

Univerzita Karlova v Praze

Pedagogická fakulta

The Influence of Phonetic Literacy on the Perception Ability
of Czech Learners of English

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Studijní program: Specializace v pedagogice – Anglický jazyk a literatura

2012

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Podpis:

Rád bych na tomto místě poděkoval vedoucí práce, Mgr. Kristýně Poesové, za její pomoc při administraci testů a zejména za přípravu podkladů a výběr odborných článků. Bez její vstřícnosti a ochoty by výzkum nebyl možný a tato práce by nevznikla. Dále děkuji kolegyni Agátě Kelmanové a studentovi Matematicko-fyzikální fakulty Michalu Salajkovi za pomoc při zánášení dat a Michalovi také za jeho neocenitelnou pomoc při jejich zpracovávání.

NÁZEV:

The Influence of Phonetic Literacy on the Perception Ability of Czech Learners of English

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ABSTRAKT:

Tato bakalářská práce ve své teoretické části poskytuje na základě výběru z odborné literatury stručný přehled procesu jazykové percepce s důrazem na percepci cizích jazyků. Tato práce se rovněž pokouší stanovit pomocí percepčních testů a následné analýzy, do jaké míry jsou čeští studenti angličtiny schopni rozlišit znělost a neznělost souhlásek ve finální pozici. Konkrétně se zaměřuje na alveolární okluzívy ve finální pozici se zvláštním zřetelem na jejich percepci v minulém participiu pravidelných sloves. Dále se pokusí objasnit, zda se percepční schopnosti studentů zlepšují následkem obeznámení se se základními poznatky fonetiky a fonologie angličtiny v rámci univerzitního kurzu.

KLÍČOVÁ SLOVA:

percepce, fonetika, fonologie, osvojování cizího jazyka

TITLE:

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ABSTRACT:

This thesis is, in its theoretical part, going to give a brief outline of the process of language perception, namely, second-language perception by reviewing a selection of articles covering this field of study. The thesis will also try to establish, through perception tests and subsequent analysis, to what extent Czech learners of English are able to discriminate between voiced and unvoiced word-final consonants, namely alveolar stops in word-final position with the special focus on their perception in the past participle forms of regular verbs, and whether their perception skills will be improved as a result of their familiarization with the basic principles of phonetics and phonology of English as presented in a university course.

KEYWORDS:

speech perception, phonetics, phonology, second language acquisition

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Introduction

The purpose of this thesis is to examine the workings of the mind in terms of the process of second language (L2) acquisition with a special focus on speech perception. Specifically, we will try to establish whether knowledge of the basic concepts of English phonetics and phonology bears any influence on the ability of perceiving English words correctly within a particular phonetic environment.

Its contents should be of value to any learner of English who wants to improve their perception and pronunciation as well as to their teacher, who may find the information contained in this thesis inspirational and revelatory even from the point of view of pronunciation teaching. It has to be stressed, however, that the thesis is not primarily concerned with English language teaching (ELT) methodology, but L2 speech perception and acquisition. Particular teaching recommendations are provided in the Discussion section of the thesis.

The present author's interest in English phonetics brought him to the issue of the relationship between speech perception and production. He wanted to explore this relationship further and realized the epiphany the knowledge of phonetics provides to some of learners as to the pronunciation in general. The central question he posed to himself was: Does a phonetics course bring practical improvements to its learners and can detailed knowledge of phonetics in general positively influence one's perception and production of the language learned?

In addition, there was a linguistic problem the author was painfully aware of when listening to Czech learners of English. In phonetic terminology it is referred to as *final stop devoicing* (Yavas 1997) and is not solely confined to beginner learners. Even a Czech university lecturer absorbed in his talk was overheard by the author pronouncing "message" as /mesɪtʃ/.

If you are struggling, at this point, to understand what exactly is wrong with the pronunciation of the word in question, you are likely to appreciate this thesis the most, as you arguably suffer from the same auditory and articulatory deficiency. It appears that you and Czech speakers in general seem unable to produce voiced consonants at the end of English words and have difficulties with their perception as well. This may go in the way of communication when distinguishing between "set" and "said" or "built" and "build", for instance.

Thus, a decision was made to combine the two main aspects just mentioned and incorporate them into a thesis that would shed some light on how specifically and to what degree does the course “Fonetika a fonologie I” at the Department of English Language and Literature (KAJL) of author’s *alma mater* contribute to better perception and consequently to appropriate production of English word-final voiced consonants. However, as it is not possible to encompass both perception and production within a bachelor’s thesis, the scope of research was narrowed down to assessing the ability to perceive word-final English phonemes /t/ and /d/ and their contrasts by Czech undergraduate learners of English at the Faculty of Education of the Charles University in Prague.

The structure of the thesis is traditional i.e. the theoretical part precedes the practical part which is then followed by the discussion.

The theoretical part, subdivided into two sections, provides a brief account of the role of speech perception within the process of second language acquisition. It focuses primarily on the current theories of L2 phonology acquisition and their implications for L2 learning and teaching. The second section deals with the production of consonants, specifically with the nature of alveolar stops /t/ and /d/ in word-final position both in Czech and English phonologies. It focuses on the articulatory phenomenon of “pre-fortis clipping” (Wells n. pag.) or “shortening” (Volín “Length and Duration” 26) and its role of an acoustic cue in native English speakers.

Similarly, the practical part of the thesis contains two sections. The first section deals with the methodology of the perception test that was devised to measure the impact of phonetic and phonological theory covered in the course on the perception abilities of first year students. The second section contains a comparative analysis of the data and their interpretation within the context of L2 speech perception.

Let us now proceed with an account of the role of speech perception in first language acquisition.

Theoretical part

Speech perception in general terms

By speech perception we understand the human ability to receive the acoustic signal of speech through the faculty of hearing and analyse it as sonic representations of a given language (e.g. Crystal 356). It is a complex process the nature of which has been the subject of substantial research and whose underlying neural mechanisms are little known (Sebastián-Gallés 546). We have come to understand, nonetheless, that it is the left hemisphere of our brains that is responsible for speech reception, perception and production and that Wernicke's area, in particular, is thought to be associated with speech perception and comprehension (e.g. Yule 140).

Ultimately, language in its spoken form consists of three levels: subsegmental (the level of features, in other words characteristic properties of phones; voicing, for example, is a feature) (Crystal 186), segmental (the level of phones or, more practically, phonemes) and suprasegmental (the level of prosody comprising rhythm and intonation).

This multilayered structure of speech signal implies great complexity, so it seems natural that humans as listeners break down the input and detect only particular aspects of the acoustic signal as indications of phonemic contrasts (Sebastián-Gallés 550). In other words, they use the aspects to tell one sound from another in a language. We refer to these aspects as perceptual or acoustic cues (Podlipský 28). For instance, native speakers of American English use spectral differences, i.e. differences in quality of the two sounds, as an acoustic cue when distinguishing between /r/ and /l/ while Japanese English learners were reported by Underbakke et al. to rely on "temporal differences", i.e. differences in duration (qtd. in Sebastián-Gallés 550).

The faculty of perception enables a speaker to feed back to his linguistic box in the brain so that he or she can not only produce language, but, more importantly, understand it, which is a logical prerequisite for a speaker to be a fully-fledged participant of a communicative event. We can see a visual representation of this relationship in Figure 1.

As it is generally observed in infants, perception of speech precedes and determines L1

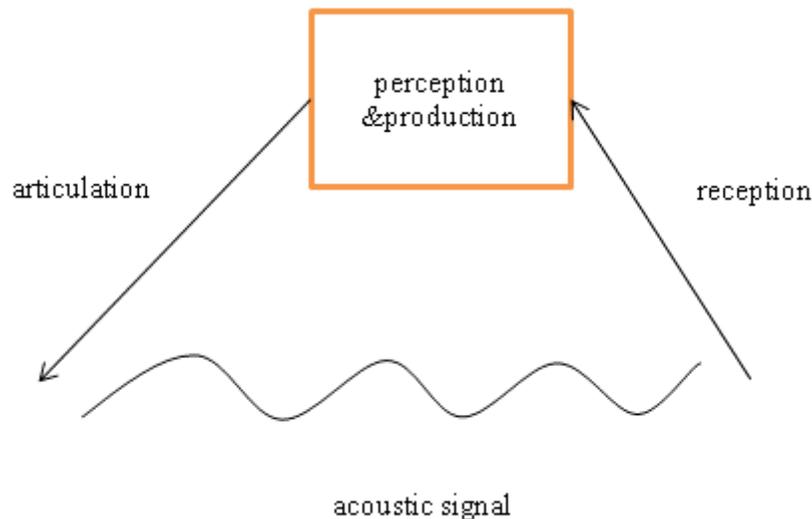


Figure 1

production together with the possibility of interaction (Yule 150) and thus constitutes one of the building blocks of L1 acquisition. According to Brown, children as young as one month can acoustically discriminate between native and non-native speech sounds (15). So it is through hearing that a child receives the sounds of its first language and by cognitive processing of this input learns to distinguish particular sound contrasts, or phonemes, that are used in that particular language to form higher linguistic units such as segments and syllables.

