

2014-09-09

Production of German L2 Stress by Native Speakers of English

Maczuga, Paulina Stefania

Maczuga, P. S. (2014). Production of German L2 Stress by Native Speakers of English (Master's thesis, University of Calgary, Calgary, Canada). Retrieved from <https://prism.ucalgary.ca>. doi:10.11575/PRISM/27448

<http://hdl.handle.net/11023/1738>

Downloaded from PRISM Repository, University of Calgary

UNIVERSITY OF CALGARY

Production of German L2 Stress by Native Speakers of English

by

Paulina Maczuga

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
DEGREE OF MASTER OF ARTS

GRADUATE PROGRAM IN GERMAN

CALGARY, ALBERTA

SEPTEMBER, 2014

© Paulina Maczuga 2014

Abstract

The production of word stress in a second language (L2) is one area of difficulty for language learners. Previous studies have shown that correct word stress may be more important for the comprehensibility of non-native speech than grammatical accuracy. Studies indicate that incorrect stress patterns in an L2 are mainly due to transfer from learners' first language (L1). This thesis examines the effect of training on the ability of English native speakers who are beginner-level learners of German to produce stress patterns in words from three distinct categories: native German words; German-English cognate words; and words with unstressed suffixes. The results reveal that training improves learners' production of German word stress and raises learners' awareness. Participants were more accurate in their production of native German words and those with unstressed suffixes than they were in their production of cognates. The results have implications for vocabulary teaching in L2 classrooms.

Acknowledgements

There are no proper words to convey my deepest gratitude to my supervisor Dr. Mary O'Brien. I have been fortunate to have a supervisor, whose expertise, guidance, motivation and patience helped me in all the time of research and writing of this thesis. She helped me to organize my thoughts and phrase my points. I would also like to express my gratitude to the committee members, Dr. Sandra Hoenle and Dr. Sylvie Roy. My sincere thanks must also go to the staff from the Department of Linguistics, Languages and Cultures for their support and advice during my graduate study. I also greatly appreciate the URCG Thesis Research Grant that I received to fund the study. Special thanks go to Dr. Tak Fung, who assisted me with statistical analysis. I deeply thank my parents for supporting me throughout my life. Finally I would like to thank my fiancé, Adam, who always made me laugh and helped me get through many crisis situations.

Dedication

To my parents

Table of Contents

Abstract	ii
Acknowledgements	iii
Dedication	iv
Table of Contents	v
List of Tables	vii
List of Figures and Illustrations	viii
List of Symbols, Abbreviations and Nomenclature	ix
CHAPTER ONE: INTRODUCTION	1
1.1 Purpose of the study	2
1.2 Organization of the thesis	3
CHAPTER TWO: LITERATURE REVIEW	5
2.1 The role of lexical stress in comprehensibility	5
2.2 Stress	6
2.2.1 Stress patterns in German words	8
2.2.1.1 Stress patterns in German nouns	10
2.2.1.2 Complex words with suffixes and prefixes	11
2.2.2 Stress patterns in English	13
2.3 Perception of lexical stress	17
2.3.1 Perception of L2 lexical stress	17
2.3.2 The role of the L1 word stress system	18
2.3.3 The role of L2 proficiency in L2 stress perception	21
2.4 Production of L2 lexical stress	22
2.4.1 The influence of the L1 on the L2 stress production	22
2.4.2 The role of L2 proficiency in L2 stress production	27
2.4.3 The role of L1 perception in the production of the L2 word stress	28
2.5 Input-based training	31
2.6 Research questions and hypotheses	35
CHAPTER THREE: METHODOLOGY	38
3.1 The Experiment	38
3.1.1 Participants and the recruitment procedure	38
3.1.2 Data collection and procedure	39
3.1.2.1 Informed Consent and Language Background Questionnaire	39
3.1.2.2 Proficiency Test	40
3.1.2.3 Word Familiarity Test	40
3.1.2.4 Production Task	42
3.1.2.5 Input-based Instructions	44
3.1.2.6 Think-aloud protocol	47
3.1.3 Data analysis	47
CHAPTER FOUR: RESULTS	49
4.1 Introduction	49

4.2 The effect of different variables.....	49
4.3 Overall results	50
4.4 Research Question 1	53
4.4.1 Results from the production pre-test	53
4.4.1.1 Correctness scores for word subtypes.....	55
4.4.2 Post-test differences by group	60
4.4.2.1 Correctness scores for word subtypes.....	62
4.4.3 Summary.....	64
4.4.4 Retention of knowledge: Results of the delayed post-test.....	65
4.4.5 Training group: pre-test vs. post-test vs. delayed post-test	67
4.5 Research Question 2a.....	71
4.5.1 Overall stress patterns.....	72
4.5.2 Penultimate stress	73
4.5.3 German-English word cognates with final stress	75
4.5.4 Words ending with the suffix -iv	75
4.5.5 Words ending with the suffix -al	77
4.5.6 Words ending with -ant	79
4.5.7 Words with stress-affecting suffixes	81
4.5.8 Summary.....	83
4.6 Research Question 2b: Think-aloud protocol	84
 CHAPTER FIVE: DISCUSSION AND CONCLUSION	 89
5.1 Introduction.....	89
5.2 Summary of the findings.....	89
5.3 Discussion.....	90
5.3.1 Research Question 1: The Effects of Training	90
5.3.2 Research Question 2: Stress patterns.....	93
5.3.2.1 Cognate words	93
5.3.2.2 Penultimate stress	94
5.3.2.3 Words with stress-affecting suffixes.....	95
5.3.3 Summary.....	95
5.4 Implications	97
5.5 Limitations	99
5.6 Conclusion	100
 REFERENCES	 102
 APPENDIX A: MEAN SCORES FOR THE WORD FAMILIARITY TEST	 108
 APPENDIX B: TEST WORDS WITH FILLERS.....	 111

List of Tables

Table 2.1 Differences between German and English word stress	16
Table 3.1. Language background with ranges in parentheses.	39
Table 3.2. Distribution of the words from the study according to word category.....	44
Table 4.1 Effect of type in the pre-test and post-test for each group.....	54
Table 4.2 Correctness scores according to word subtype in the production pre-test.....	59
Table 4.3 Performance by group and word type.....	61
Table 4.4 Effect of group in the post-test according to word subtype	63
Table 4.5 Results from the delayed post-test.	67
Table 4.6 The effect of meeting according to word type and subtype.....	69
Table 4.7 Stress pattern tendencies for incorrectly stressed words with penultimate stress in the pre-test and post-test.	74
Table 4.8 Stress patterns for words ending with the suffix -iv	76
Table 4.9 Pre- and post-test stress patterns for words ending with the suffix -al.	78
Table 4.10 Stress patterns for words ending with the suffix -ant.	80
Table 4.11 Stress patterns for words ending with the suffixes: -tum, -keit/-heit.	82
Table 4.12 Results from participants' correctness vs. their judgments after the post-test.....	85
Table 4.13 Results from participants' correctness vs. their judgments after the delayed post- test.	87

List of Figures and Illustrations

Figure 4.1 Overall results from the production pre-test, post-test and delayed post-test according to word type.....	51
Figure 4.2 Mean accuracy scores by word type from the pre-test.	55
Figure 4.3 Mean accuracy scores by word subtypes from the pre-test.	56
Figure 4.4 Mean accuracy scores by word types from the post-test.....	61
Figure 4.5 Mean accuracy scores by word subtypes from the post-test	63
Figure 4.6 Mean correctness scores for the training group.....	71
Figure 4.7 Correctly recognized stress according to word type at the post-test	86

List of Symbols, Abbreviations and Nomenclature

Symbol	Definition
df	degrees of freedom
L1	first/native language
L2	second language
N	sample size
NT	no training group
p-value	the estimated probability of rejecting the null hypothesis
RQ	research question
SE	standard error
T	training group

Chapter One: INTRODUCTION

Word stress is perceived as the acoustic prominence of certain phonological units (Hall, 1992). For example, the English verb ‘conDUCT’ differs from the noun ‘CONduct’ in terms of stress assignment. Speakers expend more force to produce stressed syllables, and this involves changes in the pitch and length of vowels and consonants. Previous studies have shown the importance of appropriate stress production by second language (L2) learners for native speakers’ comprehensibility (i.e., understanding of L2 learners’ speech). Moreover, correct lexical stress assignment may be more important for native speakers’ understanding of L2 speech than grammatical correctness (Munro & Derwing, 1995, 1999; Trofimovich, 2012). This means that native speakers are able to understand non-native speakers’ utterances even when grammatical errors occur, but incorrect stress assignment contributes to the misunderstanding of L2 speech (Munro & Derwing, 1995). Nonetheless, L2 learners are very often not aware of L2 stress rules as L2 word stress is still neglected in L2 classrooms (Lord, 2001).

Production studies on L2 word stress assignment indicate that the main reason for incorrect stress assignment in an L2 is transfer of stress pattern rules from learners’ first languages (L1s) (Altmann, 2006; Archibald, 1998; Erdmann, 1973; Peperkamp & Vendelin, & Dupoux, 2010; Schwab & Llisterri, 2011; Wang, 2008). Learners apply certain strategies based on stress rules from their L1 when they assign stress in an L2 (Altmann, 2006). For example, learners with L1s that are stress languages (i.e., languages where stress occurs at regular intervals) apply certain strategies based on stress rules from their native language when they assign stress in an L2 (Altmann, 2006). In addition, a study by Erdmann (1973) shows that L2

learners may also apply a new stress pattern, based on elaborations of rules from their L1. This means in order to avoid making use of their L1 stress patterns they set up a new stress pattern, which is not like the stress pattern from the L1 or that of the L2. According to Cutler (1984), Erdmann (1973) and Paschke (2010, 2013), words with similar forms in the L1 and L2—especially loan words and cognate words—pose a major problem for L2 learners. For this reason, it is important to include these words in investigations of L2 lexical stress production.

