

CHARLES UNIVERSITY IN PRAGUE

FACULTY OF EDUCATION

Department of English Language and Literature

Bachelor Thesis

The Influence of Second Language in the Third Language

Acquisition of Voice Onset Time

Prague 2014

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I hereby declare that this bachelor thesis is completely my own work and that no other sources were used in the preparation of the thesis than those listed on the works cited page.

Prague, June 2014

Acknowledgements

I would like to thank my supervisor Mgr. Kristýna Poesová, Ph.D., for her advice and comments and, in particular, for helping me with the choice of the topic and teaching me how to work in Praat programme. Furthermore, I would like to thank the employees of Gymnázium Říčany for allowing me to carry out the experiment with their students.

Abstract

The aim of this bachelor thesis is to find out if the knowledge of L2 influences language acquisition of L3, specifically while producing voiceless plosives /p, t, k/. The theoretical part focuses on the description of second and third language acquisition, its motivation and it introduces some important research projects carried out in this area. Further, it explores the notions of cross-linguistic influence, plosives, voice onset time and aspiration. The research presented in the practical part was inspired by the experiment conducted by a Polish phonetician Magdalena Wrembel in 2011. It investigates the degree of aspiration of voiceless plosives in stressed onset positions. A group of high school students with L1 Czech, L2 English and L3 German took part in this experiment. The results of the research do not suggest any influence between L2 and L3 in the examined area.

Key words:

Third language acquisition, cross-linguistic influence, aspiration, voice onset time, plosives.

Anotace

Cílem této bakalářské práce je zjistit, jaký vliv má znalost druhého cizího jazyka (J2) v procesu osvojování třetího cizího jazyka (J3), a to konkrétně při produkci neznělých exploziv. Teoretická část se věnuje popisu osvojování druhého a třetího jazyka a zmiňuje některé důležité výzkumy z této oblasti. Dále vysvětluje pojmy mezijazyčný vliv, explozivy, nástup hlasivkového tónu a aspirace. Praktická část byla inspirována experimentem provedeným polskou fonetičkou Magdalenou Wrembel v roce 2011. Zkoumá míru aspirace u neznělých exploziv v přízvukně iniciální pozici a byl proveden na skupině středoškolských studentů s J1 češtinou, J2 angličtinou a J3 němčinou. Výsledky výzkumu neukázaly vliv mezi J2 a J3 ve zkoumané oblasti.

Klíčová slova:

Osvojování třetího jazyka, mezijazyčný vliv, aspirace, nástup hlasivkového tónu, explozivy.

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1 Introduction

The need for learning foreign languages in a modern society is constantly growing. The possibilities to work and study abroad and the close cooperation between various states represent the main reason for constant improvement in our language skills. In today's globalised world it is not surprising to find a large number of people who can speak one or more foreign languages. Bilingualism and multilingualism can be thus viewed as an underlying feature of European citizenship and language education plays an essential role in this interconnected world.

The process of learning foreign languages together with second (SLA) and third language acquisition (TLA) are thus becoming important issues in the field of linguistic research. SLA has been more deeply explored than TLA which is now widely discussed among linguists thanks to the growing number of multilingual speakers. TLA scholars focus predominantly on research in the area of lexicology or morpho-syntax. Cross-linguistic influence, language typology and L2 status are some of the phenomena which are explored by most authors who are going to be cited in this thesis, for example Björn Hammarberg, Raquel Llama and Jasone Cenoz. Third language phonology has not received much attention among researchers although it plays a significant role within TLA. The research conducted in the practical part of this thesis might serve as a humble contribution to this linguistic field.

In connection with SLA, TLA and cross-linguistic influence (CLI), the thesis operates with the notions of 'first language' (L1), 'second language' (L2) and 'third language' (L3). Their brief explanation is given here in order to secure their clear understanding throughout the work. The definitions are borrowed from Björn Hammarberg's *Processes in Third Language Acquisition* (Hammarberg 6). L1 is any language acquired during infancy. L2 is any language encountered and acquired after infancy. L3 is used for a non-native language which is currently being used or acquired in a situation where the person already has knowledge of one or more L2s besides one or more L1s.

This thesis aims at investigating the influence of second language (L2) in the process of third language acquisition. The examined phenomenon is voice onset time (VOT) which perceptually corresponds to aspiration. While Czech contains unaspirated plosives, the sound systems of English and German have voiceless plosives with various degrees of aspiration. The area of aspiration together with the latest research findings on TLA are presented in the theoretical part. Furthermore, it explains second and third language acquisition, the role of L2 in TLA and its motivation, cross-linguistic influence and factors influencing it and last but not least, it gives an overview of plosives, aspiration and VOT. The experiment carried out in the practical part was inspired by Magdalena Wrembel's research called *Cross-linguistic Influence in Third Language Acquisition of Voice Onset Time* from 2011. She investigated the sources of cross-linguistic influence in the acquisition of VOT pattern in L3 phonology. There were 32 participants of L1 Polish, L2 English and L3 French who were recorded reading lists of words in carrier phrases in the three respective languages. The recordings were analysed in order to explore the degree of aspiration of voiceless plosives in stressed onset positions. The results revealed 'interlanguage VOT patterns, including compromise values for L3 VOT that could be attributed to a combined influence of L1 and L2, thus substantiating the existence of both native and non-native cross-linguistic influence in L3 phonology' (Wrembel 2157). In our research L1 is Czech, L2 English, L3 German and the main research question is whether we can detect any transfer from L2 English onto L3 German while producing voiceless plosives /p, t, k/.

2 **Third Language Acquisition**

Second language acquisition (SLA) is an important phenomenon which needs to be described and explained before talking about third language acquisition. 'SLA is the study of how second languages are learned' (Gass and Selinker 1). This definition is very simple and broad and it covers different matters, such as what is learned and what is not, why learners do not usually achieve the same results in learning and level etc. SLA is thus connected with different fields of study like language teaching, linguistics, psychology etc. It is important that 'SLA refers to the learning of a nonnative language after the learning of the native language' (Gass and Selinker 7).

It attempts to understand the processes associated with second language learning. Such processes are not only learning grammar, but they also include the usage of lexicology, morphology and development of listening and reading skills.

Third language acquisition (TLA) is commonly understood as an area of research which goes beyond second language acquisition (SLA). Different authors have different approaches to TLA. Gass and Selinker (21) say: 'SLA often incorporates many different types of acquisition, including third, fourth and so on...'. However, the role of third language acquisition is becoming more prominent. There are many reasons for constant education in languages in a modern society and thus many people are able to speak three or more languages. According to Hammarberg in *Processes in Third Language Acquisition* (17), such factors are: an increase in travelling and working abroad, greater focus on languages in education, greater exposure to other languages through the media, and so on.

