .05$). RM ANOVA with mean F2 as the dependent variable showed a significant effect of the Vowel ($F(3, 54) = 243.33, p < .001$). Subsequent post-hoc Tukey test showed that the vowels FLEECE and KIT again differed significantly ($p < .05$), whereas the vowels DRESS and TRAP did not prove to have any significant difference ($p > .05$). No significant effect of the Year of Study was found for either F1 or F2. The results are presented in Graph 2 and Graph 3.

Looking further into comparing between vowels it is apparent from looking at the Graph 2 and 3 that dispersion of values is overlapping for vowels DRESS and TRAP, but not for the vowels FLEECE and KIT.



Graph 2: Shows mean F1 frequency in Hertz for vowels FLEECE, KIT, DRESS and TRAP.



Graph 3: Shows mean F2 frequency in Hertz for vowels FLEECE, KIT, DRESS and TRAP.

5. Discussion

The results show that the participants clearly distinguish between /i/ and /ɪ/ based on duration, where the mean value of /i/ is much longer compared to /ɪ/. This is in accordance with the previously stated assumption that Czech distinction in duration between the long /i:/ and short /ɪ/ is carried over to production and probably perception of the vowels /i/ and /ɪ/ in English. This is not the only distinction the participants make between the English vowels /i/ and /ɪ/. The results also show a significant difference in quality when pronouncing English /i/ and /ɪ/. The very little dispersion of values in mean F1 and F2 values also points to these two vowels occupying very distinct vowel categories.

These results do agree with the previous hypothesis where the English vowels /i/ and /ɪ/ would be perceived and produced differently due to the pre-existing spectral differences in Czech language for the vowels' equivalents. Research (Podlipský, Skarnitzl, and Volín 2009) points to the spectral differences between Czech /i/ and /ɪ/ to be mostly present in Bohemia compared to Moravia. Participants of this study did follow the prediction for Bohemians by having distinct spectral differences in their pronunciation, while also accompanied by differences in duration.

Unfortunately the biological data about the participants' place of origin was not gathered. Therefore no conclusions can be drawn based on the differences in pronunciation between speakers from Bohemia and Moravia. This is an aspect that could be addressed in further studies on the same topic.

The results are concurrent with the previous research by Flege (1987b) when considering differences between English vowels /ɛ/ and /æ/. The vowels based on the results are similar enough to prove difficult for the speakers' perception and production. The spectral F1 and F2 differences measured were minimal and point to the speakers having only one category encompassing both vowels. The non-existent significant spectral differences do not mean the speakers make no difference between the English vowels /ɛ/ and /æ/. Duration proves to be a significant factor to distinguish between these vowels, where the speakers likely

not only produce, but also perceive /æ/ as a long vowel compared to the shorter /ɛ/.

The results also showed no difference between the two groups of participants, the first year and third year students. This could be due to several reasons.

The participants were already fairly proficient in English at the beginning of their studies. Although there exists formal language instruction in the English for Translation and Interpreting programme, it is mostly focused on grammar. Preparation for the C1 language exam does not include a speaking part due to time constraints and the practice of pronunciation is not at the forefront of these courses. Even though specialised classes focusing on pronunciation and phonetics were previously proven to positively affect learners' FA (Bongaerts et al. 1997), the courses the participants took were probably not of same intensity to cause significant changes.

Another reason might lie in motivation of the participants. Although they are highly motivated professionally, their motivation might lie mostly in acquiring skills to perform well as interpreters. Therefore developing note-taking skills, split-attention and other essential particulars of the profession, together with grammar and improving their vocabulary, might take preference over pronunciation practice. Since the focus in interpreting is above all on intelligibility, if the participants are judged as intelligible and their FA as not a distraction by their interpreting teachers, they might not feel the need to actively work on improving their pronunciation.

Further research is needed to consistently predict what kind of phonetic training and in what intensity would cause significant effects on speakers' degree of FA. In the current study the courses the participants completed were not the focus of attention. A better approach to describing and mapping the contents of the special phonetic training might be a point to focus on in future research on the matter.

6. Conclusion

This thesis focused on the pronunciation of Czech student interpreters and their English pronunciation in an English-only condition. The students were divided into two groups based on the amount of training and phonetics and pronunciation courses they received throughout their studies.

The review of literature presented research and explained what foreign accent is, how and why it is present in second language learners, and discussed which factors influence the degree of foreign accent. The review continued with presenting attitudes towards non-native speakers which are often negative, and the nature of transfer and interference. An overview of typical features of Czech accented English was provided, followed by description of vowels and in particular front vowels /i/, /ɪ/, /ɛ/ in Czech and /i/, /ɪ/, /ɛ/ and /æ/ in English, with focus on their acoustic qualities.