A current debate in L2 pronunciation research surrounds the effectiveness of pronunciation training. Specifically, researchers are interested in the respective roles of input- vs. output-based training. Traditionally, pronunciation instruction has focused on output: students are encouraged to practice their pronunciation through various types of speaking exercises. A number of recent studies have looked at the effectiveness of training pronunciation by focusing on input. Studies investigating the effectiveness of input-based training have shown that it may contribute to improvement in comprehension and/or production (Gonzales-Bueno, 2011; Thomson, 2011). To date no study has investigated the effectiveness of providing input-based instruction in the training of L2 lexical stress production.

1.1 Purpose of the study

In the current study I investigate how input-based training affects beginner learners' stress assignment, both immediately after training and after 4-6 weeks. The aim of the training is to examine whether participants trained not to produce but to perceive, German lexical stress will perform better in the production of stress assignment compared to untrained participants.

While there are a number of studies investigating the influence of L1 stress patterns in L2 stress pattern acquisition, these studies have only been performed on L2 learners of English (Altmann, 2006; Archibald, 1998; Erdmann, 1973; Wang, 2008), Dutch (Peperkamp et al., 2010), Spanish (Lord, 2001; Schwab & Llisterri, 2011) and Polish (Archibald, 1992). To date no studies have investigated how native speakers of English produce word stress in German.

Researchers report that beginner learners have more difficulties with correct stress assignment than those who are more advanced, and beginner-level learners very often transfer stress patterns from their L1 (Lord, 2001). Therefore, in the current study, I examine what kind of rules L2 learners of German follow then they assign lexical stress and whether they transfer stress patterns from their L1 English.

1.2 Organization of the thesis

The current thesis is organized into five chapters, including this introductory chapter. In the chapter 2, I will provide a brief introduction to stress in general and to German and English stress in particular. I elaborate on differences between German and English word stress systems and demonstrate what may contribute to learners' production of L2 word stress. I will also provide an overview of the studies that addresses the perception and production of the L2 word stress. In both sections, perception and production, I will discuss the influence of L1 word stress system and the role of proficiency levels. Then, I will explain the link between stress perception and production. In chapter 3, I will present the research questions that guided my study along with the methodology. In chapter 4, I will report the results from production pre-test, post-test and delayed post-test with statistical analyses. In chapter 5, I will provide the summary of the

findings and I will discuss the findings in relation to the previous studies. In addition I will present the practical classroom implications of this study.

Chapter Two: LITERATURE REVIEW

2.1 The role of lexical stress in comprehensibility

Lexical stress is an important factor for native speakers' understanding of non-native speakers' speech (Hahn, 2004, Trofimovich & Isaacs, 2012). In this section I will briefly discuss the importance of L2 stress for understanding of native speakers¹. In a recent study investigating the contribution of various errors to comprehensibility, Trofimovich and Isaacs (2012) found that incorrect word stress patterns have a greater influence on comprehensibility than grammatical errors.

In a study by Caspers (2011), words produced by Dutch learners with Mandarin Chinese, French, Polish, Finish and Hungarian as their L1 were presented to native speakers of Dutch, who scored them in terms of intelligibility, comprehensibility and accentedness. Four categories of words were included:

- (1) words with a stress error and a segmental error
- (2) words with a stress error
- (3) words with a segmental error
- (4) words with no stress error or segmental error

The study revealed that words with stress and segmental errors were highly unintelligible (with 53% of words being understood) compared to words without stress or segmental errors (98%

¹Research investigating intelligibility and comprehensibility deals with the extent to which a listener understands what is being said. Whereas intelligibility is listeners' understanding of L2 speech, which can be measured in an orthographic transcription task, comprehensibility is listeners' perception of understanding, usually measured on a scale from 1-9, where listeners score how easily they understood the L2 speech (Munro & Derwing, 1999).

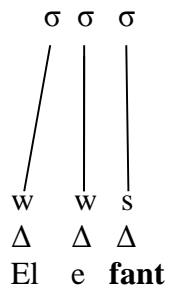
understanding). On the other hand, words with stress errors (83% understood) or segmental errors (77% understood) were scored similarly in terms of intelligibility. An analysis of data for speakers with different L1s showed that the productions of Chinese speakers were the least intelligible (32%) compared to the production of the French speakers (75%), whose utterances were rated to be the easiest to understand.

Successful communication is taken to be the central the goal in North American L2 classrooms, but incorrect stress placement may contribute to breakdowns in communication and misunderstanding between speakers. Therefore, more attention should be paid to appropriate stress assignment in L2 teaching.

2.2 Stress

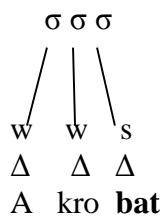
Stress is perceived by speakers as the prominence of certain phonological units. It is possible to distinguish at least two levels of stress: lexical stress (i.e., the prominence of a particular syllable in a word) and phrasal or sentence stress (i.e., the prominence of a word in a phrase). For the purposes of this thesis, I will limit discussions of stress to lexical stress. The phonetic definition of word stress describes it as a combination of pitch, duration, intensity and vowel quality (Hyman, 1977; Wiese, 2000). Stress is understood as a prosodic relationship between units, when we have one stronger syllable (marked as σ) and often one or more weaker syllables as presented in (1) (Wiese, 2000: 274).

(1) a)



'elephant'

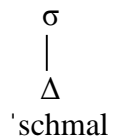
b)



'acrobat'

The stress relationship is described as undefined when there are no counterparts that could be compared, as in (2). There is no relationship between stressed and unstressed syllables in monosyllabic (i.e., one-syllable) words.

(2) a)



'narrow'

b)

σ

|
Δ

'krumm

'crooked'

Each language has its own word stress system, which is either fixed (e.g., German, Hungarian, Polish) or variable (e.g., English) (Archibald, 1997). That is to say, the location of stressed syllables in English is assigned for each individual word, but there is no specific syllable in a word that acts as default. The next section outlines the basic facts about the word stress system in German.

2.2.1 Stress patterns in German words

German belongs to the group of stress-timed languages, according to Hyman (1977), and according to Jakobson (1971) and Trubetzkoy (2001), each word contains only one primary stress. As was mentioned in the previous section, stress patterns in German are predictable. Thus, it is possible to determine a word's stress pattern on the basis of rules that depend on the structure of various units. Whereas the distinction between stressed and unstressed syllables causes no problems for native speakers of German, second language learners may have difficulties, as they cannot rely on their intuition.

When we turn to marked and unmarked stress patterns in German, Wiese (2000) considers penultimate stress (i.e., the second-to-last syllable) as unmarked and antepenultimate

(i.e., third-from the end) or ultimate (i.e., final) as marked. That is to say, speakers of German apply the penultimate stress rule for loan words as well as a large number of native German words. It also should be mentioned that according to the *Dreisilbengesetz* ‘Three-syllable rule’ (Wiese, 2000: 286), stress is assigned to one of the three last syllables, no further than to the third syllable from the right (i.e., the antepenultimate syllable). Gaeta (1998) emphasizes that the German language is similar to Latin, as the main stress is also assigned from the right word edge.

A number of studies corroborate the statement that the stress on the penultimate syllable is the default in German. Wiese (2000) presents an experiment wherein German subjects with no prior knowledge of Japanese were asked to assign stress to Japanese loan words that are used in German. These participants assigned stress to the penultimate syllables in these loan words, thereby demonstrating that penultimate stress patterns were favoured among the test subjects. This also aligns with the results from a study by Paschke (2013). In an unpublished experiment Paschke (2010) investigated stress assignment in German-Italian cognates (some of which follow the penultimate stress rule, and some of which do not) among native speakers of German and non-native speakers with various L1s. The results indicate that non-native speakers performed as well as native speakers of German when they applied stress to words following the penultimate stress rule. Conversely, they overgeneralized the penultimate stress rule for words with stress patterns that do not follow the penultimate stress rule.

As was mentioned before, stress in German is assigned to one of the three syllables from the right edge. Many researchers have shown that penultimate stress pattern is the default in German. There is evidence when native speakers of German are asked to assign stress to loan words and they stress the penultimate syllable.

2.2.1.1 Stress patterns in German nouns

It is important to differentiate between stress patterns in simplex and complex nouns², including compounds, due to different morphemic structures of words. Nonetheless, compounds are beyond the scope of the current research. Therefore I will not discuss them in this thesis. Following Wiese (2000), I will focus on the role of vowel length for simplex, or monomorphemic, words (i.e., words without any prefixes or suffixes) for the purposes of this study. Simplex words may be up to four syllables long, and they demonstrate a variety of stress patterns. These patterns are due to vowel length or syllable structure. In German syllables ending with short vowels (e.g., *ˈKanne* “pot”, *ˈextra* “extra”) do not receive stress, and these syllables are called light syllables. One of the most important stress assignment rules in German is that the rightmost non-light syllable is often stressed. A few examples are provided in (3) below.

(3) *ˈPlankton*

ˈplankton

Muˈseum

ˈmuseum

Analogously, stress is attracted to the antepenultimate syllable when both final syllables in a word include short vowels³. Examples are provided in (4). Schwa syllables never attract stress.

² Complex words are words consisting of at least two morphemes. I will elaborate on complex words in the next section.