Hammarberg (18) mentions the relative roles of L1 and L2 in influencing the acquisition of L3 which appear to depend on a complex set of interacting factors. He states some of such determinants, based on findings reported in Stedje (1977) and Ringbom (1987). Firstly, it is the degree of similarity between the languages concerned. L2 is seen to exert stronger influence on the acquisition of L3 if it is closer

to L3 than if it is more distant. Also, if L2 is more similar to L3 than to L1, the relative role of L2 tends to be stronger. Secondly, level of competence in L2 plays an important role. The greater and more current the knowledge of L2, the stronger its influence on the acquisition of L3. The third factor is natural setting for L2, and automatised skills in L2. In addition to the amount of L2 knowledge, it seems that L2 influence on L3 is furthered if L2 has been acquired in a natural environment, rather than a foreign language learning environment. The automatised use of L2 was identified as a furthering factor. The fourth factor relates to oral versus written production. As suggested by Stedje (1977: 154) and Ringbom (1987: 128), limited control in speech situations causes cross-linguistic influence to occur more often in speech than in writing. Lastly, the type of language phenomenon is mentioned. 'Generally the cross-linguistic influence between non-native languages in a European context has been shown to occur primarily in lexis' (Ringbom 1987: 117).

2.1 Motivation

Hammarberg in *Processes in Third Language Acquisition* (1-2) states, that in the past, it was mostly SLA that scholars focused on because L1 was the only background language to which attention was paid. But in the last few years the awareness of the importance of TLA has been growing. In other words, the learners are differentiated according to the complexity of their linguistic background. Cenoz, Hufeisen and Jessner (*Cross-linguistic Influence in Third language Acquisition: Psycholinguistic Perspectives* 1) add that the interest in TLA has sociolinguistic and psycholinguistic foundations. Hammarberg (2-4) distinguishes practical, theoretical and empirical motives for the interest in L3 acquisition.

Practical motives. The role of English and other languages as a *lingua franca* in Europe is still increasing thank to the possibility to travel and work abroad moving between countries and international contacts. This issue arises many educational questions, for example how to devise language instruction for minority and immigrant students, how to understand and analyse their learning problems, and how to design

adequate teacher education for these purposes. The need to approach language teaching from a wider perspective than the traditional model of target language instructions for a homogenous group of monolingual speakers has become gradually more apparent.

Theoretical motives. The fundamental theoretical aspect of the study of L3 competence, use and acquisition is the insight that *humans are potentially multilingual by nature* and that *multilingualism is the normal state of linguistic competence*. It has been assumed that bi- or multilingualism is at least as frequent in the population of the world as pure monolingualism, probably even more frequent. Although this is difficult to claim with any precision, several authors make it in the literature on bilingualism (e.g. Grosjean 1982). Mackey (1967) gives some relevant support for such an assumption by discussing the reasons why individual bilingualism (including multilingualism) is bound to be a very common situation in the world. He points to the multitude of small linguistic communities, the wide currency and usefulness of the national and international languages and people's increasing mobility across language borders. Aronin and Singleton (2008) state that multilingualism in the present era of globalisation has reached great significance in society, to the point that it can be characterised as a new linguistic disposition.

Empirical motives. If we are to study speakers' complex language competence and use, including how languages develop and attrite in the speaker's mind and interact in the performance processes, we will obviously get a more complete picture if we adopt a multilingual rather than a bilingual perspective. We will simply be able to see more and pose more questions. For example, in studying how the speaker's languages interact in the speaking process and in interlanguage development, we may examine which languages take part in the process, to what extent and why, if the speaker's L1 has a privileged role (as implicitly assumed in most studies of cross-linguistic influence in the past), if on the other hand, there is a particular reliance on prior L2 knowledge ('an L2 status effect'), and so forth. Also the cognitive abilities, such as metalinguistic awareness, linguistic creativity, communicative and acquisitional strategies and so on, are bound to be more extensively researchable in a multilingual than in a bilingual setting.

2.2 Third language acquisition research

The research conducted on TLA is quite rich and mostly focused on cross-linguistic influence, processes in TLA, language typology, L2 status and phonology. Several important contributions have been brought to this area in past years. As Cenoz, Hufeisen and Jessner (1-2) state in the book *Cross-linguistic Influence in Third Language Acquisition: Psycholinguistic Perspectives*, one of the first contributions was a research project conducted by Ringbom (1987), who analysed the influence of Finnish and Swedish on the acquisition of English as a third language.

Another significant contribution is more recent research, which is a longitudinal case study by Hammarberg (Hammarberg 17-27). It deals with TLA of a learner with L1 English, L2 German and L3 Swedish. Hammarberg observed different aspects of TLA such as pronunciation, lexicon and morphology. The project concentrated on oral production and the examined material consisted mainly of free coherent speech. There proved to occur L2 phonological influence on L3 in initial stage of learning which, however, gradually became weaker. The interesting thing is that the participant had theoretical and basic knowledge of Italian which proved to function as a source of L2 influence on L3.

Wrembel explored in her study *The Impact of a Previously Learnt Foreign Language on L3 Phonological Acquisition* the phenomenon of a 'foreign language effect', which is the impact of previously learnt foreign language(s) on the phonetic performance in L3. The paper tested the hypothesis that 'L2 outweighs the transfer from L1 at the initial stage of L3 acquisition leading to L2 accented speech, however, this interference diminishes with the increase of L3 proficiency and gradual approximation to target norms' (Wrembel). This hypothesis and also the results match the finding of the previously mentioned research conducted by Hammarberg. The material for this research project consisted of 240 recordings of 60 Polish native speakers with L2 German and L3 Polish. Another Wrembel's research project was called *Cross-linguistic Influence in Third Language Acquisition of Voice Onset Time*

and serves as the main source of inspiration for the practical part of this thesis. Its details are described in the general introduction and introduction to the practical part.

2.3 Cross-linguistic influence

By the term ‘cross-linguistic influence’ (CLI) is meant the effect that previously learnt languages can have on the learning of a new language. ‘The study of CLI in TLA is potentially more complex than the study of cross-linguistic influence in SLA because it implicates all the processes associated with SLA as well as unique and potentially more complex relationships that can take place among the languages known or being acquired by the learner’ (Cenoz, Hufeisen and Jessner 8) However, the processes in TLA may be very similar to those used by L2 learners.

‘CLI in third or additional language acquisition from a non-native language is a well-documented phenomenon especially in the area of lexis (e. g. Cenoz 2001, Hammarberg 2001) and morphosyntax (e. g. Gibson, Hufeisen and Libben 2001, Bardel 2006)’ (Wunder). Only very few studies with regard to non-native CLI on the acquisition of an L3 phonological system, have been conducted so far (e.g. Hammarberg and Williams 1993, Wrembel 2009).

2.3.1 Factors in cross-linguistic influence

Cenoz (8-9) elaborates on the conditions in which CLI takes place. These conditions are determined by several factors, such as linguistic typology, L2 status, age, recency and others. These factors are taken into account in the practical part of this thesis.