The focus of this thesis was a study carried out on student interpreters. The aim was to obtain acoustic measurements of English /i/, /ɪ/, /ɛ/ and /æ/, particularly the vowel duration in ms, and F1 and F2 frequencies in Hertz. These measurements were statistically analysed and the results showed that the students pronounce vowels /i/ and /ɪ/ differently based on both spectral and duration qualities, whereas they do not clearly distinguish between /ɛ/ and /æ/ acoustically, but only based on duration. Evidence for any difference or improvement between first year and third year group of students was also not found.

7. Resumé

Tlumočnická profese je již odedávna velmi důležitou pro usnadnění komunikace mezi jednotlivými jazyky a kulturami. Ačkoliv se mnoho tlumočnických expertů zabývá hodnocením kvality tlumočení co se týče mluvního projevu, pozornost je soustředěna spíše na srozumitelnost a neutralitu.

Tato práce si klade za cíl nahlédnout na tlumočnický mluvní projev taktéž z pohledu výslovnosti, které se často nevěnuje tolik pozornosti. Existence cizího přízvuku u mluvčích studujících cizí jazyk je známý a zkoumaný fenomén, který se samozřejmě týká také tlumočnicků.

Cizí přízvuk a důvod pro jeho existenci je popsán v úvodu této práce. Dále se práce zaměřuje na vliv cizího přízvuku, který je často negativní, a faktory, které ovlivňují míru cizího přízvuku u mluvčích. Přehled literatury se taktéž věnuje vlivu transferu a interference na mluvní projev a jak se tyto faktory projevují v mluvě českých rodilých mluvčích. Typické znaky českého přízvuku v angličtině jsou posléze popsány na suprasegmentální a segmentální rovině s důrazem na samohláskový systém angličtiny a češtiny.

Pro potřeby této práce byly vybrány samohlásky přední /i/, /ɪ/, /ɛ/ pro češtinu a /i/, /ɪ/, /ɛ/ a /æ/ pro angličtinu. Tyto samohlásky jsou podrobněji popsány v přehledu literatury z hlediska jejich artikulace a akustických vlastností.

Důležitým aspektem této práce byla studie založená na akustické analýze vybraných anglických samohlásek /i/, /ɪ/, /ɛ/ a /æ/, zejména jejich délka v promluvě a výška prvního a druhého formantu v Hertzích. Data byla získána od studentů oboru Angličtina se zaměřením na komunitní tlumočení a překlad studujících na Univerzitě Palackého v Olomouci. Data od těchto studentů byla statisticky analyzována a taktéž porovnána mezi studenty prvního a třetího ročníku.

Výsledky analýzy ukázaly, že studenti netvoří a patrně taktéž nerozeznávají výrazný akustický rozdíl mezi samohláskami /ɛ/ a /æ/, avšak odlišují je na základě jejich délky. Naopak samohlásky /i/ a /ɪ/ jsou rozlišeny akusticky v obou formantech a taktéž délkou. Žádný rozdíl nebyl nalezen mezi dvěma určenými skupinami studentů.

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9. Appendix

Vowel	Short sentences
/ɛ/	We started to beg .
/ɛ/	They found a bed .
/ɛ/	You hurt your neck .
/ɛ/	Let's make a bet .
/æ/	I'll bring a bag .
/æ/	He wore a badge .
/æ/	They flew back .
/æ/	He lit a match .
/ɛ/	Begging for money.
/ɛ/	Beds are freshly made.
/ɛ/	Necks should be covered.
/ɛ/	Betting is great fun.
/æ/	Bags filled with money.
/æ/	Badges of honour.
/æ/	Back seats are for kids.
/æ/	Matches aren't needed.
/i/	I didn't have cheese .
/i/	We are in the lead .
/i/	You can't leave .
/i/	Let's increase the heat .
/i/	I refuse to cheat .
/i/	We invited our niece .
/i/	Cheese shops closed down.
/i/	Lead the way.
/i/	Leave it up to me.
/i/	Heat the room first.
/i/	Cheating will be punished.
/i/	Nieces can make trouble.

/ɪ/	The firm grew too big .
/ɪ/	What did you give ?
/ɪ/	Don't talk and dig .
/ɪ/	Kids don't like fish .
/ɪ/	The wood is very thick .
/ɪ/	Find a place to sit .
/ɪ/	Big boys don't cry.
/ɪ/	Give us a moment.
/ɪ/	Dig around the roots.
/ɪ/	Fish ponds are empty.
/ɪ/	Thick slices of meat.
/ɪ/	Sit on the carpet.