³ The problem with vowel /a:/ is more complex, as it does not always attract stress when it occurs in final position (e.g. *ˈTurban*, *ˈBalkan* have initial stress, whereas word *ˈurban* has final stress). It is even more complex when we look at the fact that /a/ is followed by a consonant, as it makes it nearly impossible to explain the differences in

(4) in'kognito

'incognito'

Anal'getikum

'analgesic'

Stress is assigned to the final syllable in words with a heavy final syllable. That is, if a word contains a long vowel and consonant or short vowel and two consonants e.g., *Argu'ment* "argument".

2.2.1.2 Complex words with suffixes and prefixes

When discussing stress assignment in complex words (i.e., words consisting of at least two morphemes, which are either bound or free), it is essential to discuss various stress patterns for affixation and compound words. First, I will illustrate affixation (i.e., the addition of suffixes and/or prefixes). Suffixes in German are either stressed or they are unstressed. Suffixes attracting stress in the final position are as follows: -ant, -at, -ie, -ist, -ur, -al, -är, -iv, -ier (Wiese, 2000: 288). Many of these suffixes occur in cognate words e.g., *assozia'tiv* ("associative"), *kleri'kal* ("clerical"), *Ambu'lant* ("ambulant"). In addition, there are other suffixes that either always or sometimes affect various types of stress patterns (e.g., -er, -or, -ik, -isch (Wiese, 2000: 288)). For example, stress is assigned to the syllable before the suffix as in *The'matik* ("topic") or *pla'tonisch* ("platonic"). Words with suffix -er receive stress on the initial syllable as in *'Musiker* ("musician"). The suffix -or behaves different when it occurs at the end of a word as in

stress assignment. Relying solely on vowel length when attributing stress is often insufficient, as there are many instances when we have to take into account processes like vowel shortening or lengthening (e.g., *Pa'rade* where [a] is a long vowel and the stress falls on the penultimate syllable, whereas in *para'dieren* the same vowel requires shortening for the sake of stress pattern in this word (Wiese, 2000: 279))

Pro'fessor (“professor”), where the suffix does not attract stress and stress is assigned to the syllable preceding the suffix, however when it occurs before –in as in *Profes'sorin* (“female professor”) then suffix –or is stressed. Another group may result in either penultimate or antepenultimate stress (Wiese, 2000: 288):

- (5) a) -um e.g. 'Studium ~ Refe'rendum
b) -us e.g. 'Stimulus ~ Euka'lyptus
c) -a e.g. 'Afrika ~ Mar'tina

Moreover, Wiese (2000: 287) distinguishes another group of suffixes, which may receive stress or not, depending on stress rules.

- (6) a) -an e.g., De'kan~ Dekan'at
b) -al Na'tion ~ natio'n+al ~ Nation+a'l+ismus
c) -iv Pro'dukt~ produk't+iv ~ Produkt+iv+i'tät

As presented in (6) adding these suffixes to these words causes a shift of the stress pattern. A final group of suffixes does not bear stress (e.g., -bar, -chen, -er, -haft, -heit, -ig, -keit, -lich, -schaft, -tum).

Prefixes belong in categories similar to those of suffixes: those that always attract stress, those that sometimes attract stress, and those that do not attract stress. Considering that prefixes, like compound words, are not relevant for this research, they will not be presented here. Stress is also different for compound words, but since they are also beyond of the scope of this research, I will not present them in this chapter.

In conclusion, we can observe that German lexical stress assignment is rather complex. There are many intricacies and exceptions, which need to be considered, when we discuss assignment of word stress in German. Nonetheless, the following general rules apply:

- 1) The default stress pattern of penultimate stress in German is assigned to simplex words and words with schwa in the final syllable.
- 2) The final syllable of a word bears stress when it is heavy (i.e., when it contains a long vowel and consonant or short vowel and two consonants).
- 3) Suffixes in German are either stressed or they remain unstressed. Nonetheless, there are suffixes that when added to simplex words, may change the stress pattern in the words.

2.2.2 Stress patterns in English

Because participants in the current study are native speakers of English learning German as an L2, it is important to provide a general description of the basic stress patterns in English. Although Chomsky and Halle (1968) set forth a number of complex rules for stress assignment in English, presenting an elaborated system of English stress is beyond the scope of this work. Considering there are many exceptions, I will present a generalization of these rules. To start, I will focus on the main rules for assigning stress in nouns. Chomsky and Halle (1968) present a simplification of stress pattern for nouns, as it is possible to distinguish among words with penultimate, antepenultimate and final stress. As in the case of German stress, in English there is also correlation between stress placement and vowel tenseness⁴. If the penultimate syllable is

⁴Tense vowels are usually longer and produced with more muscular energy when compared to lax vowels.

heavy (i.e., contains long vowel or diphthong) as in (7), or at least one consonant as in (8), it attracts stress (Chomsky & Halle, 1968: 71).

(7) a'roma

co'rona

(8) 'genda

u'tensil

Analogously in the absence of heavy penultimate syllable, the antepenultimate syllable is stressed:

(9)

A'merica

a'nalysis

English speakers realize stress on the final syllable if it contains a tense vowel or diphthong or two consonants at the end of the word as in the word *bro'cade* (Chomsky and Halle, 1968: 69).

In contrast to the stress rules presented above, there are many exceptions, in which a light penultimate syllable may bear primary stress, as in (10):

(10) Ala'bama

ba'nana

Investigations of derivational suffixes in English show that, similar to German, they either carry stress as in (11a)⁵ or they are unstressed as in (11b). Moreover, they may affect

⁵In all of these examples there is also secondary stress on the first syllable.

stress placement in words as presented in (11c), though they remain unstressed, as they shift the stress towards another syllable, often the preceding one (Chomsky and Halle, 1968).

(11)

a) -aire, -ee, -ese, eer	b) -ly, -ness	c) -ion, -ity, -ic
doctri'naire	'friendly	'educate~edu'ca+tion
refu'gee	'likeness	'tranquil~ tran'qui+lity
Portu'gese		'climate~cli'ma+tic
Mountai'neer		

When analyzing suffixes in English we can notice that some of them have their counterparts in German that, unlike in English, bear primary stress (see (12)). Thus, it would not be surprising for native speakers of English to have difficulties in acquiring German word stress, especially in loan words in which stress assignment differs.

(12)

English	German
consul'ta+tion	Konsulta+'tion
'act+ive	ak+'tiv
'bio+graphy	Biogra+'phie
'crimin+al	Krimi+'nal

Since there are many differences between German and English word stress systems, in table 2.1 I present those that are relevant for the current study. They include instances in which stress is assigned according to syllable weight (CVC, CVV), the occurrence of a schwa syllable at the end

of a word and various suffixes. Thus, a “yes” in a cell of table 2.1 means that a given syllable type is stressed in the given language. A “no” indicates that a given syllable type is not stressed.

Stress is assigned to:	English	German
CVC ⁶	Sometimes - this syllable composition is flexible e.g., a'genda	No- is considered as light syllable e.g., 'Plankton
CVV ⁷	Yes e.g., ho'rizon	Sometimes e.g., Phonolo'gie
Schwa syllable	No e.g., ba'nana	No e.g., Apfel'sine
Suffixes: -ive/-iv, -ant, -ent, -al,	No e.g., 'total	Yes e.g., to'tal
Penultimate syllable if the final syllable is light	Yes e.g., a'genda	Yes e.g., A'genda

Table 2.1 Differences between German and English word stress

⁶This syllable composition consists of: consonant, lax or short tense vowel.

⁷ 'VV' stands for long tense vowel

2.3 Perception of lexical stress

The perception of lexical stress is influenced by many factors including duration, fundamental frequency (F_0) and intensity (i.e., loudness). However, research has shown that none of them independently correlates with stress assignment (Fry, 1958; Schwab & Listerri, 2011). That is to say, native speakers will have more difficulties in stress perception when one of these cues is not part of stress realization in their native language.

Fry (1958) conducted two experiments in order to explore what contributes to native speakers' perception of English stress. In the study he used words-pairs: *SUBject- subJECT*, *OBject- obJECT*, *DIgest-diGEST*. He looked at the influence of combined variations in duration and intensity. Manipulations of vowel duration ratio and pitch had an effect on listeners' perception of stress. It means that English native speakers rely mainly on vowel duration and pitch when they perceive lexical stress.

2.3.1 Perception of L2 lexical stress

The perception of primary stress assignment plays a central role in correct recognition of words in the L2 (Bissiri, Pfitzinger & Tillman, 2007; Jangjamras, 2011; Peperkamp et al., 2010; Schwab & Listerri, 2011; Wang, 2008; Zhang & Francis, 2010). This is particularly true in languages sensitive to stress like English and German. Moreover, many studies have shown that learners' perception of L2 stress is influenced by their L1 (Altmann, 2006, Archibald, 1993). For example, a study by Schwab and Listerri (2011) investigated two groups of French native speakers: 1) advanced learners of Spanish and 2) participants with no knowledge of Spanish. The stimuli used for the study included 4 triplets of trisyllabic words and 4 triplets of trisyllabic

pseudowords. In the stimuli there was a rightward shift of the acoustic cues to stress. In words with antepenultimate stress, F_0 , amplitude and duration were replaced by the values from words with penultimate stress, and respectively for words with penultimate stress the same values were replaced by corresponding values from words with final stress. Participants were asked to listen to each stimulus and select one of three possible answers indicating stress (e.g., 1.NUmero, 2. nuMEro, 3. numeRO). The experiment revealed that combined manipulations of F_0 , amplitude and duration had a better effect on L2 stress perception than separate manipulation of each of the acoustic parameters on its own (Schwab & Llisterri, 2011: 235). These results confirm the notion that stress is perceived as a combination of all three cues: F_0 , amplitude and duration. In addition, the results of the study indicate that exposure to the L2 makes advanced French learners of Spanish not only more sensitive to stress, but they also recognize stressed syllables faster, compared to the group with no knowledge of Spanish.