For example, a Japanese child will not class [ɹ] and [l] sounds as two distinct sounds of its language, but as two realizations of the single liquid phoneme /r/ that Japanese possesses (Flege, “Second Language” 235). A British child, on the other hand, will find out over time by listening to the speakers in its native environment that [ɹ] and [l] are used systematically as two contrastive sounds and will be lead to class them in its grammar as two phonemes of the English language.

This development of acquisition of phonological structure in child's grammar corresponds to a decline in perceptual sensitivity within the first year of life (Brown 15). The child starts out as a perceptual powerhouse universally able to distinguish between "all potential contrasts", but through the formation of phonological representations of its L1 becomes gradually less perceptive to non-native sounds (Brown 16). The main outcome of this development is the ability to perceive segments of the L1, which sets the stage for further acquisition of L1, but, conversely, it limits the ability to perceive new contrasts of different languages (Brown 16). In other words, the development may create a perceptual filter or sieve that selectively maps the acoustic signal onto the L1 phonemic categories, which, as many researchers have argued, may be the source of perceptual difficulties in L2 acquisition (Polivanov and Trubetzkoy qtd. in Escudero 109, Llisteri 92), (Trubetzkoy qtd. in Flege, "Second Language" 265), (Brown 16) and whose practical outcome may be the presence of foreign accent in L2 (Flege, "Second Language" 234) especially when the language is learned later in life (Flege, "Perception" 272).

The following section will deal with L2 speech perception and to an extent with L2 acquisition as a whole. We will try to understand how the process of L2 perception may be operating based on a number of phonological theories and we will also suggest some ways of reflecting the findings in teaching practice.

SLA and L2 speech perception

It follows from the previous section that speech perception plays an integral part in L1 acquisition and L2 acquisition is no different in this respect. There is, however, a great deal of difference between the two, so before we start dealing with L2 speech perception, we will have a closer look at the difference of the two processes.

First, L2 acquisition, if not acquired simultaneously with L1 as it is in the case of bilinguals, is more about learning, especially in the early stages, than actually acquiring the language even the two process are inseparable from each other in the process of L2 acquisition. Acquiring implies gaining a skill through active use (Yule 163) whereas learning is more of a "conscious process of accumulating knowledge" (Yule 163). These two processes are intertwined during L2 acquisition and should be exploited simultaneously given the importance of output, or active language use for the development of syntax and morphology (Swain qtd in Gass and Selinker 327).

But before one can even start learning another language, one has to be able to take in the stimuli of the language learned, or the input. This can be done either through writing, provided that the learner can read, or spoken word (or even gestures in sign languages), but in most cases these two information channels are combined. And as writing is embedded in language as a graphic representation of its spoken form, it is evident that the single most important condition for all-embracing L2 acquisition is the cognitive faculty of speech perception.

We can hypothesise a learner who has never heard the target language and has been learning only by consulting its written form without learning its sounds. The result would be a user of a language who may read and write perfectly, but whose speech, if at all present, will bear the phonetic and phonological marks of his or her L1 or what we may call a foreign accent. Now such a situation rarely occurs in real life. However, it is a well known fact that most learners of second language do have, if not noticeably foreign, some sort of an accent (Yule 164).

We will now turn our attention to the concept of L2 speech perception and outline its basic theoretical background before progressing to the concept of final stop devoicing connected with the practical part of the thesis.

L2 speech perception

There is no doubt that in terms of L2 acquisition it is often the level of pronunciation that falls behind the most from the desired mark of native-like competence, especially in adult learners, as opposed to other parts of the language system as, for example, syntax and morphology that can be mastered even later in life (Yule 163). It means that the learner's pronunciation diverges in some aspects, be it subsegmental (e.g. shorter aspiration in English stops /p t k/ in adult Spanish learners [Flege "Perception and Production" 274]), segmental (e.g. replacing L2 vowel qualities with L1 vowel qualities: Czech /i/ for French /y/ [Fenclová 69]) or suprasegmental, from the native norm the result of which is referred to as foreign accent.

The presence of such accent can lead to several problems the speaker may face. As Flege points out, foreign accent may go in the way of being understood by the native speakers or the native speaker may misinterpret the affective state of the non-native speaker. Furthermore, the extra effort needed to understand the non-native speaker may "provoke negative personal evaluations" in the native speaker ("Second Language" 234). The issue of "negative group stereotypes"

(“Second Language 234) is undoubtedly even more pressing (e.g. marked accent in Ukrainian learners of Czech) and may ultimately lead to discrimination and other manifestations of racism or xenophobia.

So if the authenticity of pronunciation is that important in L2 production, how can we improve it? Majority of the research in L2 phonology acquisition has shown that the ability to perceive the sounds of a target language is a necessary precondition for successful production even though evidence to the contrary has also been presented (e.g. Escudero 111; Llisterri 98). The next question follows: how can we learn to correctly perceive the sounds of a target language?

The above question is complex and requires more than a single answer. First, the fact that L2 learners possess their native language contributes to the confusion in speech perception. As we mentioned earlier, the development of L1 phonology results in a reduced ability to perceive new speech sounds. This phenomenon described by Trubetzkoy (qtd. in Fenclová 67) in his seminal work *Principles of Phonology* as a “phonological filter” that limits the beginning learner to perceive L2 sounds in terms of his or her L1 phonology.

In general terms of cross-language perception we can distinguish three kinds of perceptual illusion a listener may experience when exposed to a foreign language (Sebastián-Gallés 547):

1. Deafness – occurs when a listener cannot hear any difference between two distinct sounds of a foreign language as in Japanese speakers who often fail to make the distinction between the words “lock” and “rock”. The reason behind this illusion lies in the listener’s mapping the two sounds that are two distinct phonemes of the foreign language (here English /r/ and /l/) onto the single phonological category of his or her mother tongue (Japanese has only /r/ as a phoneme).
2. Mirage – occurs when the listener adds information not present in the signal; the example might be the epenthetic /ε/ Spanish speakers hear in English words beginning in “s” e.g. /ε'spein/ for Spain.
3. Mutation – has to do with phonotactics of a native language and causes the change of one cluster of sounds into another according to the combinatory rules of the native language e.g. the transformation of /tl/ clusters by English listeners (such a

cluster is non-existent in English) into /tr/ or /kl/ (these clusters are legal in English).

Secondly, it is important to underline the fact that the later L2 acquisition begins in life, the less likely it is for the learner that he or she will achieve native-like competence and this applies especially to speech perception (Flege “Second Language” 257). It is paradoxical, however, that adult learners, whose cognitive abilities are far above those of children, are ultimately confined to limited success in phonology acquisition. The answer for this paradox can be found in the Critical Period Hypothesis which “... states that there is a limited developmental period during which it is possible to acquire a language be it L1 or L2, to normal, native like levels. Once this window of opportunity is passed, however, the ability to learn language declines.” (Birdsong qtd. in Gass and Selinker 405). The “limited period” is thought to end by puberty (Lenneberg qtd. in Gass and Selinker 406) and is connected with brain maturation and its lateralization, or specialization, (Yule 145) which results in a loss of neural plasticity of the brain according to McLaughlin (qtd. in Flege “Assessing constraints” 2).

The question arises whether there is also a sudden drop-off in L2 acquisition ability as might be the case with L1 acquisition (cf. the case of a sensorily deprived child Genie and her failure to fully acquire L1 at the age of 13, Yule 146) or rather a linear decline in language learning ability, as some believe (e.g. Flege et al. “Age Constraints” 99), or possibly no limitation at all provided that enough appropriate input is given (e.g. Flege “Second Language” 234).

There are, however, views to the contrary, arguing that adult learners’ frequent inability to achieve native-like levels of linguistic competence in a target language is caused not solely by neural changes but, more importantly, by different conditions under which L2 acquisition takes place compared to L1 acquisition. This involves a different amount of motivation (“I already know a language, so why bother learning another one” vs. a baby who does not have an effective means of communication), incomparable difference in the amount of time and energy an adult can put in language learning compared to a child and a lack of “environmental support” be it lack of native input or simplified learner-targeted native input in the form of “foreigner talk” which facilitates ample comprehension and thus acquisition (Gass and Selinker 413).

The issue of L2 phonology acquisition is a broad one and has produced several theories that are concerned with the nature of the process of acquisition of new phonemic representations in a speaker's grammar, with the resulting interactions between L1 and L2 phonologies or with the relationship between perception and production.

Contrastive Analysis Hypothesis

One of these theories is the Contrastive Analysis Hypothesis (CAH) proposed for the first time by R. Lado in 1957 and connected with the application of the behaviourist interpretation of language (Gass and Selinker 96). Behaviourism saw language as a set of acquired habits and this view was extended to L2 acquisition: L2 was thought to be learned through adopting a new set of linguistic habits (Gass and Selinker 95). Furthermore, CAH saw languages as differing in structures that are either similar or dissimilar. It proposed the concept of transfer of language structures from the native language (NL) to the target language (TL). This meant that similar structures would be easily learned through the positive transfer, or facilitation, from NL to TL while dissimilar structures will cause difficulty to learners by the process of negative transfer, or interference, from NL to TL and that focus on these is particularly important in L2 acquisition as these structures are the cause of errors in TL production (Gass and Selinker 94).