Linguistic typology. Linguistic typology was proved to be influential in the choice of the source of language. Speakers are influenced by the language which is typologically closer to the target language or the language which is perceived as typologically closer. For instance, influence from L2 is favoured if L2 is typologically close to L3, especially if L1 is more distant. This effect has been proved in several

studies as so called ‘factor of typological similarity’ (Cenoz, Hufeisen and Jessner 22). Such cases can be found with non-Europeans who acquire their second European language, e.g. a Hindi or Chinese speaker with knowledge of English who acquires German (Chadrasekhar, 1978; Vogel, 1992).

L2 status. L2 and its status is another factor which must be taken into account. ‘CLI in SLA has been related to the level of proficiency in the target language, and less proficient learners have been reported to transfer more elements from their first language than learners who present higher level of proficiency (Ringbom, 1987; Möhle, 1989; Poullisse, 1990)’ (Cenoz, Hufeisen and Jessner 9).

On the other hand, ‘it has also been reported that at the early stages of L3 acquisition, the L2 may exert a strong influence on the pronunciation of the target language (e.g. Williams and Hammarberg, 1998)’ (Llama, Cardoso and Collins 313). This study by Llama, Cardoso and Collins aimed to provide an answer to the question: Which is a stronger predictor in the selection of a source language for phonological influence in TLA: L2 status or typology? The results of the analysis pointed out to L2 status as a stronger predictor of CLI with respect to VOT patterns for /p, t, k/ production in L3.

The so called ‘foreign language effect’ of L2 status and its influence on CLI is a topic connected to the issue of L2 status. Wrembel explored this area and her study *The Impact of a Previously Learnt Foreign Language on L3 Phonological Acquisition* is presented in chapter 2.2.

Age. CLI can be also related to age. ‘...research on the relationship between age and CLI in TLA has received very limited attention’ (Cenoz, Hufeisen and Jessner 9). Age can be associated with cognitive and metalinguistic development.

Recency. ‘It could be hypothesised that learners are more likely to borrow from a language they actively use than from other languages they may know but do not use’ (Cenoz, Hufeisen and Jessner 10). This theory was proved in Hammarberg’s research (in *Cross-Linguistic Influence in Third Language Acquisition: Psycholinguistic*

Perspectives), which is described in chapter 2.2, because the participant uses the most recently acquired language, German, as a base language.

Other factors. Other factors determining the presence of CLI are related to the specific context in which communication takes place, including the interlocutors, the setting and the topic of the conversation.

3 **Aspiration and VOT**

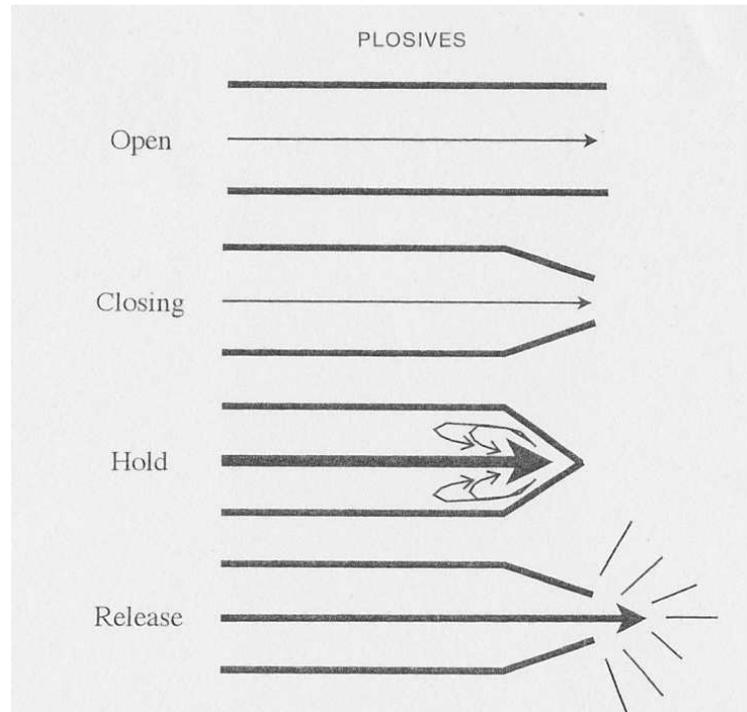
As the investigated phenomenon in our research is aspiration, the following two chapters focus on a detailed description of this feature. Firstly, the system of English plosives is presented and secondly, aspiration and its acoustic correlate voice onset time are scrutinised.

3.1 **Plosives**

Plosives are a group of consonants which consists of three pairs: /p, b/; /t, d/; /k, g/. Together with fricatives and affricates they are obstruents, which means that there is a full or partial obstruction to the air stream during their production. In the case of plosives, the obstruction is complete. The place of articulation of a plosive depends on the place where the blockage is made. When both lips are involved, the plosive is said to be bilabial /p, b/. When the tip of the tongue touches the alveolar ridge, the plosive is alveolar /t, d/ and finally, when the back part of the tongue is touching the velum, the plosive is considered velar /k, g/. ‘Throughout the articulation of plosives, the velum is raised, sealing off the nasal cavities so air cannot escape through the nose’ (Ogden 96).

Plosives are produced during three main phases: closing, hold and release phase. In the closing phase, the articulation organs are brought together in order to create a full obstruction. In the hold (or compression) phase, the air behind the closure is blocked thank to the lung action and the air pressure builds up. During the release (or explosion) phase, the organs forming the obstruction part rapidly and the closure is released, allowing the compressed air to escape abruptly with an explosive sound which is called plosion.

Picture 1 serves as a visual support of the theoretical description of a production of a plosive:



Picture 1. The phases of a plosive. (Ogden 97)

Plosives are either voiced or voiceless. /p, t, k/ are voiceless, there is needed more muscular effort to produce them and thus they are fortis. Fortis plosives have great influence on pronunciation when a vowel precedes them in one syllable, which means that the vowel is pronounced shorter. This phenomenon is called pre-fortis shortening.

Voiced plosives /b, d, g/ are produced with a weaker degree of muscular effort and thus they are referred to as lenis. These are fully voiced in medial positions, e.g. *hobby, lady, foggy*. On the other hand, these plosives lose some of their voicing and thus become devoiced in initial or final position, e.g. *fog, globe, hid*.

3.2 Aspiration and voice onset time

Aspiration is a phenomenon which occurs during the production of voiceless plosives /p, t, k/ when initial in an accented syllable. It is ‘a voiceless interval consisting of strongly expelled breath between the release of the plosive and the onset of a following vowel, e.g. *pin, tin, kin* /p^hin, t^hin, k^hin/’ (Cruttenden 153). Aspiration ‘is generated by air passing through the glottis and then the vocal tract. It is a product of turbulent airflow, and sometimes it persists even after the voicing has started’ (Ogden 102). It can be felt as a ‘puff of air’ (Ogden 102) while pronouncing e.g. *pin, tin, kin*. For transcription of aspiration a superscript /^h/ is used. The main function of aspiration is to distinguish between voiced and voiceless plosives, which is very important as ‘listeners are very sensitive to VOT and use it to categorise the plosive they are hearing as voiceless or voiced’ (Ashby and Maidment 92).