In the following sections, I will elaborate on factors that influence the perception of primary stress in the L2. According to Flege's (1995) Speech Learning Model that I will present in detail in section 2.4.3, perception is the first step in the acquisition of L2 sounds, and it precedes production. Therefore, perception and production are linked to each other, and it is impossible to talk about L2 production without referring to perception. Nonetheless, factors affecting perception and production-especially the L1 and L2 proficiency-may differ.

2.3.2 The role of the L1 word stress system

We cannot analyze stress perception without taking into account subjects' L1s, as many studies show influence of the L1 on L2 stress perception (Altmann, 2006; Archibald, 1998;

Dupoux et al., 1997; Dupoux et al., 2001; Paperkamp & Dupoux, 2002). However, the impact of the L1 on L2 stress perception is not completely understood. In order to explain how L1 stress influences the perception of L2 stress I will present two models: the Stress Deafness Model (SDM) proposed by Paperkamp and Dupoux (2002) and the Stress Typology Model (STM) proposed by Altmann and Vogel (2002). According to the SDM, speakers with predictable (regular) stress in the L1 demonstrate more difficulties in L2 stress perception. The researchers established four classes of stress “deafness” based on how regular stress is. That is, speakers with a regular stress pattern in their L1 will have more difficulty in the correct perception of L2 stress compared to speakers with a less regular stress pattern. Altmann and Vogel’s (2002) STM, which was extended by Altmann (2006), predicts that speakers of non-stress languages will be more successful in L2 stress perception. The results from study by Altmann (2006) indicate that speakers with L1s that are stress languages (particularly when stress is predictable⁸) show more evidence of interference and negative transfer from their L1s. More specifically, the results revealed that subjects with unpredictable stress in the L1 (Spanish) and subjects with an L1 that has no stress (Korean, Japanese, Chinese) performed better in stress perception than native speakers of Arabic, Turkish or French (fixed-stress languages) in perceiving stress in English. To conclude, learners with L1s that are stress languages have more difficulties in correct L2 stress perception compared to learners with L1s that are non-stress languages, as there is a negative transfer of stress patterns from their native language.

⁸Predictable stress is regular stress, which “can be predicted based on phonological characteristics of the word alone e.g. position of the syllable within the word, syllable weight”, whereas primary stress without fixed position is a characteristic of non-predictable stress (Altmann, 2006: 26)

Researchers are interested in whether the L1 plays a role in the acoustic cues that L2 learners rely upon in their perception of L2 stress. Many studies have shown that non-native speakers rely on different acoustic cues than native speakers of the target language when they detect stress in the L2 (Bissiri, 2007; Jangjamras, 2011; Peperkamp et al., 2010; Schwab and Llisterri, 2011; Wang, 2008; Zhang & Francis, 2010). That is to say, they rely on acoustic cues that correlate with stress in their L1.

Wang (2008) found that F_0 is more important for lexical stress recognition than other cues including duration or intensity for Chinese learners of English. Moreover, even though Chinese is a non-stress language, Chinese native speakers are not deaf to stress.⁹ They can differentiate stressed and unstressed syllables when they have appropriate cues such as F_0 . The results from this study indicate that native and non-native speakers of English rely on different parameters. When non-native speakers in the study detected stress in the L2, they relied on only one cue, whereas native speakers used all three parameters: F_0 , duration and intensity. At this point, there is a question why some speakers rely on different parameters when they perceive stress. As in previous studies investigating various L1-L2 pairings (e.g., Altmann & Vogel, 2002; Altmann, 2006; Archibald, 1998; Caspers & Kępińska, 2011; Cutler, 1984; Erdmann, 1973; Flege & Bohn, 1989; Jangjamras, 2011; Paschke, 2010; Schwab & Llisterri, 2011; Zhang & Francis, 2010), Wang (2008) claims that a speaker's L1 may play a role in lexical stress perception. Hence, Chinese learners rely more on F_0 , as their L1 is a tonal language. Therefore pitch will be the most important cue for them (Altmann, 2006; Wang, 2008).

⁹According to Dupoux (1997; 2001) stress “deafness” is described as inability to perceive stress contrast.

In conclusion, native speakers rely on different parameters compared to non-native speakers of the target language. As was indicated by Altmann (2006), native speakers of English relied on three parameters: F_0 , duration and intensity, whereas non-native speakers of English relied only on one of those cues. Therefore, I predict that participants in the current study will rely on parameters based on their L1 (English), and their perception of stress is expected to be different compared to native speakers of German.

2.3.3 The role of L2 proficiency in L2 stress perception

Studies on the perception of L2 stress indicate more accurate results for participants at advanced levels in comparison to those at the intermediate level, beginners or participants with no knowledge of the language (Schwab & Llisterri, 2011; Tremblay, 2009). Moreover, reaction times of stress perception for advanced learners may be shorter than for learners at lower proficiency levels (Schwab & Llisterri, 2011; Tremblay, 2009). The results of the study by Schwab and Llisterri (2011) showed that daily exposure to and the use of the L2 makes advanced L2 learners “more sensitive” to recognition of L2 stress placement (Schwab & Llisterri, 2011: 238). The difference between the advanced group and the group with no knowledge of the L2 is also noticeable in their reliance on different parameters in stress perception: proficient learners demonstrated better results in stress perception when all three parameters (F_0 , amplitude and intensity) are manipulated together, whereas subjects with no L2 knowledge relied only on duration and intensity (Schwab & Llisterri, 2011).

Tremblay (2009) investigated the perception of stress in English as an L2 by French Canadian speakers at three proficiency levels: intermediate, low-advanced, and high-advanced.

Seventy-five French Canadian learners of English and 31 native English speakers took part in the experiment. Reaction times varied by proficiency level, with high-advanced L2 learners demonstrating faster response times. Together with the results of Schwab and Llisterra (2011), this study indicates that participants may vary in their perception of stress according to proficiency level.

2.4 Production of L2 lexical stress

In the previous section I presented studies that indicate an influence of learners' L1 stress system and proficiency on the perception of stress in the L2. I will also refer to L1 influence and the role of L2 proficiency in this section. Results of a number of previous studies show that there is a positive transfer from the L1 when L1 and L2 share similar stress systems (Lord, 2001; Paschke, 2013). This is also true for word cognates, as they may have positive effect when they are stress cognates (i.e., they share stress pattern in the L1 and the L2); however L1 patterns may cause interference in stress assignment when the stress pattern is different in the L1 and the L2 (Erdmann, 1973; Lord, 2001, Paschke, 2013).

2.4.1 The influence of the L1 on the L2 stress production

Authors of other studies (e.g., Erdmann, 1973; Flege & Bohn, 1989; Lord, 2001; Paschke, 2010) emphasize that one of the major problems in L2 acquisition, and in particular in production, is the negative influence of the first language (L1). Flege and Bohn (1989) investigated Spanish native speakers producing cognate words in English. Their results indicate that Spanish learners rely on the stress pattern from their L1, whenever they are not familiar with the English counterpart (Flege & Bohn, 1989). That is to say, participants transferred word stress

patterns from their L1 (Spanish) when they were unfamiliar with English words. For example, participants did not stress the initial syllable in word *Satan*, but they assigned stress correctly to word *sa'tanic*. The possible explanation is that they knew the stress pattern for other words ended with -ic (i.e., the syllable preceding the suffix -ic always receives stress).

Caspers and Keçińska (2011) also investigated the influence of the L1 on L2 stress production. They investigated the production of Dutch words by native speakers of French, Mandarin Chinese, Polish and Hungarian. Though they claim that learners assign stress to L2 words on the basis of their L1, the main reason for problems with correct assignment of stress in the L2 seems to be the overgeneralization of L1 stress rules. This aligns with the proposal made by Erdmann (1973), who claims that rules applied by native speakers of German in the production of English word stress are extensions of the rules from their L1, but not “approximations of the rules to be mastered” (Erdmann, 1973: 230). Hence, Erdmann (1973) points out that students’ productions were not random guesses but had a regular pattern. Nonetheless, Caspers and Keçińska (2011) point that it is essential to consider learners’ L1s. They claim that there might be positive transfer from the L1 on the one hand, when the prosodic structure is similar in the L1 and L2, or negative transfer when the L1 and L2 differ from each other in terms of their stress systems (Caspers & Keçińska, 2011). Particularly words with irregular stress patterns pose difficulties, whereas words with fixed stress contributed to correct stress assignment (Caspers & Keçińska, 2011).

Erdmann (1973) analyzed the production of English words by 94 German native speakers: 58 high school students with four years of English and 36 students who were in the first semester of a university-level introductory course on English linguistics. The first list of

words used in the study contained adjectives taken from high school students' English books. The second list included words that participants were expected to memorize in previous courses. In addition, there was a list of novel words that did not appear in students' textbooks during the four years of English study for participants in the first group. Adjectives in the study had suffixes that occur both in German and English. Thus, these words are considered cognates (i.e., words with similar etymological origin, though very often different meaning). Nonetheless, German suffixes: -'al, -'abel, -a'tiv, -a'torisch are stressed, whereas English: -al, -able, -ative, -atory remain unstressed as illustrated in (13) (Erdmann, 1973: 231-233).