In terms of phonology, the acquisition process should be highly predictable according to CAH. Disregarding the vague notion of "similarity", we could predict, for example, that Czech learners of American English will have no difficulty in acquiring the open-mid front unrounded vowel /ɛ/ given the corresponding formant values in both languages (Palková 173; Ladefoged 172) while the near-open front vowel /æ/ that is unique to the American phonological repertoire and thus dissimilar will arguably be a source of difficulty. This prediction holds as far as personal experience of the present author is concerned. However, not all errors have their origin in negative transfer (Corder), acquisition of dissimilar phonemes is not always problematic (Best) and, conversely, similar phonemes are not always acquired without problems (Flege) (all qtd. in Podlipský 3).

Speech Learning Model

More recent theory of James Emil Flege and his colleagues provides a more comprehensive and complex approach to L2 phonology formation. The Speech Learning Model (SLM), which “aims to account for age-related limits on the ability to produce L2 [sounds] in a native-like fashion.” (Flege “Second Language” 237) introduces an interesting hypothesis which goes against the view presented by CAH, namely, that “[the] greater the perceived distance of an L2 sound from the closest L1 sound, the more likely it is that a separate category will be established for the L2 sound.” (Flege “Second Language” 264). In other words, the similarity, or perceptual closeness, between an L1 and an L2 sound will render the creation of a new L2 phonemic category more difficult and the learner will maintain perception of the L2 sound in terms of his or her “phonological filter” or L1 phonological inventory until he or she has gained more experience (Flege “Second Language” 263). This also applies to the case of two L2 sounds the listener cannot make out as two distinct sounds (cf. perceptual deafness above). The main problem of this assumption is that it has not been proposed how to measure the “perceived phonetic distance” as Flege refers to similarity and thus it is impossible to predict which sounds will be perceived as similar and which as dissimilar.

SLM also advocates the importance of input and more specifically native input for the development of discerning abilities that could lead to the formation of an L2 phonemic category, especially in the early stages of L2 learning (Flege “Perception and Production” 273). According to Flege the formation may take place in three following steps (“Second Language” 262):

1. L2 sounds are detected as “positional allophones” of L1, or variants thereof.
2. L2 learner gains more experience of L2 sounds until he or she can discern a phonetic difference between an L2 sound and the closest L1 sound.
3. When this happens, a new phonemic representation of an L2 sound may be established in learner’s grammar.

Another important and recurring aspect in Flege’s research is the age of learning (AOL), or age when L2 learning begins, which Flege presents as one of the main factors contributing to native-like performance in both perception and production. Even though Flege is not a proponent

of the CPH, as we suggested earlier, his research shows that native Italian learners who started learning before the age of 10 exhibited native-like pronunciation of English dental fricatives and the alveolar liquid, but the pronunciation of learners who commenced learning after the age of 10 manifested a steady decline in perceived correctness (“Second Language” 256). In another study we referred to earlier (Flege et al. 99), it was found that accuracy of speech production declined linearly with rising AOL in Korean learners of English, which Flege attributes to the growing complexity of L1 phonology over time and not to the declining ability of language learning as such. The L1 phonology, he argues, interacts with the L2 system and puts constraints on its development.

There are other equally influential theories and models that shape the current research in L2 speech perception e.g. the Native Language Magnet Model or Phonological Interference Model (see Escudero for an overview), and they all conceptualize the same mechanism of “phonological filter” proposed by Trubetzkoy, which attests to the lasting legacy of the Prague School.

Final stop devoicing

Voicing

Before we start exploring the nature of final stop devoicing, we have to define what actually constitutes voicing. Voiced sound is any sound that is produced with vocal folds vibrating (Gimson 11). This is the conventional definition of this phonetic feature. Voicing can also be defined in terms of variation in supraglottal and subglottal pressure (i.e. in areas above and below the glottis). According to this view, voicing occurs when the subglottal pressure is higher. Conversely, the smaller the supraglottal area is (e.g. in velars) the greater chance there is that voicing will cease through change in pressure (Yavas “Final Stop” 273). Voicing in stops, however, is slightly more complicated. We will limit our account now to the one voiced stop that interested us in research, namely, /d/.

The above mentioned voiced alveolar stop falls into the class of obstruent consonants (stops, fricatives, affricates) whose primary acoustic characteristic is noise as opposed to sonorant consonants which are tonal in nature (vowels, approximants and voiced nasals) (Gimson 31). The production of the /d/ obstruent consists of three stages (Gimson 139):

- i. Closing stage – this stage captures the initial movement of the articulator, the tongue in the case of /d/, towards the place of articulation, the alveolar ridge, while voicing is ongoing.
- ii. Compression stage – a closure forms in the airstream and air pressure builds up; there may or may not be voicing during this stage.
- iii. Release stage – the blade of the tongue comes apart from the alveolar ridge, creating a noise element that accompanies the release of the compressed air.

As regards voicing, if stage 2 is voiced, the voicing will continue in stage 3 as well provided that it is followed by a vowel (e.g. “rider”). If stage 2 is voiceless, implying a voiceless stop, stage 3 will be voiceless before a pause (e.g. “bat” but also in “bad”), voiceless before the onset of voicing before a vowel - aspiration (e.g. “ten”), or voicing may begin at this stage if a voiceless stop is not aspirated (e.g. “stop”) (Gimson 139).

While focusing on alveolar stops, we should also mention the distinction between fortis and lenis stops. These two terms refer to the force of articulation employed, i.e. to the amount of energy exerted by the articulators and the amount of breath involved in producing a sound (Gimson 140). /d/ is lenis in nature while /t/ is fortis in nature, so the distinction could also be made as: voiced – lenis and voiceless – fortis (Gimson 141).

In English, voiced stops /b d g/ lose their voicing property, or devoice, if placed before or after a pause, i.e. word-finally (WF) or word-initially (WI) respectively. The devoicing may be partial (in WI position) in which voicing begins only “in the last portion of the compression stage” (Gimson 141), or in WF position it may be partial but more often complete which manifests itself by vocal fold vibration “finishing in the first portion of the compression stage” or by “having no voicing at all at this stage” respectively. Moreover, even if devoiced, the stops retain their lenis nature of articulation (Gimson 141).

It follows from the above text that a devoiced stop in WF position does not share the same articulatory characteristic with its voiceless counterpart. This aspect of final stop devoicing should be stressed and practiced straight from the beginning of L2 learning, highlighting the lenis

nature of a devoiced stop to prevent the occurrence of voiceless stops from L1 in place of devoiced stops.

But the most important phonetical aspect connected with the final stop devoicing is the change in quantity of the preceding vowel. As Ladefoged points out, it may not be easy for a listener to determine whether what you have just pronounced was “cap” or “cab”, especially at the end of an utterance, simply because of the devoicing and the absence of an audible release (Ladefoged 46). In such cases, native speakers rely primarily on the duration of the preceding vowel as a cue for the voicing contrast in stops (Volín “Length and Duration” 27).

Pre-fortis vowel shortening

As has been just mentioned, when devoicing occurs, the only certain phonetical indication of the voiced/voiceless contrast is preserved the preceding vowel duration. Pre-fortis shortening, or clipping, refers to the fact that in a syllable a vowel preceding a voiceless, or fortis, stop will have shorter duration than the same vowel preceding a devoiced, or lenis, stop. This shortening also applies to any sonorant in between the vowel and the fortis stop (e.g. “l” in “self” will also be clipped [Wells n. pag.]). Volín found that the pre-fortis vowels have about 60% shorter duration than their pre-lenis counterparts (28). He also observed that the shorter the vowel the smaller is the effect of pre-fortis shortening. To give an example, let us compare two sets of monosyllabic words. The words “league” and “leak” contain the same vowel /i:/. However, its duration in the former in pre-lenis position is 317 ms while in the pre-fortis position of the latter it is 136 ms (Volín “Length and Duration” 28). In other terms, the vowel duration in “leak” is approximately 43% of the duration in “league”. If we take into account the vowel /i/ in the minimal pair “bid”, “bit” and their duration of 169 ms and 125 ms respectively, we will see that while /i/ is generally considered a “shorter” vowel compared to /i:/, in some cases the duration may actually be reversed (cf. 136ms in “leak” and 169 ms in “bid”).

Pre-fortis shortening has an important role in speech other than to help distinguish voicing. Fortis stops require more energy of the articulators than lenis stops which in turn consumes more time during articulation, i.e. fortis stops are “longer”. This aspect is offset by pre-fortis vowel shortening and pre-lenis vowel lengthening the result of which lies in the similar overall

length of “bid” and “bit” even though the duration of the vowel differs considerably in these words. If the vowels were of constant duration, the syllables in which they occur would be of varying lengths and this would in turn make regular rhythm of speech more difficult to maintain (Ladefoged 47).