Voice onset time (VOT) and aspiration are two inseparable phenomena. They are two correlates, aspiration is a perceptual phenomenon and VOT is an acoustic phenomenon. Unlike aspiration, VOT is measurable (usually in milliseconds). Generally, if the VOT is longer than 30 ms, a plosive does not just sound voiceless, it is aspirated. Ashby and Maidment in *Introducing Phonetic Science* (92) explain the notion of voice onset time as following: ‘While producing voiceless plosive consonants, vocal fold vibration is stopped for a period that is a little longer than the hold phase, so there is still no vocal fold vibration around the moment of release and possibly for a further brief time afterwards. This delay, measured from the start of the explosion to the point where vocal fold vibration begins, is called the VOT.’ ‘If the voicing starts after release, VOT is said to be positive, while if it starts before release, it is said to be negative’ (Ogden 100).

Table 1 shows reference VOT values in English and German which will be used in the practical part of this thesis. VOT values for German are more vaguely given than those in English. For the purposes of this thesis, values measured by Mansell in 1979 (*The Articulation of German Plosives*) will be used. These figures are taken from *Phonetics and Phonology of Tense and Lax Obstruents in German* (Jessen 52).

	English	German
/p/	59	30-50
/t/	67	30-50
/k/	84	30-50
	Lisker & Abramson 1964	Mansell 1979

Table 1. Reference VOT values in ms.

3.2.1 Aspiration and voice onset time in Czech, English and German

Aspiration and VOT are of course not the same for all languages. The length of VOT differs across languages. There are even different levels of aspirations, such as in German. ‘The commonest pattern in languages around the world is for the voiceless plosives to have a short VOT (10 ms on average); they are therefore voiceless unaspirated plosives’ (Ashby and Maidment 92). These languages are French, Spanish, Italian, Greek, Dutch and a great many of others. English and German (together with other languages, such as Japanese and Chinese) do it a different way. ‘Their voiceless plosives have a longer VOT and are thus aspirated’ (Ashby and Maidment 92).

Palková (77) mentions that in some languages aspiration is produced while pronouncing plosives. Czech cannot be classified as such language because the VOT produced while pronouncing Czech voiceless plosives /p, t, k/ is 0-30 ms and thus these plosives are considered unaspirated. It is a completely new issue for Czech learners studying languages with aspiration and therefore they are ‘advised to pay particular attention to the aspiration of /p, t, k/ when these phonemes occur initially in an accented syllable. If a word such as *pin* is pronounced /pɪn/, instead of /p^hɪn/, there is the danger that the English listener may understand *bin*, since he interprets lack of aspiration as a mark of the lenis /b/’ (Cruttenden 155).

In English, the situation is different. ‘Voiceless aspirated plosives are the commonest productions of the sounds /p, t, k/ in English’ (Ogden 102). The quality of aspiration in English differs and it depends on the accompanying vocalic articulation (borrowed from Ogden 102):

- *qualities of palatalisation*: with front, close vowels (in words like ‘peat’, ‘trick’, ‘king’, ‘cute’ in most varieties)

- *qualities of labiovelarisation*: with back, close vowels (in words like ‘port’, ‘took’, ‘queen’ in most varieties)
- *accompanying retroflexion and possibly also labiovelarisation*: with /ɾ/-sounds (in words like ‘prey’, ‘treat’, ‘creep’)

The degree and duration of aspiration are influenced by word and sentence stress. ‘The more prominent a word is, the more aspiration with any voiceless plosive in it is likely to have’ (Ogden 103).

There is no voicing during the closure for voiceless unaspirated plosives. Unaspirated plosives occur in the syllable-initial clusters /st, sp, sk/, even when the syllable carries a strong accent (Cruttenden 152).

German is also the type of language with aspirated voiceless plosives. There are several distinguished degrees of aspiration (in German referred to as *Behauchung*) in German but the boundaries are not very clear and it is difficult to evaluate the scale precisely. Wiese in *The Phonology of German* (270) mentions very little information about aspiration and says: ‘More problematic, however, is the decision about which segments are aspirated and which are not.’ For this overview of the use of aspiration in German, the information from pronunciation dictionary of German *Duden* was used:

/p, t, k/ is always unaspirated when it occurs in:

- /ps, pʃ, ks, kʃ/ when there is no syllable boundary between /p/ and /s/, /p/ and /ʃ/, /k/ and /s/, /k/ and /ʃ/ (as in *Erbse, Xenie, Wegs* and others)
- the first part of the clusters: /pp/, /pb/, /tt/, /td/, /kk/, /kg/ (as in *abpassen, entdecken, Rückkehr* and others)

/p, t, k/ have different degrees of aspiration in other positions:

- strong to very strong in initial and final position before a pause, especially in a stressed syllable before a stressed vowel, when there is no /k/ or /ʃ/ preceding (as in *Pack, Tat, keck, Einsamkeit* and others)
- mid-strong to weak in all other positions (as in *Lippe, hatte, Wirtschaft, möglich* and others)

4 Practical part and experiment

The previous theoretical part scrutinised the most important phenomena relating to the experiment conducted in the practical part. The source of inspiration was an experiment carried out by Magdalena Wrembel in 2011 called *Cross-linguistic Influence in Third Language Acquisition of Voice Onset Time*. She investigated the sources of cross-linguistic influence in a group of thirty-two university students (twenty-four female and eight male) of L1 Polish, L2 English and L3 French. They were highly proficient in English but they differed in their level of French. While English is a language with voiceless aspirated and unaspirated plosives (after /s/ sound), Polish and French only distinguish voiced and voiceless unaspirated plosives.

The participants' task was to read a list containing twelve carrier phrases with the target words in the respective languages. The target words contained voiceless plosives /p, t, k/ in initial stressed positions. The acoustic measurements of VOT in L1, L2 and L3 indicated significant differences for all languages. The place of articulation showed to be significantly influential as longer VOT values were measured in velars than in alveolars and bilabials. The VOT measurements were compared to the reference figures presented previously in order to find out to what extent they differed from the norms. The findings for English L2 VOT measures fell within the accepted native range. Significant differences were found for mean VOT figures in L3 French in comparison to the native-like norms. The values were longer than typical Polish or French values but shorter than the English ones. There were found no significant differences between measured VOT and native-like norms in L1 Polish.

All in all, these results show that Polish advanced learners of English tend to produce aspirated voiceless plosives in L2 English with native-like values. This finding may be caused by several factors, such as the participants' early age of onset for L2 acquisition (nine years), long exposure to the language (eleven years) or recency. The subjects fell within the native-like norms in L1 Polish and L2 English. In L3 French the participants failed to approximate the norm. Instead of unaspirated plosives with the

average VOT values, around 18 ms for /p/, 23 ms for /t/ and 32 ms for /k/, higher values were measured. A combined cross-linguistic influence from L1 and L2 was found, which resulted in compromise VOT values for L3. In other words, the aspiration was influenced by both L1 Polish and L2 English. This provided evidence for the L2 effect in third language phonological acquisition.