(13)

- a) bisyllabic words: English 'global vs. German glo'bal
- b) trisyllabic words: English la'ryngal vs. German laryn'gal
- c) four-syllable words: English funda'mental vs. German fundamen'tal

In their production of these adjectives, subjects demonstrated a tendency not to transfer the stress pattern from their L1. Instead, they tended to create a new stress pattern, as shown in (14) (Erdmann, 1973). According to Erdmann (1973), the stress pattern set up by German native speakers was neither German nor English. Thus, the new stress pattern they created is 'intermediate' -between two languages:

“[...] the rules of the intermediate system are elaborations of the rules of his native language, and not approximations of the rules of English to be mastered [...] His prosodic assumptions, however, are not random guesses, but follow a regular pattern that emerges, when one analyses larger numbers of mis-stressing” (Erdmann, 1973: 230).

Examples of this “intermediate” stress pattern are provided in (14):

(14)	English	new stress pattern	German
	cen'tripetal	centri'petal	zentripe'tal
	de'rivative	deri'vative	deriva'tiv

Erdmann (1973) points out that learners apply a new stress rule whenever the adjective is new for them. In (14) it is noticeable that the new pseudo-stress rule (bold faced in (14)) is basically a shift of one syllable to the left from the syllable that receives stress in German (Erdmann, 1973: 240). Erdmann claims that the new rule can also be applied to words containing suffixes derived from Romance.

(15)	English	German
	'affable	af'fabel
	'blamable	bla'mabel
	'capable	ka'pabel

In German words with the suffix '-abel', stress falls on the penultimate syllable, and as expected participants stressed antepenultimate syllable in their English productions (one syllable to the left of the L1 pattern). Therefore, in this case there were no mistakes, since stress indeed falls on the preceding syllable in the bisyllabic English words presented in (15).

The study by Erdmann (1973) indicates that on the basis of the rules from the L1, L2 learners may establish a new pseudo-stress pattern. Paschke (2013), along with Erdmann (1973) and Lord (2001), emphasizes that words similar in the L1 and L2, called cognates (i.e., words that look similar and have the same etymological origin, but very often with different meaning and different stress pattern) contribute to incorrect stress placement. Paschke (2013) investigated 26 advanced Italian students of German. Participants were asked to produce 171 German words

(91% nouns and 9% adjective) along with their Italian counterparts. Words with ultimate (i.e., final), penultimate, antepenultimate and pre-antepenultimate stress (i.e., fourth-from-last) patterns were included in the study. Paschke (2013) analyzes 11 hypotheses, considering the penultimate and non-penultimate stress patterns for each of them, in order to determine whether different phonological conditions (e.g., neighbourhood of schwa syllables) may affect stress assignment. In cognates with penultimate stress patterns and a schwa syllable at the end of a word, the number of correct answers was significantly higher, compared to words with the non-penultimate stress and schwa syllables (Paschke, 2013). Paschke (2013) also found that words with suffixes that are the same in the L1 and the L2 result in positive stress transfer from the L1. This study has some limitations, as Italian students from the North of Italy are very often bilingual in German and Italian, because of geographical proximity. Moreover, the fact that participants first said the word in the L1 and then the German cognate may have contributed to interference in stress assignment. Previous research has shown that cognate words pose difficulties in correct stress assignment when the stress pattern for cognates is different in the L1 and the L2 (Archibald, 1998; Flege & Bohn, 1989; Lord, 2001; Paschke, 2010, 2013).

Many studies have shown that incorrect stress placement is usually because of the transfer of stress pattern rules from learners' native language (Erdmann, 1973; Flege & Bohn, 1989; Lord, 2001; Paschke, 2010). The most problematic words are cognates that share the meaning in an L1 and L2. Therefore in the current research I would like to determine the extent to which L1 stress systems influence the production of L2 word stress and what happens when stress pattern rules are the same in both languages.

2.4.2 The role of L2 proficiency in L2 stress production

Some studies have shown that there is no significant difference in the production of L2 lexical stress among learners at different levels of proficiency (Archibald, 1992; Erdmann, 1973). Archibald (1992) investigated Polish learners' of English productions of English real words from seven different categories (i.e., nouns and verbs with primary stress on the final, penultimate, antepenultimate syllable; nouns with secondary stress) and showed that there was no improvement in speakers' productions even when their grammar scores increased. Similarly, even though the Italian M.A. students of German in Paschke's (2013) study performed in a more nativelike manner in assigning stress to Italian–German word cognates with penultimate stress patterns than B.A. students, the difference between the groups was not significant.

One important study does indicate that proficiency may play a role in the accurate production of lexical stress. Lord (2001) investigated the production of Spanish lexical stress assignment by native English speaking learners on three proficiency levels: beginners, intermediate and advanced learners. The results indicated a significant difference in the performance between beginner (62.5% accuracy rate) and advanced learners (92.5% accuracy rate), and also between beginners and intermediate learners (79% accuracy rate). Moreover, all three groups had slightly higher accuracy rate (beginner: 57.62%, intermediate: 79.27%, advanced: 91.98%) for cognate words with different stress patterns in both languages compared to non-cognate words; however, the accuracy rate was the highest when cognates shared stress patterns in the L1 and L2 (beginner: 77.33%, intermediate: 94%, advanced: 99.41%). The results suggest that all learners, and in particular beginner learners of the L2, have problems with assigning stress to cognate words with different stress patterns in the L1 and L2, whereas they

tend assign stress more accurately when cognates have the same stress placement in both languages.

In conclusion, the results of previous studies indicate that advanced learners might have an advantage in stress assignment. Nonetheless, since there are not enough studies that have investigated the production of L2 stress among learners at a variety of proficiency levels, it is difficult to determine whether there is a significant difference between beginners and intermediate learners.

2.4.3 The role of L1 perception in the production of the L2 word stress

A long-standing debate in the L2 pronunciation literature surrounds the interrelatedness of perception and production. Most of the work on the link between perception and production deals with speech segments. According to Flege's (1995) popular Speech Learning Model (SLM), perception and production are closely linked in L2 acquisition. Perception is the first step, and then comes production. Flege (1995) also emphasizes that at the beginning stages of L2 acquisition, transfer from the L1 will be very common. During the process of learning, the relationship between perception and production becomes stronger than at the beginning when we start learning an L2 (Baese-Berk, 2010: 19). The SLM predicts that learners will have the least difficulties with sounds that are the same in the L1 and L2, and that they will have relatively few difficulties in acquiring L2 sounds that differ from sounds in their L1 (i.e., "new" sounds), as learners set up a separate category for them. Consequently, sounds that are similar in the L2 and L1 will cause the most problems for L2 learners, as it will be difficult for learners to distinguish them. Though this model may not seem to be relevant for the current study, it may be that new

stress patterns in the L2 (i.e., stress on the initial syllable in words with stress-affecting suffixes: -keit/-heit) will be easier to acquire for learners, whereas cognates (i.e., words that look similar in English and German, but have different stress patterns) will be problematic for L2 learners as they will transfer stress pattern from their native language. Words ending in schwa syllables should not pose difficulties for English native speakers as stress rule for these words is the same in English and German (i.e., stress is assigned to the penultimate syllable as final schwa syllables never receive stress. Therefore, I expect participants to successfully transfer stress rule from their first language.

Although many studies indicate that correct production of L2 stress by non-native speakers is vital for native speakers' ability to understand what was said, the perception and production of lexical stress in a second language have been shown to be difficult for L2 learners due to the many rules and exceptions in L2 word stress systems (e.g., Caspers, 2010; Derwing et al., 1998; Field, 2005; Hahn, 2004; Munro et al., 1995). Studies focusing on both perception and production have as a goal to present the influence of perception on production (i.e., whether being able to perceive word stress correctly guarantees correct production of the words stress) (Altmann, 2006; Jangjamras, 2011; Zhang et al., 2008; Zhang & Francis, 2010).

Successful stress perception does not always guarantee the same results in production, as showed in studies by Altmann (2006) and Archibald (1998). Archibald (1998: 176) pointed out "a subject may have a correct representation [in perception] but may be unable to easily access that representation under certain circumstances" (e.g., time constraints or tasks which do not focus on accuracy). There are also many factors influencing production in the L2. In the preceding section it was mentioned that learners with L1s with predictable stress patterns had

poorer results for L2 stress perception than learners with L1s that are non-stress languages or non-predictable stress languages (Altmann, 2006). The same group of participants (L1: Arabic, Turkish, French, Spanish, Japanese, Korean, Chinese) from Altmann's (2006) perception study also completed a production experiment, the goal of which was to determine whether there is a correlation between perception and production of L2 English stress. Forty-six words used for the production study had similar syllable structure to items from the perception experiment and followed the same principles. Each participant received a list of words and read each word aloud. The results from this production study showed that participants with L1s that are stress languages performed better in the stress production task in comparison to those with L1s that are unpredictable/ non-stress languages. Moreover, some of these subjects performed as well as native speakers of the target language (Altmann, 2006). Native speakers of Chinese, Korean and Japanese performed much less accurately in the production of English word stress, compared to other participants (i.e., native speakers of Spanish, Turkish, Arabic). Nonetheless, considering that Chinese native speakers make use of pitch accent and tone in their L1 and have no experience in the production of stress, their poor results in the production study of English word stress could be expected. Spanish native speakers, however, were expected to perform better in the production experiment, as Spanish belongs to group of stress languages, even though it, like English, has unpredictable stress. In his explanation of the unexpected results of the Spanish learners of English, Altmann (2006: 126) emphasizes that Spanish participants may need more information about the morphological structures and syntactic categories of words.

The same tendency was also reported in a study by Archibald (1998) investigating the perception and production of English words by 23 native speakers of Polish and 20 native speakers of Hungarian. Although Hungarian and Polish are fixed-stress languages, Polish

speakers performed better in the production task (60% words with correct stress pattern) compared to Hungarian speakers (31% words with correct stress pattern). Nonetheless, both Hungarian and Polish subjects performed more accurately in the perception experiment compared to the production experiment. Archibald's (1998) study sheds more light on the role of the L1. Native speakers of Polish tend to choose the penultimate stress, which is dominant in Polish. Hungarian speakers, however, tended to stress the initial syllable, as this is a main stress in their native language.