Czech learners and final stop devoicing

Unlike English, Czech does not allow the voicing contrast in word-final position while sharing this contrast with English in initial and medial positions (e.g. ten-den, věta-věda). Although Czech preserves the contrast in writing due to morphophonological reasons, words like “let” and “led” are pronounced equally as /let/, i.e. there is no devoicing involved, simply substitution of a potential lenis /d/ by a fortis /t/. We speak of neutralization of the voicing contrast in word-final position (Palková 263).

As Volín observes, “Czech speakers ... tend to clip all the [English] vowels as if they were all followed by fortis consonants.” (“Length and Duration” 29). He continues by saying that such speech sounds “tense” and its rhythm is “choppy”. This is not surprising given that Czech has only fortis consonants in WF position (Palková 261). It is worth noting that Czech is not alone. German, Russian and Polish also prefer voiceless stops word finally (Yavas “Final Stop” 268). And as we might suspect, such tendency for neutralization projects to L2, if the language maintains the voicing contrast as is the case of English.

To illustrate, in a study by Flege and Davidian, Polish speakers were found to have devoiced over 48% of the voiced stops /b d g/ in WF position before a pause while native English speakers did not devoice any stops (qtd. in Yavas “Final Stop” 270). In another study by Edge, native English speakers were reported to have devoiced approximately 11% of word final voiced obstruents in varying phonological contexts (before a pause, before a vowel, before a voiced consonant, before a voiceless consonant) and that these obstruents were mostly fricatives and not stops. The greatest probability for devoicing was before a pause, then before a voiceless consonant, next before a voiced consonant and the least likely it was before a vowel (qtd. in Yavas 271). It also seems that “closure voicing” in English is an important indicator of the voicing contrast in WF stops (Flege et al. qtd. in Yavas “Final Stop” 272; Raphael qtd. in Yavas “Final Stop”

278). In other words, it functions as an acoustic cue to the voicing contrast together with the vowel duration and with changes in first formant frequencies (Flege “Second Language” 261).

A further point about final stop devoicing should be mentioned. Some stops are more likely to be devoiced than others, as it appears in Yavas, depending on the place of articulation and the height of the preceding vowel (“The Effects of Vowel Height”). More specifically, a high vowel (e.g. /i/) preceding an alveolar stop or a velar stop will “accelerate” devoicing thereof. The effect is stronger before velars than before alveolars and diminishes after lower vowels (e.g. /ε/ or /æ/). This finding explains to an extent the final stop devoicing in the production of “message” by the lecturer mentioned in the Introduction.

Yavas concludes by suggesting that the phonetical environments which increase the possibility of devoicing and are thus more difficult for the learner to acquire should be included in production training as last items (Yavas “Final Stop” 276). This is to say that a textbook should be graded so as to contain first monosyllabic words with low vowels and bilabial stops in WF position (this combination is the least likely to be devoiced, e.g. “Rob”), then proceed to high vowels (e.g. “rib”) and similarly with alveolars (e.g. “bad” > “lid”) until the most difficult combination of high vowels and velar stops (e.g. “tag” > “fig”) where the devoicing is most likely due to increased supraglottal pressure.

Having outlined the relationship between Czech and English as far as final stop devoicing and pre-fortis shortening are concerned, let us now proceed to the next section where hypotheses will be formulated for the experiment.

Hypotheses and predictions

To begin with, we will assign our hypotheses separately between the two perception tests that were administered due to the different contexts and research goals for the tests. Hypotheses connected with the first administration of the test follow.

As has been mentioned in the previous sections, there is a tendency in L2 learners to perceive the target language in terms of their L1 phonetical and phonological categories. And as we

also mentioned, Czech phonological system, contrary to the English one, neutralizes the voicing contrast in stops placed word-finally. With this in mind, we propose the first hypothesis:

1. There will be a prevalence of perceived /t/ sounds relative to the overall ratio between /t/ and /d/ due to the negative transfer from Czech. In other words, participants will mark certain /d/ sounds as /t/.

As regards the test items (cf. Appendix C) and the kind of phonemes preceding the final obstruent /d/ in past participles, we propose the following:

2. There will be a higher rate of phonologically correct responses for verbs (cf. Appendix C) in which a sonorant (i.e. /m n ŋ l/ or /eɪ au i: u: ə/) precedes the WF /d/ than if a voiced obstruent does (i.e. /b g v z ʒ dʒ ð/).

Based on the positive effect of native input in the development of L2 perception as evidenced by researchers (e.g. Flege “Second Language” 259), we propose second hypothesis:

3. The more often a participant engages in conversation with a native speaker, the more native-like or phonologically correct his or her response will be.

In a similar way, we propose third hypothesis:

4. The more often a participant is exposed to English language through multimedia, the more native-like or phonologically correct his or her response will be.

Finally, we want to find out whether students benefit in terms of improved perception of word-final /t/ and /d/ from the information and training provided in the phonetics course. Given the little time (cf. the section Training in pre-fortis shortening in the Practical part) that was devoted to the concept of pre-fortis shortening and to its practical application compared to the intensity of training in Yamada et al. who proved that sufficient perception training improves both perception (by 16%) and production (607) (three 30 to 40 minute sessions a day in 15 day period), we surmise that

5. There will not be a significant (i.e. more than 5%) increase in overall performance in the second perception test.

Practical part

Experiment

Method

Stimuli

The test was devised under the supervision of Kristýna Poesová, who suggested the division into the six main phonetical categories (cf. Appendix C) and provided other useful tips that were to assure validity of the test. The selection of particular test items was guided by the intention of covering the broadest possible phonetic ground in the position before the participial ending “-ed”. The items were collected in such a way as to include words in which all English sonorants and obstruents are represented in the position preceding the WF /t/ and /d/. We excluded /t/ and /d/ as they require a following epenthetic /ɪ/ (e.g. in embedded) and would be superfluous in the test. The liquids /r/ and /j/ could not be included due to phonotactical limitations of British English. As for vowels, the selection does not comprise all possible variations found in English, but is limited only to 2 diphthongs, 2 full vowels and a reduced vowel for an even representation. Later, monosyllabic nouns were included, more specifically four pairs of them that share the same vowel or diphthong preceding WF /t/ and /d/ but vary in terms of consonants. Overall, 32 items were used for the test.

It was decided to insert the items in carrier phrases (cf. Appendix C) for the sake of natural authenticity of the items and these were formed with the intention of preventing any kind of assimilation in WF /t/ and /d/ and of having the item surrounded by words of the phrase. The use of material from carrier phrases was abandoned due to extreme difficulties with recognizing word boundaries during the isolation process and the consequent phonetic interference that rendered some of the items difficult to perceive.

The individual items in isolation and in carrier phrases were recorded using the Ableton Live recording software with a Rode NT1-A microphone, on an Apple iMac desktop computer by a female native speaker of British English with neutral accent. The recording format was stereo

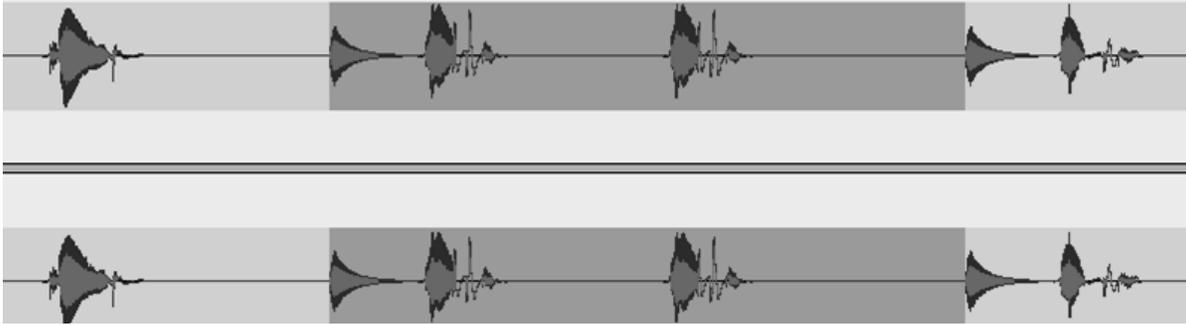


Figure 2: the highlighted segment contains the item “robbed”; the cone-like shape represents the ‘gong’ sound.

Microsoft WAV with a sample rate of 44.1 kHz and 16 bit PCM sample format (cf. Appendix D – the enclosed CD). The items produced in isolation were extracted using Audacity software. A test matrix was designed in Audacity that consisted of a modified Risset drum feature generating a ‘gong’ sound (cf. the cone-like waveform in Figure 2) envisaged as a desensitizing sound. It

Succession	Trial items	Secion 1	Section 2	Secion 3	Section 4	Control items
1	Rhett	bead	breathed	sinned	raced	called
2	cured	mate	booed	fat	plugged	loved
3		loved	banged	spade	fished	watched
4		signed	red	laughed	massaged	
5		managed	allowed	dad	frothed	
6		seat	gazed	watched	dreamed	
7		called	honoured	hopped	robbed	
8		prayed	bet	agreed	looked	

Table 1

was immediately followed by a test item, then a pause of approximately 1.2 to 1.3 seconds, the same test item and another longer pause of approximately 1.4 to 1.7 seconds during which participants were supposed to make a mark on the answer sheet. The pauses were selected arbitrarily with the objective of keeping a steady flow of words without extremely long pauses in order to promote intuitive rather than measured answers.