The experiment conducted in this thesis attempts to map the relationship between the second and third language acquisition in the area of voice onset time patterns in L3 German by L1 Czech learners with L2 English. The languages involved differ in their presence of aspiration. While in Czech, there is no aspiration, in English and German, aspiration is a very common phenomenon. The research partly replicates the previously described project by Wrembel, however, it differs in some respects. It included a smaller number of participants with different L1, L3 and their language levels. Also the amount of target words in short phrases was reduced to nine in each language. The experiment tries to answer the following research questions:

1. Do respondents differentiate in L2/L3 with respect to VOT?
2. Do L2 English VOT values approximate native-like English norms?
3. Do L3 German VOT values approximate English or German native-like norms?
4. Does language experience have any effect on L2 English and L3 German VOT values?
5. What are the sources of cross-linguistic influence in this case?

The expectations are that the previous knowledge of English and its sound system should positively influence the production of aspiration in German, especially in the group of the students with a higher language level. This could demonstrate the presence of cross-linguistic influence in a positive sense.

4.1 Method

4.1.1 Participants

The participants included twenty Czech lower and upper secondary school (*gymnázium*) students. Two groups of students were investigated, one from the fourth grade (lower secondary school), the other from the seventh grade (upper secondary school). From now on, these groups will be referred to as Group 1 and Group 2 respectively.

Following Wrembel's research design, a language background questionnaire was given to each student to tap their language history and use (see Table 2). The questions were written in Czech to make sure the students understood them and were not nervous.

Jméno:	Třída:
Jak dlouho se učíš anglicky?	
Jak často mluvíš anglicky?	
Jak často se s angličtinou setkáváš mimo školu a v jaké formě nejvíce (filmy, knížky, internet...)?	
Jak dlouho se učíš německy?	
Jak často mluvíš německy?	
Jak často se s němčinou setkáváš mimo školu a v jaké formě nejvíce (filmy, knížky, internet...)?	
Máš ve svém okolí někoho, s kým bys komunikoval/a v angličtině nebo v němčině (kamarád, rodinný příslušník...)? Pokud ano, jak často s ním mluvíš?	

Table 2. Language background questionnaire.

4.1.1.1 Group 1

Group 1 contained 6 females and 4 males. According to the questionnaire, they have been learning English as their L2 for 8 years on average and German as their L3 for 1,5 years. Their achieved language level can be thus described as low intermediate (B1) in English and as elementary in German (A1).

The students stated that they used English almost every day, mostly passively in when watching movies, TV series and on the Internet. On the other hand, the usage of German is significantly less frequent and the students encounter it only at school (three times a week) and they use it rarely outside the school.

4.1.1.2 Group 2

Group 2 contained 4 females and 6 males. According to the questionnaire, they have been learning English as their L2 for 10 years on average and German as their L3 for 5 years. Their achieved language level can be described as upper intermediate (B2) in English and as low intermediate (B1) in German.

This group had an American student in their class for a year. Almost all of the participants stated that they talked to her very often even outside the school. One male participant studied in Canada and keeps in touch with his host family and friends there. Otherwise, all the participants wrote that they used English practically every day on the Internet, when watching movies and TV series and they also read books in English. On the other hand, German is used and spoken only at school and very little.

4.2 Procedure

The data were collected in all three languages of the participants who read aloud lists of short phrases with similar Czech, English and German target words, for example *prášek-pill-die Pille*. The selected lexical items included voiceless plosives /p, t, k/ in initial positions of stressed syllables in order to secure a strong degree of aspiration in both English and German. The target words were read in short sentences in order to mask the purpose of the testing and obtain relatively natural productions. There were three words representing each plosive. The complete list can be seen in Table 3.

First of all, the participants were given the instructions to fill in the language background questionnaire in Czech. Then they came to an empty room one by one to be recorded by Edirol voice recorder. The recordings were made in the natural order of

acquisition, with Czech as first, English as second and German as third. The students were asked to read the phrases at a natural speed with a short break interval between the recordings. The interaction with the researcher was carried out in the language of the subsequent recording to promote the activation of respective languages. The phrases in L1 Czech served as a language support and to see if L1 influences the degree of VOT produced in L2 and L3. The L1 recordings did not undergo the acoustic analysis because Czech plosives are not aspirated by default.

L1 Czech	L2 English	L3 German
Mám pět <i>korun</i> .	I have five <i>crowns</i> .	Ich habe fünf <i>Kronen</i> .
Smažte <i>tabuli</i> .	The <i>table</i> is black.	Der <i>Tisch</i> ist schwarz.
Dnes jdu na <i>poštu</i> .	It was sent by <i>post</i> .	Ich gehe zur <i>Post</i> .
Hlavní město Francie je <i>Paříž</i> .	The capital of France is <i>Paris</i> .	Die Hauptstadt von Frankreich ist <i>Paris</i> .
Auto <i>váží tunu</i> .	I haven't got much <i>time</i> .	Du hast eine rote <i>Tasche</i> .
Moje <i>kočka</i> je hezká.	My <i>cat</i> is nice.	Meine <i>Katze</i> ist schön.
Vezmi si <i>prášek</i> .	Have a <i>pill</i> .	Nimm eine <i>Pille</i> .
<i>Klasifikace</i> je uzavřena.	Our <i>class</i> is small.	Unsere <i>Klasse</i> ist klein.
Můj <i>trenér</i> je přísný.	My <i>trainer</i> is strict.	Mein <i>Trainer</i> ist streng.

Table 3. The list of phrases with the target words in italics.

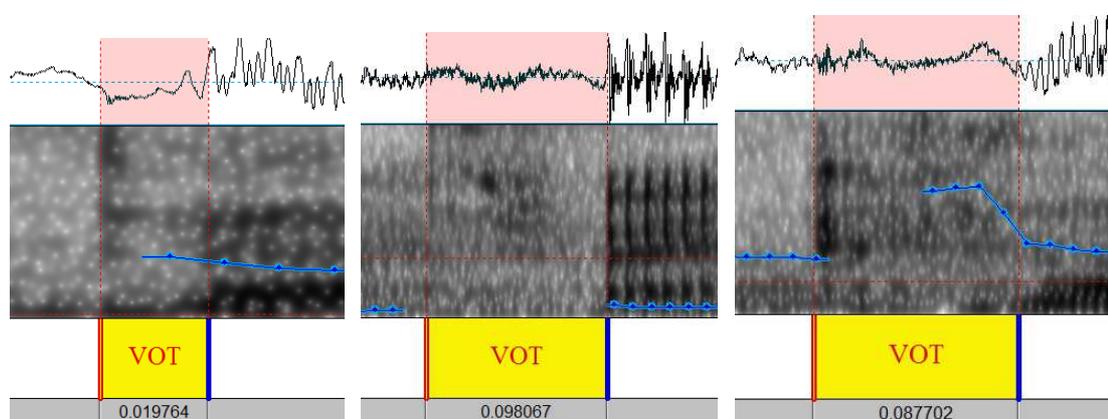
A total of 345 tokens was a subject to an acoustic analysis performed using the PRAAT programme (Boersma and Weenik). Fifteen tokens had to be excluded as they were mispronounced.