Unlike the study by Altmann (2006) and Archibald (1998), Jangjamras (2010) shows that Thai speakers of English performed similarly in perception and production tasks. Moreover, they performed similarly to native speakers of American English. Participants produced the target words three times in isolation and three times in the frame sentence. Half of the words used in the study were with initial stress and half with the final stress. The study also reveals that both American and Thai speakers had less difficulty with the production of initial stress than final stress.

2.5 Input-based training

Given the relative importance of stress assignment in comprehensibility, Lord (2001) notes that not enough attention is paid to teaching stress rules in the L2 classroom and that there is disagreement among researchers about what kind of lexical stress teaching model would work the best for learners (Lord, 2001).

Traditional training that usually involves only listening and repeating may be effective. A study by Lord (2005) was based mainly on textbook explanations and production. Though the

results showed that participants improved at the end of the semester, there was no control group to indicate if the effect of training was actually significant. A later study by Lord (2013) with a control group showed that there was no clear effect of training. Another experiment by Hardison (2004) indicates that there was no significant improvement in participants' prosody for novel sentences. Prosody training was individual, and sentences included were 20 familiar sentences from the textbooks from previous year as well as 20 novel sentences. First, participants produced sentences, and then they had a chance to listen to their production and then to native speakers' productions (auditory and visual) with a feedback on correct prosody. Participants could repeat sentences multiple times. After the post-test participants' productions were judged by native speakers who were supposed to indicate how nativelike their prosody was. Though the results from the study show improvement in prosody, it should be noted that participants' improvement was only for trained sentences and there was no significant effect for novel sentences.

Flege's (1995) Speech Learning Model (SLM) elaborates how learners' L1s influence the acquisition of the L2. According to the SLM, perception and production are related phenomena, and accurate perception is required for production. As such, it should follow that pronunciation training should consider first honing students' perceptual skills. An input-based study by Thomson (2011) showed that learners' production may improve after receiving only perceptual training. Mandarin native speakers' pronunciation of English vowels improved after input-based Computer Assisted Pronunciation Training (CAPT). The results from the post-test indicated that both groups (lengthened vowel group and select vowel group) improved in the perception after receiving the training.

VanPatten's (2004) Input Processing (IP) Model postulates that learners make connections between meaning and forms. Before I move to Processing Instruction I will clarify the difference between Input Processing (IP) and Processing Instruction (PI). IP refers to processes that occur in the learner's brain when he/she is perceiving the input, whereas PI is what a teacher does, so that learner is able to process the input. A central tenet of PI is that training should consist of structured input.

PI is composed of a series of "strategically controlled drills" (Gonzales-Bueno & Quintana-Lara, 2011). Primarily used in the teaching of morphosyntax, in PI, learners assign meaning to the input, and, according to Gonzales-Bueno and Quintana-Lara "learners process input for meaning before they process it for form" (2011:55). PI assumes deliberately delayed production, as once a student masters the system of rules, he/she will be able to apply them in the target language (Gonzales-Bueno & Quintana-Lara, 2011). Gonzales-Bueno and Quintana-Lara (2011: 55) propose six principles from Grammar Processing Instruction that can be applied in teaching pronunciation. The most important is focusing learners' attention on tasks connected with processing the input (e.g., when they are listening to native speakers' productions). At this point in the training, it is important to indicate differences between the L1 and L2. It is advised to give learners a chance to figure out rules based on the input. Moreover, specific tasks should be set up, so the learner can use the input.

A few previous studies have indicated pronunciation instruction making use of PI may not be beneficial for second language learners (e.g., Gonzales-Bueno & Quintana-Lara, 2011; Counselman, 2010). In the PI-inspired input-based study run by Counselman (2010), he investigated English learners of Spanish learning the pronunciation of the Spanish vowels /e/ and /o/. Counselman designed training sessions on Spanish pronunciation including perception and

production assignments. The results from the study indicate that giving learners instructions (i.e., pronunciation rules) contributes to their improvement in the perception task; however there was no clear influence on their production. Nonetheless, even when pronunciation instruction does not result in more accurate pronunciation, researchers often note that further investigation is required in order to determine whether some training is more helpful than other types (Counselman, 2010; Gonzales-Bueno & Quintana-Lara, 2011).

Gonzales-Bueno and Quintana-Lara (2011) examined the effects of the Pronunciation Processing Instruction for both perception and production of second language learners' pronunciation. They compared three groups Spanish learners of English. The first group received Processing Instruction, the second one received more traditional listen-and-repeat instruction, and the last one did not receive any instruction. Considering that processing the input is the most important part of the Pronunciation Processing Instruction (PPI), perception training took 7 weeks, whereas production training took 2 weeks. The post-test revealed that the PPI group slightly improved in the production task when compared to the pre-test. However, further investigations are required to determine the influence of PPI on perception. The study showed that not only subjects who received Pronunciation Processing Instruction (PPI), but also subjects with traditional listen-repeat treatment, improved in the post-test. There was no improvement among learners without instruction. To date, no study has investigated the effectiveness of input-based instruction on L2 learners' lexical stress production.

2.6 Research questions and hypotheses

Previous studies have not investigated if there is a positive effect of input-based training on the production of L2 stress. In addition, previous research has shown that differences between the German and English word stress systems may pose problems for second language learners of German. The studies on the production of L2 lexical stress showed that incorrect stress patterns in an L2 are mainly due to transfer from learners' L1s. However, none of these studies investigates English learners of German. Therefore, it remains to be determined how differences between L1 (English) and L2 (German) word stress system will affect stress assignment in German by English native speakers. As such, two main research questions guide the current study.

Research Question 1:

To what extent does training contribute to results in stress assignment in a production task? Is there any effect of training after 4-6 weeks?

Hypothesis. Based on the results of previous studies, I predict that participants who received training will perform better in the post-test than subjects who did not receive any training. Studies making use of PI-inspired input-based training (Counselman, 2010; Thomson, 2011, Gonzales-Bueno, 2005) have shown that providing learners with focused input in conjunction with instructions (i.e., pronunciation rules) contributes to their improvement in perception. Although these studies found no clear influence on their production, I expect that input-based training will raise learners' awareness of L2 lexical stress enough for trained participants to show an advantage in production.

Research Question 2a:

What kind of rules do English-German L2 learners follow when they apply word stress to German words from three distinct categories?

- native German words with a regular (penultimate) stress pattern (e.g., Fo´rle “trout”, Para´deiser “tomato”)
- German- English cognate words (e.g., lukra´tiv “lucrative”, ambu´lant “ambulant”, harmo´nal “hormonal”)
- native German words with predictable stress patterns due to suffixes they contain (e.g., ´Bösartigkeit “viciousness”, ´Tätigkeit “activity”)

Hypothesis: I predict that English- German L2 learners will transfer stress patterns from the L1 as predicted by previous research (Altmann, 2006; Archibald, 1998; Lord, 2001; Paschke, 2010, 2013) or that they will set up an intermediate stress pattern, which is not like the stress pattern from the L1 or that of the L2 (Erdmann, 1973). As was mentioned in the literature review (see 2.2.2.), schwa syllables in both English and German are never stressed. Hence, I expect that English native speakers will not stress schwa syllables. Recall the stress pattern in German-English cognates: in German these words have final stress, whereas in English the final syllable is not stressed. Therefore, I assume that cognates will be the most problematic words for English native speakers. With regards to Flege’s (1995) SLM, I predict that native speakers of English will have fewer difficulties in assigning stress to words with stress-affecting suffixes, as there will be no interference with stress pattern in their L1. Therefore, L2 learners will be able to set up a separate category for these words.

Research Question 2b:

Are trained participants aware of the stress rules that they apply when assigning stress to German words?

Hypothesis: I predict that participants who received training will be able to explain what kind of rules they applied when they were assigning stress to German words. Moreover, they will be able to say if their stress assignment was correct or not.

Chapter Three: METHODOLOGY

3.1 The Experiment

The first goal of the study was to investigate whether PI-inspired input-based instruction influences the production of second language word stress. The second goal was to examine which rules second language learners of German with English as first language follow when they assign stress to German words.

3.1.1 Participants and the recruitment procedure

In order to start recruiting participants for the research project I obtained Ethics Approval from the Conjoint Faculties Research Ethics Board (CFREB) at the University of Calgary. Twenty-six students, all of whom were native English speakers who were enrolled in a second-semester German course, participated in the current study. They had not received any training on stress assignment in German before the experiment.

Participants were recruited from their second-semester German courses during the Winter 2014 semester, and participation in this experiment was voluntary. Nonetheless, students received compensation of \$15 per meeting for participating in the study. Participants were assured about the confidentiality and anonymity of their data, and each was assigned a unique numerical participant ID.

3.1.2 Data collection and procedure

3.1.2.1 Informed Consent and Language Background Questionnaire

Before they came into the laboratory for the first meeting, participants signed an online consent form and completed a word familiarity task. They then completed two additional tasks online: a background questionnaire and a proficiency test (Goethe Insittut, 2004). The language background questionnaire included questions about participants' age, gender, age of first exposure to German, and other L2s. Additionally, participants indicated how long they had received German instruction and the time they had spent immersed in a German-speaking environment. This information is summarized in Table 3.1.