. These matrixes containing individual test items were stringed together (cf. Figure 1), the order subsequently randomized by the author so as to ensure even distribution of phonetic environments (cf. Table 1). The string was divided into four sections for the test. Two trial items were selected and made into a section. Three items from the four main sections were selected and grouped into a final section in order to test students' consistency.

The master test was played and rerecorded in Audacity in the same format. The duration of the recording was 2:58 seconds. Each of the five sections was saved as a separate WAV file to facilitate administration of the test. No formal acoustic analysis of the recorded material was undertaken as in Flege or Yavas due to limited human and technical resources (Flege "Second Language" 263; Yavas "The Effects of Vowel").

The test was piloted prior to administration and no serious shortcomings were found. The overall length of the test including the introduction and completion of the questionnaire was around seven minutes.

Questionnaire

A questionnaire forms part of the answer sheet (cf. Appendix A). The questions were formulated so as to collect important information about the participants that would shed some light on their performance before pre-fortis shortening of vowels was known to them.

Two main aspects that needed to be established was the age of learning (AOL) and exposure to native input. These two variables are crucial both for L2 perception and production as we suggested earlier. As for the native input, we asked about the frequency of interaction with native speakers 6 months prior to the test and about their exposure to English in the media. We also asked questions pertaining to their knowledge of phonetics, but the responses were largely negative or concerned phonetics of languages that possess neither pre-fortis shortening nor voiced contrast in WF position (German, Russian and Czech were the most frequent answers). As a consequence, the data from this question were not included in the final data analysis nor were taken into account when drawing hypotheses.

Procedure

The test was run twice in identical fashion. There was a six-week period in between the administrations of the tests during which participants received training in pre-fortis shortening and were presented with the theoretical background (cf. section Training in pre-fortis shortening).

. The tests were administered during phonetics seminar in six sessions each in one afternoon in a regular classroom using medium-sized PC speakers and a portable digital audio player. After receiving formal instructions (cf. Appendix B) and filling in the questionnaire (cf. Appendix A), the two trial items were played to accustom participants to the speed and the format of the test. The WF /t/ or /d/ detection task in the test used two-alternative forced choice as a means of gauging participants' perception of the stimuli. Participants were required to mark one of the two options after hearing an item twice before the 'gong' sounded introducing another item. After each section of eight items, a brief pause was made to ensure everyone was ready for the next section.

It is important to stress that participants were elicited to provide answers based on their impression of the final sound, i.e. what they hear and not what they should hear at the end of the word. This aspect of the test might attest to its limited validity unless a relative comparison is made of native speakers' perception. However, based on the information in Yavas that native English speakers' production contains around 11% of WF devoicing "almost" uniquely in fricatives, we can surmise that "almost" all WF /d/ sounds in our test are voiced one way or another ("Final Stop" 271).

Participants

Sixty-seven first year students of English language at the Department of the English Language and Literature, the Faculty of Education, Charles University in Prague, took part in the two tests. Mostly, they were Czech native speakers, but there were some Russian native speakers as well in the test group. However, it was judged that this fact should not influence their performance, given that Russian neutralizes voicing in WF position (Yavas, "Final Stop" 268).

Out of the 67 participants, there were 48 females and 19 males with the mean age of 21.5 years, average age of learning 12.3 (AOL) and a total of years studied 9.2 as indicated the table below. The data were collected from 64 participants as some gave irrelevant values relating to

their university studies and not to their L2 learning experience as such. These participants were excluded from the calculation.

	Age	AOL	Total of years studied
Average	21,5	12,3	9,2
Median	22	10	12

Training in pre-fortis shortening

As has been mentioned already, there was a period of six weeks between the first and second administration of the two tests. We will now have a closer look at how the training was conducted during this period.

First of all, it is important to mention that time was not on Kristýna Poesová's side. She is the lecturer in phonetics at the department and provided the participant students with theoretical background and practical skills regarding pre-fortis shortening. Out of the possible five seminar sessions there were only four that took place. In addition, the semester was comparatively short and there was a quite a bit of ground to be covered other than pre-fortis shortening. This is to underline the brevity and speed of the training.

The students dealt with pre-fortis shortening for the first time the week after the test for about 15 minutes. The rule of vowel shortening before fortis consonants in a syllable was introduced and a few examples presented (e.g. series rye, ride - write). The practice consisted of both perception and production activities (cf. Appendix E). Students listened to an exercise which contrasted minimal pair words like "cap" and "cab" in short phrases (e.g. "What's a cap? – A kind of hat.") and then repeated the exercise in pairs. This was followed again by a series of listening and speaking tasks contrasting an array of monosyllabic words (e.g. seat/seed; bus/buzz) but also words in which the voicing contrast signals different word class (e.g. advise/advice; prove/proof) (Rogerson and Gilbert 78-9). Homework was also assigned that practiced the quantitative differences in vowel before fortis and lenis consonants (Plavka 10-12) as well as ways of indicating varying vowel quantities in IPA transcription plus basic theory (Volín "IPA-Based Transcription" 70).

The following week a revision took place (cf. Appendix E) which was followed by a brief practice of the exercise from Gilbert and Rogerson.

The week after, in the third training session, about 10 minutes time was spent practicing the voicing contrasts in production and perception using an exercise from Roach (200, also Appendix E).

Two weeks later, in the fourth and final seminar that touched upon the area of changing vowel quantity in a syllable before consonants, participants were practicing the voicing contrast of WF fricatives in minimal pairs such as “teeth/teethe and “breath/breathe”.

Given that most words in training were monosyllabic nouns or verbs in infinitive forms, the positive influence on the performance remains debatable as the majority of test items included past participle forms (cf. Table 1). We will provide more points for debate in the discussion section.

Results

The data were fed into Microsoft Excel 2007 for analysis. The original responses “t” and “d” were given binary values “1” for correct “0” for incorrect based on the pronunciation in *English Pronouncing Dictionary*.

As for the hypothesis number 1, we had to omit results from categories 5 and 6 as they have no voiceless counterparts in the test. We compared category 1 and 2 (i.e. nouns ending in /t/ and /d/ respectively) and categories 3 and 4 (i.e. past participle forms of regular verbs with a voiceless or voiced obstruent before WF /t/ and /d/) (cf. Appendix C). The ideal ratio between responses in the two pairs of categories should by definition be 1 suggesting balanced correct responses on either side.

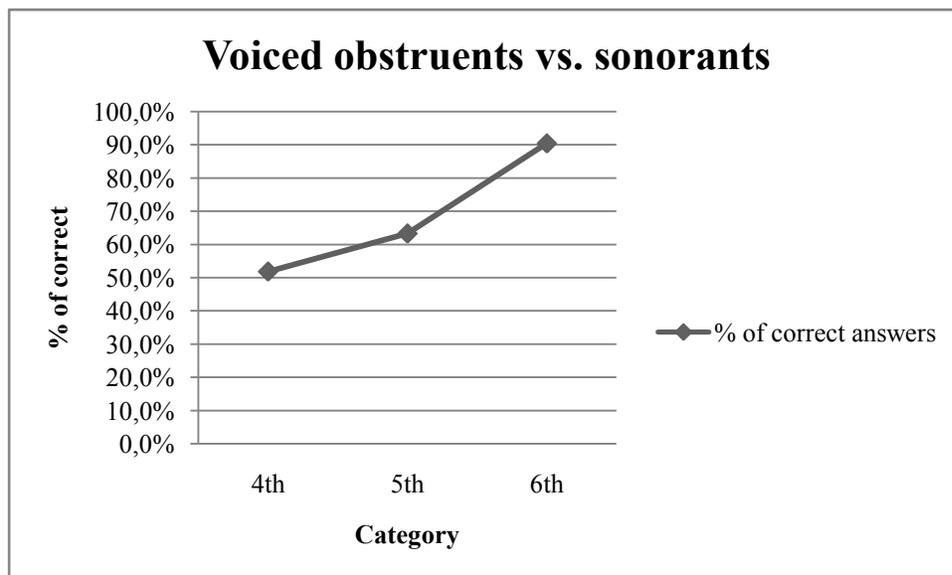
However, the ratio of correct answers between categories 1 and 2 is 1.82 suggesting a greater rate of correctness for nouns ending in /t/ than for nouns ending in /d/.

By the same token, the same ratio between categories 3 and 4 has the value of 1,26 suggesting again a greater rate of correct indications in past participles with WF /t/. The table on the following page provides further details.

Category	% of correct /t/	% of correct /d/	Ratio
1st/2nd	95,5%	52,6%	1,82
3rd/4th	65,2%	51,8%	1,26

These findings confirm our hypothesis in that Czech participants will identify certain /d/ sounds as /t/ due to the perceptual interference from L1 where WF voicing neutralization exists. What could be disputed, however, is the fact the data from Czech participants were not compared relative to native speakers' responses in the same test.