After the recording was finished, the acoustic analysis itself was carried out. For this purpose, the method of phonetic segmentation was employed. This approach is based on Machač and Skarnitzl's book *Principles of Phonetic Segmentation*. First, the target words were labelled which was followed by the location of VOT boundaries of /p, t, k/. These are not considered difficult to find for the obstruction is usually quite easily visible in the spectrogram. It corresponds to a dark vertical line. VOT is measured from the obstruction to the beginning of vocal fold vibration which is represented by the regular formant structure. However, in some cases, mostly while

producing /k/, the obstruction is more difficult to identify and as Machač and Skarnitzl (26) suggest, listening is often necessary to confirm the visual cues.

Sometimes multiple explosions occurred in the analysed material. In those cases, the first explosion was considered as the beginning of VOT.

The respective VOT figures were then put into a table in Microsoft Excel with columns for the participants' number, sex and measured VOTs of respective words, so that mean values could be counted.



Picture 4. Example of VOT spectrogram for /p/.

Picture 2. Example of VOT spectrogram for /t/.

Picture 3. Example of VOT spectrogram for /k/.

4.3 Results and discussion

The acoustic measurements of VOT in English and German target words yielded mean values presented in Tables 4, 5 and 6. In order to maintain greater detail of the figures and thus be able to see the differences between the respective items more clearly, the figures are given and processed in seconds (s).

BOTH GROUPS	/p/	/t/	/k/
L2 English	0,0394	0,0485	0,0470
L3 German	0,0253	0,0262	0,0394

Table 4. Mean VOT values for both groups.

Table 4 shows mean VOT values measured for both groups of respondents. The figures for L2 English do not approach the reference value and are considered below-average. Only the production of /k/ in L3 German approaches the reference value, otherwise /p/ and /t/ values are below-average, too. However, the reached L2 English VOT figures are always more prominent than those in L3 German in all three cases.

GROUP 1	/p/	/t/	/k/
L2 English (level B1)	0,0342	0,0458	0,0479
L3 German (level A1)	0,0221	0,0232	0,0399

Table 5. Mean VOT values for Group 2.

Table 5 shows mean VOT values measured for Group 1 only. The figures for L2 English do not approach the norm. The values for /p/, /t/ and /k/ turned out to be below-average. The figures for L3 German approach the norm only in the case of /k/, other values are below-average, too. The comparison of the values for /p, t, k/ in both languages shows significant differences in VOT produced by the participants.

GROUP 2	/p/	/t/	/k/
L2 English (level B2)	0,0455	0,0483	0,0492
L3 German (level B1)	0,0285	0,0292	0,0390

Table 6. Mean VOT values for Group 2.

Table 6 shows mean VOT values measured for Group 2 only. The figures for L2 English do not approach the reference value, they actually turned out to be as below-average. The figures for L3 German approach the norm only in the case of /k/, other values are below-average, too. The comparison of the values for /p, t, k/ in both languages shows significant differences in VOT produced by the participants.

There proved to be significant differences in VOT figures of the respective words within the target groups. This phenomenon occurs in both tested groups in L2 English and L3 German but mainly in Group 2 in their L2 English. An example of this phenomenon can be seen in Figure 1. The VOT measured for *table* and *time* is relatively of the same value, but the VOT of *trainer* is twice longer.

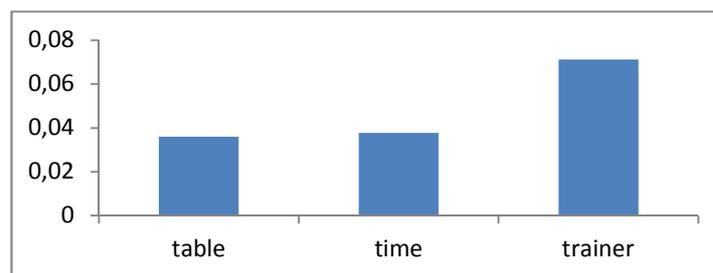


Figure 1. VOT values differences in L2 English measured within the group of /t/ words in Group 2.

As was already mentioned, sometimes the VOTs of the target words in the respective groups differed to a large extent. This section presents the target words with the longest VOT in Group 1 and Group 2.

In Group 1, the English word *trainer* showed to be the one with the longest VOT, precisely 0,0741 s. *Katze* was the word with the second longest VOT and at the same time with the longest VOT of the German words (0,0662 s). See figure 2.

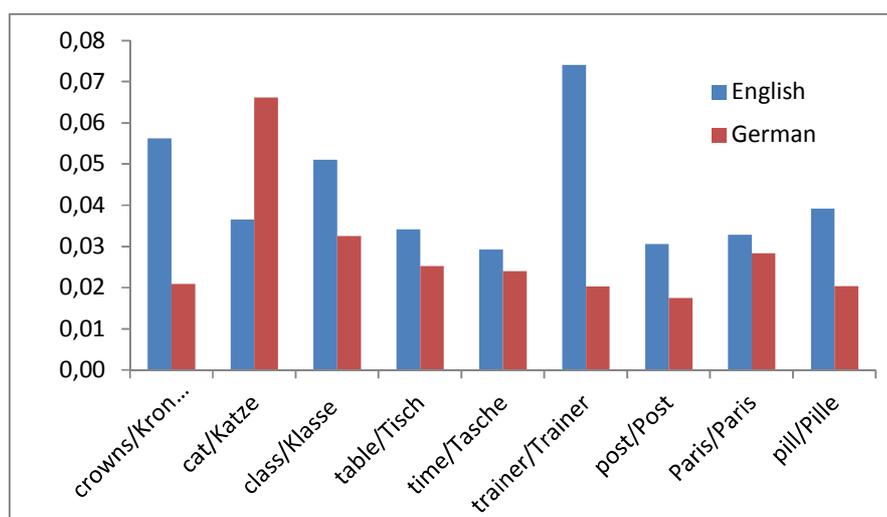


Figure 2. Mean VOT values for L2 English and L3 German in Group 1.

In Group 2, the word *trainer* showed to be the one with the longest VOT, precisely 0,0712 s. The word *Klasse* has the longest VOT of all the German words (0,0465 s). It is observed that the values are slightly more balanced in Group 2 than in Group 1.