Group	Training (N=13)	No training (N=13)
Mean Age	20.92 (18-32)	19.62 (18-23)
Mean Number of L2s besides German	1.23(1-2)	1.69(1-3)
Mean Years of German Study	1.38 (0.5-3)	1 (0.5-3)
Mean Age of starting studying German	20.08 (16-32)	17.15(16-20)
Mean Proficiency Score (out of 30)	10.77 (1-15)	9.33 (4-14)

Table 3.1. Language background with ranges in parentheses.

3.1.2.2 Proficiency Test

In order to ensure that all participants were beginner learners of German, they completed an online German proficiency test based on that developed by the Goethe Institut (2004)¹⁰ during the first meeting. The test included 30 fill-in-the-blank and multiple-choice questions. Results are included in Table 3.1. According to the proficiency levels established by the Common European Framework of References of Languages (CEFR), participants were beginner level learners (A1-A2).

3.1.2.3 Word Familiarity Test

Prior to the first meeting in the lab, 19 participants completed an online survey of word familiarity. The task contained 95 potential study words, and the goal was to determine which potential words should be used in the study¹¹. Because the focus of the current study is to determine how participants are able to make use of morphological information in assigning lexical stress, it was important to select words that were relatively unknown to the participants.

The words included in the word familiarity task used for the pre-test included words of three different types: native German words with penultimate stress (N = 12), German-English cognate words with final stress (N = 24), words with suffixes that do not attract stress but that affect stress assignment (N= 16). Each word was presented on a separate page along with two questions. Participants were asked to check one of the options that characterized their familiarity

¹⁰Goethe-Institut. 2004. *Einstufungstest [Placement test]*. Retrieved from: <<http://www.goethe.de/cgi-bin/einstufungstest/einstufungstest.pl>> (30 October 2006)

¹¹Since some of the participants resigned after the recruitment process, I started my study having 19 participants who completed the word familiarity test. Based on their answers I chose the words for the current study.

with a given word. There were two measures of familiarity for each word. The questions were as follows:

1. *Do you know the meaning of the word?*

5- *Yes, I know the meaning and I use it myself*

4

3- *I might know the meaning*

2

1- *No, I don't know the meaning*

2. *Have you heard this word before?*

5- *Yes, I have heard it very often*

4

3- *I think I have heard it a few times*

2

1- *No, I have never heard it*

Except for German-English cognates, words selected for the current production study received familiarity responses of “1” on both familiarity questions by the majority of participants. This indicates that participants are not familiar with meaning of the words (Question 1) or have never heard them before (Question 2). All words that got responses of “5” were not included among the final words for the study. Words belonging to the group of German-English cognate words were more familiar to the participants (i.e., mean familiarity rates were higher for

these words), as they look similar to their English equivalents. All of the words chosen for the study along with their mean familiarity ratings are provided in Appendix A.

3.1.2.4 Production Task

All meetings were individual and took place in the Psycholinguistics Lab in the Language Research Centre at the University of Calgary. On the basis of the participant IDs two groups were created. All participants with odd participant IDs were assigned to the group that received training. The second group of participants remained untrained. The first meeting started with the 15-minute production pre-test. This was followed by a 40-minute-long training session on word stress assignment for the half of the participants who received training. This training is described below. Untrained participants only completed the production pre-test at the first meeting. The second meeting took place one week later. It started with the second part of the training for the trained participants. The second production task along with think-aloud protocol followed immediately after the training for these participants. That is, participants in the trained group listened to their productions and talked about stress rules that they applied while assigning stress to each word. The think-aloud protocol was inspired by Osbourne (2003), who found that an oral protocol serves to provide insights into the pronunciation strategies that second language learners use in their L2 productions. Hence, participants are expected to explain why they produced the words as they did, and to some extent we may understand the reasons for their difficulties when they are assigning stress in the L2. Untrained participants again only completed the production task.

A delayed post-test was conducted with the trained participants 4-6 weeks after the post-test to determine whether any effects of training were maintained. Ten participants out of thirteen who were in the training group took part in the delayed post-test with think-aloud protocol.

Participants were asked to produce a total of 104 words (52 test words and 52 fillers) belonging to the classes set out in table 4: words with initial (12), antepenultimate (4), penultimate (12) and final stress (24), consisting of 3 or 4 syllables. Furthermore, 12 were native German words, 24 were English–German cognate words with the stressed suffixes: -iv, -ant, -al, and 16 were German words with stress-affecting suffixes: -keit/-heit, -tum.

Word category		3-syllable words	4-syllable words
German words with penultimate stress and final schwa syllable		Fo'relle	Para'deiser
German words with penultimate stress and final closed light syllable		Kar'nickel	Mene'tekel
English-German cognates	-iv suffix	lukra'tiv	alterna'tiv
	-ant suffix	Ambu'lant	Interpe'lant
	-al suffix	laryn'gal	pontifi'kal

German words with stress- affecting suffixes	-keit/-heit suffix	ˈMagerkeit	ˈDusseligkeit
	-tum suffix	ˈBürgertum	Heˈroentum

Table 3.2. Distribution of the words from the study according to word category.

All words were randomized and incorporated in the carrier sentence *Ich habe das Wort _____ gesagt* (“I said the word_____.”), along the lines of previous studies (Lord, 2004; Guion et al., 2004; Thomson, 2011). This was done in order to ensure that words would be produced in the stressed position of the utterance and would be less susceptible to reduction. Participants were instructed to read the sentences aloud at normal pace and as naturally as possible. These productions from the pre-test served as the comparison for the post-test and the delayed post-test, in the case of the 10 trained participants who completed the delayed post-test. Subjects’ productions were recorded on the computer using recording software *Praat* (www.praat.org).

3.1.2.5 Input-based Instructions

The training for participants in the training group consisted of PI-inspired input-based training on the word stress system in German. That is to say, participants were exposed to productions of German words produced by a native speaker of German. All words used in the input-based training were different than words tested in the pre-test, post-test and delayed post-test. The input-based training was based on Processing Instruction, which stipulates that participants should not produce the target forms during the training sessions (VanPatten, 1996; Gonzales-Bueno, 2005; Gonzales-Bueno & Quintana-Lara, 2011). As such, nine tasks were

designed in order to have participants process input on lexical stress assignment in German. In addition, participants were asked to come up with stress assignment rules based on the patterns they observed in the auditory tasks. The training was divided into two sessions. One of the tasks was following:

Task 5: Differences between German and English.

Indicate which syllable is stressed in the following words.

1. relativ
2. Variant
3. Material
4. Ornamental
5. Emigrant
6. Bäckerei
7. dekorativ
8. Experiment
9. Militär
10. Konferenz
11. expressiv
12. Kapital
13. Deodorant
14. materiell
15. liberal

Look at the cognates in task 5. Please write a rule to describe stress placement in these German-English cognates.

The first session focused on perceiving word stress and learning word stress rules for native German words with penultimate stress. In addition, it focused on differences in word stress in German-English cognates. This session included six tasks, four of which were identification tasks. Participants listened to words with default stress pattern and identified which syllable was stressed. After receiving training on default stress in German, participants

were then asked to predict which syllable would be stressed. They then checked their answers with the recording. Then, participants were acquainted with German- English cognate words. They were asked to listen to the recordings, mark the stressed syllable and try to figure out rules for cognate words with various morphemes, as in task 5 above. The task that followed tested participants' predictions of in German-English cognate words.

During the second training session that occurred approximately one week after the first training session, participants reviewed the material from the previous session and were acquainted with the role of suffixes in word stress assignment in German. Participants listened to the recordings and marked the morphemes that were unstressed. Then they were asked to explain the stress assignment patterns in these words. Participants received immediate feedback on all of the responses they gave during the training session.

To sum up, in both training sessions participants in the training were presented with a large quantity of German lexical items produced by a native speaker. They first noticed stress assignment patterns. They then made predictions about stress assignment, and they then checked their answers with the recordings. The final task was a discrimination task, in which they listened to the word pairs: with incorrect and correct stress pattern and marked the column that contained word with the correct stress pattern.

3.1.2.6 Think-aloud protocol

In order to determine whether students in the training group¹² could express a set of rules for stress assignment in German, they engaged in a think-aloud protocol. Immediately after s/he completed the production task, each trained participant was asked to listen to his/her production from the post-test and delayed post-test and to say whether he/she assigned stress correctly and which stress assignment rule s/he applied for each of the words. Extensive notes were taken on the students' comments about their stress assignment.

3.1.3 Data analysis

In order to determine which syllable was the stressed in each of the words, two raters (a native speaker of German and I) independently listened to the recordings and determined a) whether words were stressed correctly and b) which syllable was stressed. Words with correct stress were assigned 1 point, and words were assigned 0 points if the stress placement was perceived by both raters as incorrect. Mispronunciation or syllable deletions were noted and transcribed in the analysis of the data. In cases of non-agreement between raters, both raters listened to these recordings together in order to make a final judgment.

Due to the correlated and unbalanced nature of the data (i.e. measuring the same subjects longitudinally), data were analyzed using Generalized Estimating Equations (GEE). The analysis was done through the GENLIN procedure in SPSS version 22. Wald Chi-Square Tests were run

¹²Results of the pilot study showed that those participants who did not receive any instructions on word stress rules in German (i.e., participants who were not in the training group) were not able to assess their stress and emphasized that they are not familiar with any stress rules in German. Therefore, in the current study only participants in the trained group took part in the think-aloud protocol.

in order to determine whether there is a significant difference between the training and no training group in the production post-test according to word type and subtype.