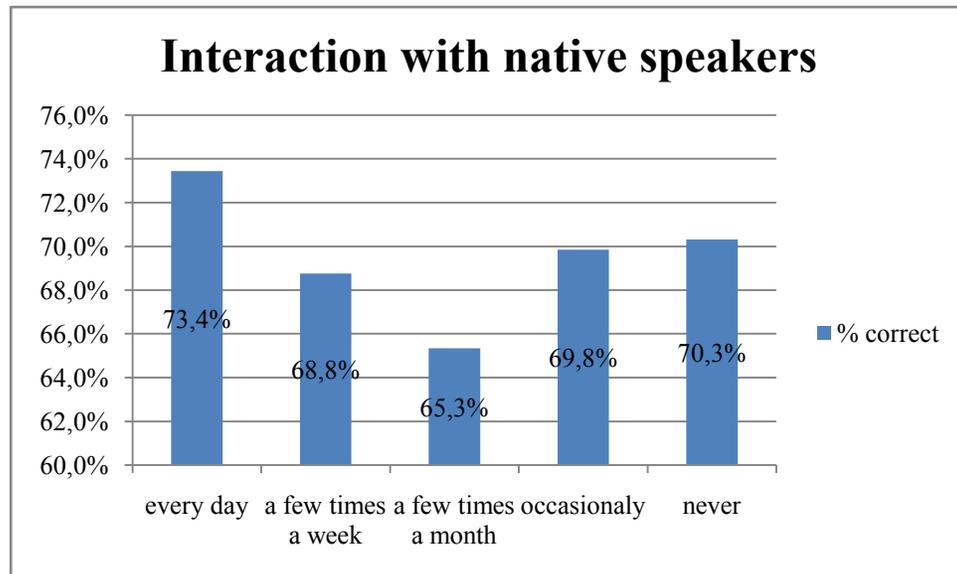
The second hypothesis claimed that there will be a higher success rate in verb forms with



sonorants before /d/ (i.e. categories 5 and 6) than in verb forms where /d/ is preceded by an obstruent. As can be clearly observed in the graph, the highest rate of correct responses was for verbs containing vowels prior to WF /d/ (category 6), followed by category five with nasals and a lateral approximant and verbs containing a voiced obstruent in the position before WF /d/ had the lowest rate of correct answers from the set.

This finding underlines the difference in acoustic properties between obstruents (noise element) and sonorants (tone element). It is evident that clusters of obstruents in (e.g. /gd/ as in “begged”) are more difficult to distinguish in syllables when they are in the coda than when the coda contains a single obstruent as in categories 5 and 6.

The assertion that the more participants interacted with native speakers, the better their



results will be was part of the third hypothesis. As can be seen from the values in the chart “Interaction with native speakers” the data are somewhat ambiguous. It might seem that there is a clear benefit from daily interaction with native speakers, however, as there is almost the same result in the group that does not interact with native English speakers at all, we cannot draw any conclusions from the data.

The reason for this ambiguity probably lies in comparing groups of divergent number of participants (cf. the table below).

Interaction with a native speaker	Quantity
every day	2
a few times a week	21
a few times a month	22
occasionally	20
never	2

Next, let us have a look at whether exposure to English by means of multimedia helps in better performance as was suggested in hypothesis number 4.

The table at the bottom right shows that students who are exposed to English regularly in the media and making up for the lack of native input in L1 environment.

English through multimedia	Quantity	% correct
>2 hrs a day	16	69.3%
<2 hrs a day	10	69.1%
a few times a week	24	67.3%
a few times a month	6	67.7%
never	0	0%

Moving to the main point of our examination, we will now see to what extent did the participants profit from the training they were given in the phonetics seminar at the faculty.

We hypothesised that there will not be a significant overall increase in phonologically correct answers in the second run of the test. The overall percentual difference between the two tests was 3.40% which is statistically insignificant. Here it is important to stress the fact that results for individual items differed greatly between the first and second run of the test and while there were significant improvements in detecting some items in some cases by more than 10 % (e.g. “bead”) there were also deteriorations for some items by more than 10 % (e.g. “love”).

average1	68,14%
average2	71,55%
difference	3,40%

Consequently, a statistical analysis using McNemar’s test was undertaken. McNemar’s test provides a measure as to what extent the results of two identical measurements are accidental. If the value p is 0.05 it means that the likelihood of an accidental result is only 5 % and we can speak of significant result and if the value is 0.01 or less the result is very significant.

McNemar’s test conducted in the case of the two perceptual tests showed that the results were not significant (p : >0.05). However, as for individual words, there were values of p : <0.05.

Descriptors	managed	dad	dreamed
L	15	18	10
H	3	7	2
P	42	6	49
N	7	36	6
chi2	6,722222222	4	4,083333333
p	0,009521892	0,0455	0,04330815

As can be seen from the table, words “managed”, “dad” and “dreamed” seem to be the only items for which our tests provided valid results. These three words exhibit the highest improvement from test to test.

Discussion

Given the results of our research, it is evident that as for the first run of the test, the results provide consequential data that correspond to some of the information provided in the theoretical part of the thesis, namely, the influence of L1 phonology on perception abilities of L2 learners with special relevance to WF voicing neutralization. The results also speak for the importance of native input.

As for the influence of phonetics on the perception abilities of the participants, we cannot provide any conclusive remarks.

Finally, as for teaching implications in perception training, numerous studies speak in favour of recreating the conditions during L1 acquisition which in practice means using some sort of “baby talk for foreigner” by using: “exaggerated acoustic cues”, “multiple instances of the same sound”, and “mass listening experience” (Escudero 128). As Yavas suggested, graded material also helps acquisition and research into the underlying phenomena behind L2 speech perception and production can contribute to this aspect immensely (Yavas “Final Stop” 276).

Works Cited

- Brown, Cynthia. "The Interrelation between Speech Perception and Phonological Acquisition from Infant to Adult." *Second language acquisition and linguistic theory*. Ed. John Archibald. Oxford: Wiley-Blackwell, 2000. 4-63. Print.
- Crystal, David. *A Dictionary of Linguistics and Phonetics*. 6th ed. Oxford: Blackwell Publishing, 2008.
- Escudero, Paola. "Second-language Phonology: The Role of Perception." *Phonology in Context*. Ed. Martha E. Pennington. Basingstoke: Palgrave Macmillan, 2007. 109-34. Print.
- Fenclová, Marie. *Fonetika francouzštiny jako lingvodidaktický problém*. Praha: Pedf UK, 2003. Print.
- Flege, James E., Grace H. Yeni-Komshian and Serena Liu. "Age constraints on Second-Language Acquisition". *Journal of Memory and Language* 41 (1999): 78-104. Pdf file.
- Flege, James E. "Assessing constraints on second-language segmental production and perception." *Phonetics and Phonology in Language Comprehension and Production, Differences and Similarities*. Ed. Antje Meyer and Niels O. Schiller. Berlin: Mouton de Gruyter, 2003. 319-55. Print.
- . "Perception and production: the relevance of phonetic input to L2 phonological learning." *Crosscurrents in Second Language Acquisition and Linguistic Theories*. Ed. T. Heubner and C. Fergusson. Philadelphia: John Benjamins, 1991. 249-89. Print.

- . "Second Language Speech Learning: Theory, Findings, and Problems. *Speech Perception and Linguistic Experience: Issues in Cross-Language Research*. Ed. Wilfred Strange. Timonium: York Press, 1995. Pdf file.
- Gass, Susan M., and Larry Selinker. *Second Language Acquisition: An Introductory Course*. 3rd ed. Routledge: New York, 2008. Pdf file.
- Gimson, A. C. and Alan Cruttenden. *Gimson's Pronunciation of English*. Rev. ed. London: Edward Arnold, 1994. Print.
- Jones, Daniel. *English Pronouncing Dictionary*. 16th ed. Ed. Peter Roach, James Hartman and Jane Setter. Cambridge: Cambridge University Press, 2003. Print.
- Ladefoged, Peter. *A Course in Phonetics*. 4th ed. Boston: Heinle & Heinle, 2001. Print.
- Llisterri, Joaquim. "Relationships between Speech Production and Speech Perception in a Second Language". *Proceedings of the XIIIth International Congress of Phonetic Sciences, 13-19 August, 1995, Stockholm, Sweden*. Ed. Kjell Elenius and Peter Branderud. Vol. 4. Stockholm: KTH / Stockholm University, 1995. 92-9. Microsoft Word document.
- Palková, Zdena. *Fonetika a fonologie češtiny*. Praha: Karolinum, 1994. Print.
- Plavka, Rudolf. *Aspects of English Pronunciation*. Praha: Fragment, 1997. Print
- Podlipský, Václav J. "Re-evaluating perceptual cues: Native and non-native perception of Czech vowel quantity." Diss. Palacký University, 2009. Pdf file.
- Roach, Peter. *English Phonetics and Phonology: A Practical Course*. 2nd ed. Cambridge: Cambridge University Press. 1991. Pdf file.