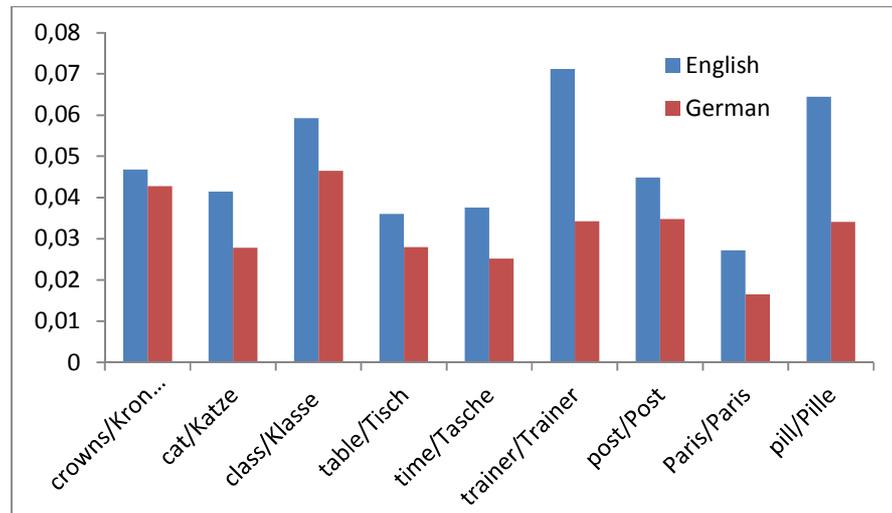


Figure 3. Mean VOT values for L2 English and L3 German in Group 2.

To summarize this analysis of the target words with the longest VOT, the word *trainer* turned out to be the most aspirated one in L2 English in both groups. The word *Katze* proved to be the most aspirated one in L3 German in Group 1 and the word *Klasse* showed to be the most aspirated one in L3 German in Group 2. Apparently, the place of articulation of the respective plosives is significant here. The word *trainer* contains an alveolar plosive /t/ and the words *Katze* and *Klasse* begin with a velar plosive /k/.

The results of this analysis showed that the measured values of VOT of Czech learners with L2 English and L3 German are not produced in a native-like manner. This might be caused by many factors. One of them could be insufficient practice and explanation of aspiration at schools. The fact that there is no aspiration in Czech and therefore it is a new phenomenon to be learned for Czech students might be considered as another factor. It shows a strong influence of L1 Czech on L2 English and L3 German. This negative transfer of the mother tongue seems to outweigh the potential interaction between L2 and L3.

According to the results of the measurements, aspiration seems to be a rather randomly produced phenomenon, which is indicated by the unstable VOT values. It

suggests that the learners are vaguely aware of the existence of aspiration thanks to their listening to music and watching films as it was observed from the language background questionnaires. On the other hand, they probably do not have sufficient knowledge of this phenomenon on the theoretical and practical level.

The factors influencing CLI were discussed in the theoretical part. Some of these proved or disproved to be influential also in this analysis. Among them are L2 status, age and recency. L2 status partially disproved its influence on L3 in this case. All the participants were more fluent in L2 English than in L3 German and although the aspiration in English and German has quite similar rules, the knowledge from L2 does not seem to have been transferred to L3. It must be taken into account that VOT values in English were below-average in comparison to the native-like norm. On the other hand, this tendency is closely connected to age and in all cases, the older and more fluent participants (Group 2) performed slightly longer VOT patterns than the younger and less fluent participants (Group 1).

Age seems to be influential in terms of the two groups of participants which were tested. The following figures support this tendency:

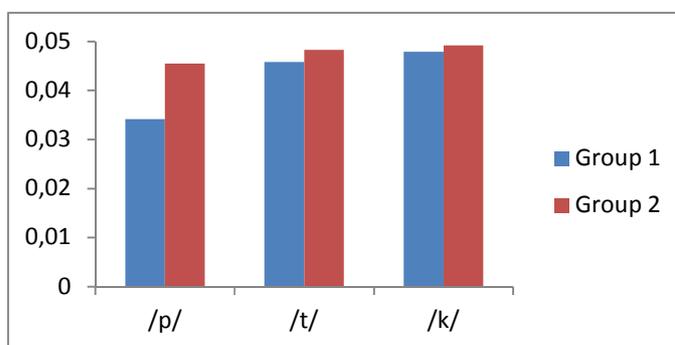


Figure 4. Mean VOT values of L2 English produced by Group 1 and Group 2.

As can be seen in Figure 4, especially in the case of /p/ there seems to be a significant difference in the production of VOT by the respective groups. Group 2 was a group of older learners.

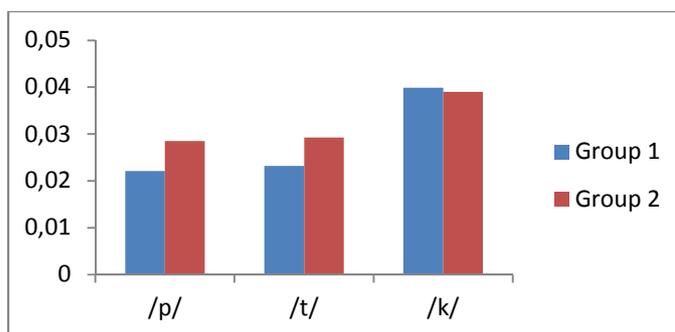


Figure 5. Mean VOT values of L3 German produced by Group 1 and Group 2.

Figure 5 shows mean VOT values of L3 German measured by both groups. In the cases of /p/ and /t/ the tendency toward longer VOT of the older learners proved, in the case of /k/ the tendency disproved, but not significantly.

The factor of recency turned out to be relevant. Although it goes hand in hand with status and age, recency seems to be prominent among these. According to the questionnaires, almost all the participants regardless their age stated that they were in touch with English almost every day outside school. On the other hand, German is used only during school lessons a few times a week. Even though the measured VOT values of both L2 and L3 came out to be below-average, the values for L2 English were in all cases higher, which is probably partly caused by its more frequent use and longer period of its study.

4.3.1 Comparison with other studies

As this thesis replicated a research, it would be interesting to compare the results of both. Wrembel found out that in L1 Polish and L2 English the respondents fell within the native-like range of VOT. The less L3 French proficient participants failed to fit the native-like range. A cross-linguistic influence which combined L1 Polish and L2 English was observed resulting in compromise VOT values for L3 French. In comparison to these findings, the results of this research project seem to be rather inconclusive. The respondents' VOT values of L2 English were below-average and thus they could not have influenced those in L3 German as it was expected. The transfer can be evaluated as negative because the measured results were influenced by the fact that there is no aspiration in L1 Czech.

One more research study investigating VOT is worth mentioning and comparing with our research outcome. Andrea Pospíšilová based the research project in her bachelor thesis (*Aspiration of English Plosives in Czech Students of English Studies*) on testing the production of VOT before and after a semester of mandatory course in Phonetics and Phonology. The twenty participants were students of English and American studies at the Faculty of Arts, Charles University in Prague. Their task was to read the same article taken from the BBC before and after the obligatory course, which allowed for direct comparison. The aim was to find out, whether the students improved their pronunciation in terms of aspiration after passing the course. The results show that these university students aspirate correctly, however the VOT values are lower than those of native speakers. A significant improvement in production of VOT after a semester of Phonetics and Phonology course was observed. This shows that teaching phonetics is very important and with some practice, improvement in pronunciation can be achieved.