- Rogerson, Pamela and Judy B. Gilbert. *Speaking Clearly*. Cambridge: Cambridge University Press, 1990. Print.
- Sebastián-Gallés, Núria. “Cross-Language Speech Perception.” *The Handbook of Speech Perception*. Ed. David B. Pisoni and Robert E. Remez. Oxford: Blackwell Publishing, 2005. 546-66. Print.
- Volín, Jan. *IPA-Based Transcription for Czech Students of English*. Praha: Karolinum, 2003. Print
- . “Length and Duration of English Vowels.” *ATE Newsletter* 16.1 (2005): 26-30. Print.
- Wells, John C. “Syllabification and Allophony”. *Wells: Syllabification and allophony* [sic]. 11 Dec. 2002. Web. 12 June 2012.
- Yamada, A. Reiko et al. “Does training in speech perception modify speech production?” *Proceedings of the International Conference on Spoken Language Processing, 3 – 6 October 1996, Philadelphia, PA, USA*. Ed. H T Bunnell and W Idsardi. Vol. 2. Philadelphia: n.p. 606-9. Pdf file.
- Yavas, Mehmet. “Final Stop Devoicing in Interlanguage.” *First and Second Language Phonology*. Ed. Mehmet Yavas. Singular Pub Group, 1994. 267-88. Print.
- Yavas, Mehmet. “The Effects of Vowel Height and Place of Articulation in Interlanguage Final Stop Devoicing.” *IRAL - International Review of Applied Linguistics in Language Teaching* 35.2 (1997): 115-38. *Microsoft Word* document.
- Yule, George. *The Study of Language*. 3rd ed. Cambridge: Cambridge University Press, 2006. Print.

Appendix A – Answer sheet

kód:

fonetiku jsem již studovali: ano/ne

pohlaví: žena/muž

pokud ano, uveď jazyk:

studijní kombinace:

dále uveď kdy (rok) a délku studia (semestr):

délka studia AJ (v letech):

za posledních 6 měsíců konverzují v AJ s rodilými mluvčími:

věk při započeti studia AJ:

a) každý den

d) náhodně

b) několikrát týdně

e) vůbec

c) několikrát za měsíc

rádio, televizi, seriály nebo filmy sleduji v AJ:

a) více než 2 hodiny denně

c) několikrát týdně

e) vůbec

b) méně než 2 hodiny denně

d) několikrát měsíčně

pokud ano, dávám přednost: a) hudebě/zpěvu

b) mluvenému slovu

t	d

a

b

1	t	d
2		
3		
4		
5		
6		
7		
8		

9	t	d
10		
11		
12		
13		
14		
15		
16		

17	t	d
18		
19		
20		
21		
22		
23		
24		

25	t	d
26		
27		
28		
29		
30		
31		
32		

33	t	d
34		
35		

Appendix B – Instructions

- △ tento test je zaměřen na percepci fonémů /t/ a /d/ v koncové pozici slov
- △ test je zcela anonymní
- △ je rozdělen do šesti sekcí:
 - 1. sekce slouží k procvičení a osvojení
 - sekce 2 až 6 obsahují otázky vlastního testu
 - každá sekce obsahuje 8 slov, každému slovu předchází zvuk gongu, následně slovo zazní vždy dvakrát po sobě a následuje další gong a slovo atd
 - v poslední sekci jsou pouze tři slova
- △ záznamový arch je rovněž rozdělen do stejného počtu sekcí

Pokyny

- △ podepište košilku a napište na ni kód svého testu (kód naleznete vlevo nahoře na záznamovém archu)
- △ vyplňte prosím krátký dotazník
- △ během testu označujte (křížek, háček, čárka...jakkoliv) odpovědi do čtverců tabulky t nebo d **podle toho, co slyšíte a ne co byste slyšet měli**, jde čistě o vaše vnímání koncových fonémů těchto slov
- △ tempo je svižné a vyžaduje rychlé odpovědi
- △ odpovídejte tedy pokud možno intuitivně
- △ po skončení každé sekce bude několik vteřin pauza, až budou všichni připraveni pokračovat, spustí se další sekce
- △ SVÉ ODPOVĚDI ZPĚTNĚ NEOPRAVUJTE

Appendix C – Test items including carrier phrases

- △ 1. category – nouns ending in /t/
 1. **mate** My mate Colin is ill.
 2. **bet** My bet killed the race.
 3. **seat** This seat corrupts.
 4. **fat** The fat can't.
 5. **Rhett** I saw Rhett coming. – TRIAL ITEM
- △ 2. category – nouns ending in /d/
 6. **spade** Our spade glared.
 7. **red** I see red glow.
 8. **bead** My bead glistens.
 9. **dad** John's dad goes to the theatre.
- △ 3. category – past participles with voiceless obstruents preceding /t/ (p f k s ʃ tʃ θ)
 1. **hopped** I hopped conspicuously.
 2. **laughed** I laughed crazily.
 3. **looked** I looked clean.
 4. **raced** I raced keenly.
 5. **fished** Joe fished cotton.
 6. **watched** I watched closely.
 7. **frothed** He frothed constantly.
- △ 4. category – past participles with voiced obstruents preceding /d/ (b g v z ʒ dʒ ð)
 1. **robbed** I robbed gravely.
 2. **plugged** Eve plugged great plugs.
 3. **loved** I loved greedily.
 4. **gazed** My sister gazed gaily.
 5. **massaged** I massaged girls.
 6. **managed** Your pal managed gladly.
 7. **breathed** I breathed guiltily.
- △ 5. category – past participles with sonorants preceding /d/ (m 2xn ŋ l)
 1. **dreamed** I dreamed gaily.
 2. **signed** My father signed guess lists.
 3. **banged** Sheila banged geezers.
 4. **called** I called granny.
 5. **sinned** I sinned greatly.
- △ 6. category – past participles with vowels preceding /d/ (eɪ au i: u: ə)
 1. **prayed** We prayed 'God save us.'
 2. **allowed** I allowed geese to my room.
 3. **agreed** The council agreed gladly.
 4. **booed** I got booed going for the prize.
 5. **honoured** I honoured gracefulness.
 6. **cured** I cured granny. – TRIAL ITEM

Appendix D – CD attachment

Please find attached inside the back cover of the thesis.

The contents:

Perception test.zip – contains WAV files used in the test

Appendix E – Training materials

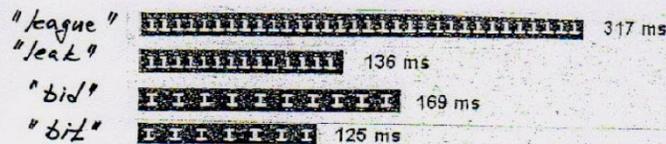
Length and duration of English vowels

- most Czech vowels differ in their length; English vowels differ primarily in their colour (quality, timbre) eg /ɪ, iː/
 - ! pre-fortis shortening of vowels! → any of the 20 English vowels is pronounced shorter if it is followed by a fortis consonant in the same syllable and longer if it is not
 - fortis consonants: /p, t, k, f, θ, s, ʃ, tʃ/
- tie, tied – tight rye, ride – write why, wide – white bat - bad

ex. 1 An *authentic* picture was provided by Rob.

/ɔː/ 130 ms /ɒ/ 250 ms

ex. 2



Long vowels – quantitative difference (but the same quality)

/iː/	bee, bead – beat	fee, feed – feet	see, seed – seat	lea, leave – leaf
/ɑː/	are, arm – art	bar, bard – bark	car, card – cart	star, starred – start
/ɔː/	bore, board – bought	core, cord – court	saw, sword – sort	
/uː/	lieu, lose – loose	too, tool – tooth	you, use (v.) – use(n.)	
/ɜː/	bur, bird – birth	burr, burn – burnt	fir, furred – first	

Short vowels – quantitative difference (but the same quality)

/ɪ/	bid – bit	hid – hit	lid – lit	ridge – rich
/e/	bed – bet	edge – etch	led – let	said – set
/æ/	bag – back	bad – bat	cab – cap	mad – mat
/ʌ/	buzz – bus	bud – but	cud – cut	dug – duck
/ɒ/	dog – dock	log – lock	nod – not	pod – pot
/ʊ/	bull – book	full – foot	hood – hook	pull – put
/ə/	about, agree, alive	balloon, contain, forget	breakfast, cupboard, pilot	
	better, collar, doctor, measure	Canada, sofa, data, phenomena, visa		

Qualitative difference (but almost the same quantity)

/iː/ – /ɪ/	beat – bid	heat – hid	peak – pig	leaf – live
/e/ – /æ/	bed – bad	beg – bag	bet – bat	letter – latter
/ɑː/ – /ʌ/	bark – bug	carp – cub	laugh – love	mark – mug
/ɔː/ – /ɒ/	court – cod	nought – nod	port – pod	sort – sod
/uː/ – /ʊ/	hoot – hood	shoot – should		
/ɜː/ – /ɜː/	burn – born	fur – four	shirt – short	work – walk
/ɜː/ – /ɑː/	burn – barn	firm – farm	fur – far	heard – hard
/ɜː/ – /ɑː/	born – barn	four – far	form – farm	tor – tar
/ə/ – /ɪ/	accept – except	affect – effect	dancers – dances	

oka, R. (1997) Aspects of English Pronunciation. Fragment.

in, J. (2005) Length and Duration of English Vowels. In: ATE Newsletter.

Teaching material used in the 1st seminar out of 4 that practiced pre-fortis shortening.

The theoretical part was taken from Volín ("Length and Duration" 28). The exercises were assigned for homework and come from Plavka (10-12).

Exercises used in the 1st and 2nd seminar for practicing perception and production. The left half including the exercise in the top-right corner were used to practice perception and production (from Gilbert and Rogerson 78-9).

1 Listen to the following pairs of words and practise the contrast

<i>Shorter vowel</i>	<i>Longer vowel</i>
<i>Unvoiced final consonant</i>	<i>Voiced final consonant</i>
safe	save
leaf	leave
ice	eyes
peace	peas
bus	buzz
back	bag
cap	cab
seat	seed
batch	badge
rich	ridge

2 Listen to the recorded groups of words and pick out the word which sounds different in each group of four.

Example: fees feed feed feed

This contrast between long and short syllables and between voiced and unvoiced final consonants can also help distinguish the different grammatical function of words which are similar.

1 Listen to the following pairs of words and practise the contrast.

<i>Voiced</i>	<i>Unvoiced</i>
<i>Longer syllable</i>	<i>Shorter syllable</i>
use (verb)	use (noun)
excuse (verb)	excuse (noun)
advise (verb)	advice (noun)
prove (verb)	proof (noun)
lose (verb)	loose (adjective)
close (verb)	close (adjective)

2 Now listen and write the word you hear in the correct column. The first one is an example.

	<i>Verb</i>	<i>Noun</i>	<i>Adjective</i>
1	Advise
2
3
4
5

C 

Listen to the recorded statements and choose the appropriate reply. Put a cross by it.

- 1 Reply: a) Call a doctor.
- b) Call a waiter.
- 2 Reply: a) It's only a fly.
- b) I think it's just a car.
- 3 Reply: a) No, I'm not leaving yet.
- b) No, mine is brown and checked.
- 4 Reply: a) What! Every week?
- b) Did she like them?

<i>Longer vowel</i>	<i>Shorter vowel</i>
her	heard
lay	laid
pea	peas
rye	rise
fee	feed
sir	surge
	hurt
	late
	peace
	rice
	feet
	search

Pair practice **VOWEL LENGTH**

- 1. a. What's a cap? - A kind of a hat.
- b. What's a cab? - A taxi.
- 2. a. What's a buck? - A dollar.
- b. What's a bug? - An insect.
- 3. a. What's a seat? - Something to sit on.
- b. What's a seed? - Something to plant.
- 4. a. How do you spell "tight"? - T, I, G, H, T
- b. How do you spell "tide"? - T, I, D, E
- 5. a. What does "wrote" mean? - The past of "write".
- b. What does "rode" mean? - The past of "ride".
- 6. a. What's a rope for? - To tie up something.
- b. What's a robe for? - To keep you warm.
- 7. a. What does "bright" mean? - The opposite of dark.
- b. What does "bride" mean? - A woman getting mar

A bearded mountaineer **/ɪə/**

(Mr and Mrs Lear are on holiday in Austria.)

Mr Lear: *Let's have a beer here, dear.*

Mrs Lear: *What a good idea! They have very good beer here. We came here last year.*

Mr Lear: *The atmosphere here is very clear.*

Mrs Lear: *And it's windier than last year.*

Mr Lear: (speaking to the waiter) *Two beers, please.*

Mrs Lear: *Look, dear! Look at that mountaineer drinking beer.*

Mr Lear: *His beard is in his beer.*

Mrs Lear: *His beard has nearly disappeared into his beer!*

Mr Lear: *Sh, dear! He might hear.*

Waiter: (bringing the beer) *Here you are, sir. Two beers.*

Mr Lear: (drinking his beer) *Cheers, dear!*

Mrs Lear: *Cheers! Here's to the bearded mountaineer!*

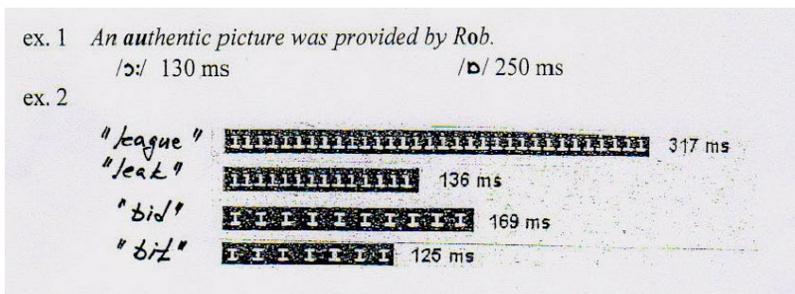
The bear chant **/eə/**

- 1 Run! There's a bear! Run! There's a bear!
- 2 Where? Where's the bear? Where? Where's the bear?
- 1 Over there!
- 2 Where?
- 1 Over there!
- 2 Where?
- 1 Over there! On a chair! Over there! On a chair!
- 2 Where? Where's the chair?
- 1 Near the square! Over there near the square!



Slides from a presentation on pre-fortis shortening used during the 2nd seminar out of 4 – the revision.

- any of the 20 English _____ is pronounced _____ if it is followed by a _____ consonant in the same syllable and longer if it is not.
- fortis consonants are strong; they force preceding vowels to get shorter e.g. *phase x face*;
log x lock; *ridge x rich*
 - native English speakers rely primarily on the colours (quality) of vowels
- the main role of pre-fortis shortening → **to signal the following consonant** (the difference between word-final /t, d, s, z.../ is small; /d, z.../ are devoiced → vowels help with the distinction)
 - [feɪz̥] x [feɪs]
 - [lɒg] x [lɒk]
 - [rɪdʒ] x [rɪtʃ]



- **What is pre-fortis shortening stopped by?**
- by morphemic boundaries: *day one*, *day two*; *play time* x *plating* [ˈpleɪt.ɪŋ] → an intervocallic consonant belongs to the syllable with the strongest stress: *letter* [lɛt.ə]
- **Describe the length of /ɪ/ in *built* and *build*.**
- fortis consonants affect preceding sonorants /m, n, l/ too; their shortening is not marked [bɪlt]

Exercises used in the 3rd seminar out of 4 that practiced pre-fortis shortening. The exercise “Identification of final plosives” comes from Roach (200).

English plosives /p, b, t, d, k, g/

♫ **initial fortis plosives** (aspirated): paw, tea, car, pie, toe, care, two, key, tar, pay

♫ **initial lenis plosives** (devoiced): bee, door, go, bear, do, gear, boy, dear, bough, day

♫ **initial /sp, st, sk/ clusters** (unaspirated): spy, store, ski, spare, steer, score, spear, stay, sky

♫ **repetition of final plosives** (fortis followed by lenis):

mate – made, rope – robe, leak – league, cart – card, back – bag

♫ **repetition of final plosives** (lenis followed by fortis):

code – coat, bid – bit, lobe – lope, heard – hurt, brogue – broke

♫ **identification of final plosives:**

You will hear the twenty words of Exercise 2. Each will be one of a pair. You must choose whether the word is the one ending with a fortis plosive or the one ending with a lenis plosive; when you hear the word, say “fortis” if you heard the word on the left, or “lenis” if you heard the word on the right. You will then hear the correct answer and the word will be said again for you to repeat.

Example: ‘coat’

Fortis	Lenis	Fortis	Lenis
coat kəʊt	code kəʊd	mate meɪt	made meɪd
leak li:k	league li:g	coat kəʊt	code kəʊd
hurt hɜ:t	heard hɜ:d	leak li:k	league li:g
bit bɪt	bid bɪd	rope rəʊp	robe rəʊb
mate meɪt	made meɪd	hurt hɜ:t	heard hɜ:d
lopeləʊp	lobeləʊb	brokebrəʊk	broguebrəʊg
back bæ:k	bag bæ:g	lopeləʊp	lobeləʊb
cart kɑ:t	card kɑ:d	bit bɪt	bid bɪd
brokebrəʊk	broguebrəʊg	back bæ:k	bag bæ:g
rope rəʊp	robe rəʊb	cart kɑ:t	card kɑ:d

Silent letters

Listen. In one word in each group, the ‘b’ or ‘p’ is not pronounced.

EXAMPLE double doubt Dublin

- | | |
|----------------------|-------------------------------|
| 1 lamb label lab | 5 recipe repeat receipt |
| 2 crab robbed climb | 6 possibly psychology special |
| 3 cup cupboard copy | 7 Cambridge combine combing |
| 4 photo potato paper | |

Minimal pairs

Directions: Circle the picture of the word you hear.

Answers: 1. pear/bear; 2. peach/beach; 3. pole/bow; 4. tear/dear; 5. time/dime; 6. coat/goat; 7. card/guard; 8. curl/girl

Figure 3.12 Minimal-pair listening discrimination with pictures

Celeste-Hurcic et al. (2010) Teaching Pronunciation . CUP.