4.3.2 Limitations

It is important to acknowledge certain limitations of this research which may have had impact on the character of the findings. Firstly, the author did not have any information about the process of teaching aspiration in the classes which participated in the experiment and did not know whether aspiration had been taught there at all. This and other variables should have been better controlled. For future research, it would be also useful to have a control group in order to help us establish the relationship between L2 and L3 more clearly.

5 Conclusion

In the theoretical part, the information necessary for understanding the background for third language acquisition, cross-linguistic influence and aspiration was given. The practical part presented an experiment inspired by Magdalena Wrembel's research which proved certain co-influence of L1 Polish and L2 English on the sound system of L3 French. The research questions formulated at the beginning of the practical part will be discussed and a summary of the results will be given.

The first question was, whether the respondents differentiated in L2/L3 with respect to VOT. It was observed that they did. The measured values of VOT in L2 English were higher than those in L3 German. This might be influenced by many factors, especially by L2 status and recency. According to the language background questionnaires, the participants used (at least passively) English almost every day, while German was encountered and practised only at school.

The second and third question investigated, whether the VOT values of upper-secondary students approximated native-like English and German norms. In general, the respondents did not produce native-like VOT patterns in either language. The only exception was the velar plosive /k/ in German where the reference range is 30-50 ms and the measured value on both groups was 39,4 ms. The figures for /p/ and /t/ were below 30 ms, which is considered as a lack of aspiration. Although the native-like values were not reached, all three voiceless plosives /p, t, k/ were aspirated in English, as their mean values were higher than 30 ms. Again, this result might be explained by greater exposure to the English language.

Regarding the fourth question, age and L2 status proved to be significant factors because we observed a tendency toward longer VOT in the group of older and more experienced learners in all measured cases except for /k/ in German. The question is, whether this trend is a result of pronunciation teaching at school or if it is a result of cross-linguistic influence of English on German.

The fifth question asked about the sources of cross-linguistic influence. Although the manifestations of CLI were found to be rather unclear, certain factors related to CLI seemed to operate in the experiment, particularly age, recency and L2 status. There were two groups of participants and their level of English was always higher than that of German. The students seemed to focus their attention more on English than on German. Higher VOT values were measured by older and more advanced participants in both languages.

What must be definitely taken into account is the undeniable influence of L1 Czech. As there is no aspiration in Czech, it is more difficult for Czech learners to aspirate. Aspiration is an allophonic variation which distinguishes voiced and voiceless plosives and its absence in pronunciation might cause problems in communication especially with native speakers of English or German. It was observed that the respondents did not sufficiently aspirate in English, therefore the expected influence did not occur in German. The negative transfer from L1 probably overrode the acquisition of aspiration in both sound systems. The cross-linguistic influence failed to be materialised as the L2 and L3 did not seem to interact due to the strong effect of the mother tongue.

Despite the disappointing results, the research sends an important message for second language pedagogy. Teaching pronunciation is an inseparable part of language teaching and should not be neglected. Although it turned out that the passive contact with language can enhance some features of pronunciation, such as aspiration in this case, the practical and theoretical knowledge is very important for their correct usage.

This bachelor thesis can be considered a small contribution to a yet not much explored area of third language acquisition and phonology. Future research could be oriented to other areas of phonology, such as intonation or word stress.

6 Works cited

- 1) Anders, Lutz Christian, et al. *Deutsches Aussprachewörterbuch*. Berlin: Walter de Gruyter, 2009.
- 2) Ashby, Michael and John Maidment. *Introducing Phonetic Science*. New York: Cambridge University Press, 2005.
- 3) Boersma, Paul and David Weenik. *Praat. Doing Phonetics by Computer*. 2007. www.praat.org.
- 4) Cenoz, Jasone, Britta Hufeisen and Ulrike Jessner. *Cross-linguistic Influence in Third Language Acquisition: Psycholinguistic Perspectives*. Clevedon, UK, Buffalo: Multilingual Matters, 2001.
- 5) Cruttenden, Alan. *Gimson's Pronunciation of English*. London: Arnold, 2001.
- 6) Gass, Susan M and Larry Selinker. *Second Language Acquisition*. New York: Routledge, 2008.
- 7) Hammarberg, Björn. *Processes in Third Language Acquisition*. Edinburgh: Edinburgh University Press, 2009.
- 8) Cho, Taehong and Peter Ladefoged. "Variations and Universals in VOT: evidence from 18 languages." *Journal of Phonetics* (1999): 207-229.
- 9) Jessen, Michael. *Phonetics and Phonology of Tense and Lax Obstruents in German*. Amsterdam; Philadelphia: John Benjamins Pub. Co., 1998.
- 10) Ladefoged, Peter. *Vowels and Consonants*. Oxford: Blackwell Publishing, 2005.
- 11) Llama, Raquel, Walcir Cardoso and Laura Collins. "The Roles of Typology and L2 Status in the Acquisition of L3 Phonology: The Influence of Previously Learnt Language on L3 Speech Production." *New Sounds 2007: proceedings of the Fifth International Symposium on the Acquisition of Second Language*

- Speech*. Canada: Concordia University, Centre for the Study of Learning and Performance, 2007. 313-323.
- 12) Machač, Pavel and Radek Skarnitzl. *Principles of Phonetic Segmentation*. Praha: EPOCH Publishing House, 2009.
 - 13) Mansell, P. "The Articulation of German Plosives." *Forschungsberichte des Instituts für Phonetik und sprachliche Kommunikation der Universität München* 11 1979: 1-207.
 - 14) Ogden, Richard. *An Introduction to English Phonetics*. Edinburgh: Edinburgh University Press, 2009.
 - 15) Palková, Zdena. *Fonetika a fonologie češtiny*. Praha: Karolinum, 1997.
 - 16) Pospíšilová, Andrea. "Aspiration of English Plosives in Czech Students of English Studies." Bachelor thesis. 2011.
 - 17) Ringbom, H. *The Role of the First Language in Foreign Language Learning*. Clevedon: Multilingual Matters, 1987.
 - 18) Wiese, Richard. *The Phonology of German*. Oxford: Clarendon Press, 1996.
 - 19) Wrembel, Magdalena. "Cross-linguistic Influence in Third Language Acquisition of Voice Onset Time." Hong Kong: Adam Mickiewicz University, Poznan, 2011. 2157-2160.
 - 20) Wrembel, Magdalena. "The Impact of a Previously Learnt Foreign Language on L3 Phonological Acquisition." Poznań: Adam Mickiewicz University, 2009.
 - 21) Wunder, Eva-Maria. "Phonological Cross-Linguistic Influence in Third or Additional Language Acquisition." Augsburg: University of Augsburg.

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