Chapter Four: RESULTS

4.1 Introduction

In this chapter I will present statistical analysis of the data from the production pre-test, post-test and delayed post-test, which are organized according to research questions. The primary data analyzed in this chapter include participants' word stress assignment correctness scores from the pre-test, post-test and delayed post-test. The independent variables include two groups (training, no training), three word types (penultimate stress, German-English cognates, stress-affecting suffixes) and seven subtypes (open and closed schwa syllables; suffixes with final stress: -iv, -al, -ant; stress-affecting suffixes: -keit/-heit, -tum). Correctness scores from the pre-test, post-test and delayed post-test serve as dependent variables. Additional data include information on the location of stressed syllables in the case of incorrectly stressed words and results from the think-aloud protocol.

4.2 The effect of different variables

The effect of different variables was tested in order to see if there are other factors that may influence production of L2 lexical stress. These variables include: age group, gender, age of starting to learn German, number of syllables in the word, number of languages spoken by participants, and immersion experience. In addition I tested the familiarity with words: the effect of meaning and effect of frequency (i.e., how often participant heard certain word).

Although there was no significant effect of age starting learning German ($\chi^2(1) = 2.261$, $p > .05$), there was an effect of age group ($\chi^2(2) = 7.673$, $p = .022$). The group that had the highest accuracy scores was 20-21 years old (mean accuracy score = 61%).

The number of syllables in the words appeared to be very important for correct stress assignment ($\chi^2(1)= 18.585$, $p= .000$). Participants had fewer problems with correct stress assignment when words consist of 3 syllables (mean= 57%), whereas their accuracy score was lower for 4-syllable words (mean= 50%).

Moving to the effect of word familiarity, participants' familiarity with meaning of a word had no significant effect on participants' accuracy ($\chi^2(1)= 1.209$, $p > .05$); however participants had higher accuracy scores if they had already heard this word ($\chi^2(2)= 7.1621$, $p= .007$);

Other variables including gender ($\chi^2(1)= .097$, $p > .05$), immersion ($\chi^2(1)= .003$, $p > .05$) and number of languages ($\chi^2(1)= .013$, $p > .05$) had no significant effect on how accurately participants assigned word stress to German words.

4.3 Overall results

In this section, I present the results from the pre-test, post-test and delayed post-test for all participants, regardless of training. The results from Wald Chi-Square Test with both groups included in the analysis indicate that the effect of word type (i.e., words with penultimate stress, German-English cognate words with final stress, words with stress-affecting suffixes) was significant in the production pre-test ($\chi^2(2)= 28.901$, $p= .000$); however there was no significant difference among word types in the post-test ($\chi^2(2)= 4.641$, $p=.098$) or in the delayed post-test ($\chi^2(2)= .389$, $p= .823$). To clarify this, in the pre-test participants assigned stress more accurately to words with penultimate stress (56%) and words with stress affecting suffixes (54%) than to German-English cognates with final stress (31%). The results from the production pre-test, post-test and delayed post-test and presented in Figure 4.1.

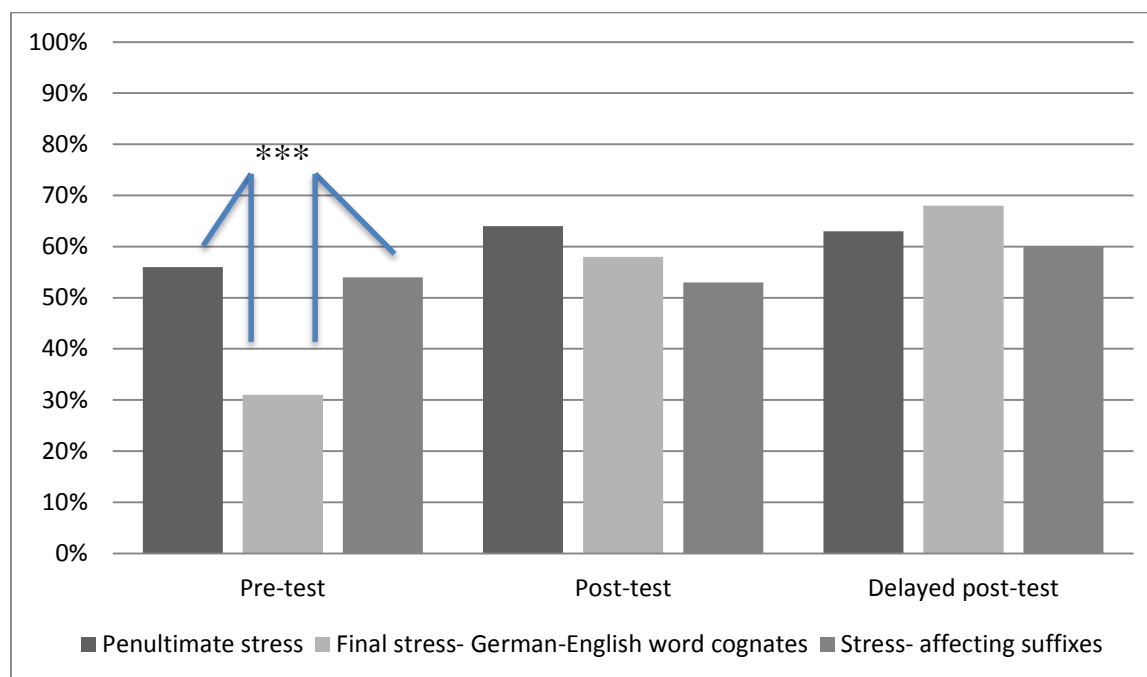


Figure 4.1 Overall results from the production pre-test, post-test and delayed post-test according to word type¹³.

Though the significant difference in correctness scores between word types is significant only in the production pre-test, the results of the Wald Chi-Square Test show that there is a significant effect of word subtype in the production pre-test ($\chi^2(6)=82.346$, $p= .000$), post-test ($\chi^2(6)=31.628$, $p= .000$) and delayed post-test ($\chi^2(6)=78.507$, $p= .000$). In the production pre-test, the highest correctness scores were noted for words with open schwa syllables (63%) and for words with the suffix -keit/-heit (63%) compared to words with the suffixes: -iv ($p < .001$, mean dif. =0.31, SE= .056), -al ($p < .001$, mean dif. =0.47, SE= .053), -ant ($p < .05$, mean dif. =0.21, SE= .052) and -tum ($p < .05$, mean dif. =0.19, SE= .056). Although in the production post-test participants assigned stress most accurately to words with an open schwa syllable (71%), there

¹³ Stars included in figures in the results section indicate the level of significance.

was no significant difference between word with open schwa syllable and suffixes -iv, -ant and -keit/-heit. Only words with a closed schwa syllable ($p < .05$, mean dif. =0.15, SE= .048), the suffix -al ($p < .05$, mean dif. =0.24, SE= .074) and the suffix -tum ($p < .05$, mean dif. =0.27, SE= .067) had accuracy scores significantly lower than for words with an open schwa syllable. In the delayed post-test, similarly to the results from the production post-test, participants performed better in assigning stress to words with an open schwa syllable than to words with a closed schwa syllable ($p < .001$, mean dif. =0.29, SE= .065). There was no significant difference between words with open schwa syllable and the other subtypes. It is worth noting that the accuracy scores among words with final stress were significantly higher for the suffix -iv than for the suffix -al ($p < .05$, mean dif. =0.20, SE= .063).

To conclude, English learners of German have fewest difficulties in assigning stress to words with open schwa syllables and the suffix -keit/-heit. Particularly problematic seem to be words with closed schwa syllables and the stressed cognate suffixes -iv, -al and -ant and the unstressed non-cognate suffix -tum. In all three tests participants had lower accuracy scores for words with closed schwa syllables when compared to words with open schwa syllables.

4.4 Research Question 1

The first research question guiding this study is as follows:

To what extent does training contribute to results in stress assignment? Is there any prolonged effect of training after 4-6 weeks?

4.4.1 Results from the production pre-test

At the outset of the study, participants in the training and no training groups performed similarly on the production pre-test. Wald Chi-Square Tests were used to test: group effects, type effects and group by type interaction effects. Results from the Wald Chi-Square Test reveal that there is no statistically significant group effect ($\chi^2(1)=2.090$, $p= .148$) or significant group by type interaction effect ($\chi^2(2)= .097$, $p= .952$). This means that the groups do not differ in their overall performance at pre-test. Further investigation indicates that there is no significant difference between the training and no training group in the production pre-test by word type: penultimate stress ($\chi^2(1)= .887$, $p= .346$), German-English cognates ($\chi^2(1)= .785$, $p= .375$) and words with stress-affecting suffixes ($\chi^2(1)= .673$, $p= .412$). There is, however, a significant overall type effect ($\chi^2(3)= 29.99$, $p<.001$). The effect of word type provided in the table 4.1 on the correctness scores was significant in both the training ($\chi^2(2)= 38.435$, $p < .001$) and the no training groups ($\chi^2(2)= 13.109$, $p= .001$).

Meeting	Word type	Training Group	Sig.	No Training Group	Sig.
Pre-test	Penultimate stress	.53	.000	.60	.001
	German-English cognates	.27		.34	
	Stress-affecting Suffixes	.51		.56	
Post-test	Penultimate stress	.68	.060	.59	.028
	German-English cognates	.78		.38	
	Stress-affecting Suffixes	.61		.45	

Table 4.1 Effect of type in the pre-test and post-test for each group

The performance of the groups at pre-test according to word type can be seen in figure 4.2. Both groups had significantly higher accuracy scores for words with penultimate stress (T: $p = .000$; NT: $p = .006$) and stress-affecting suffixes than to German- English cognates. However, there was no significant difference in correctness scores for words with penultimate stress and stress affecting suffixes (T: $p = .771$; NT: $p = .642$). That is to say, in the production pre-test, the training and no training groups performed better in assigning lexical stress to words with penultimate stress and words with stress-affecting suffixes; however both groups had difficulties in assigning stress to German-English cognates with final stress.

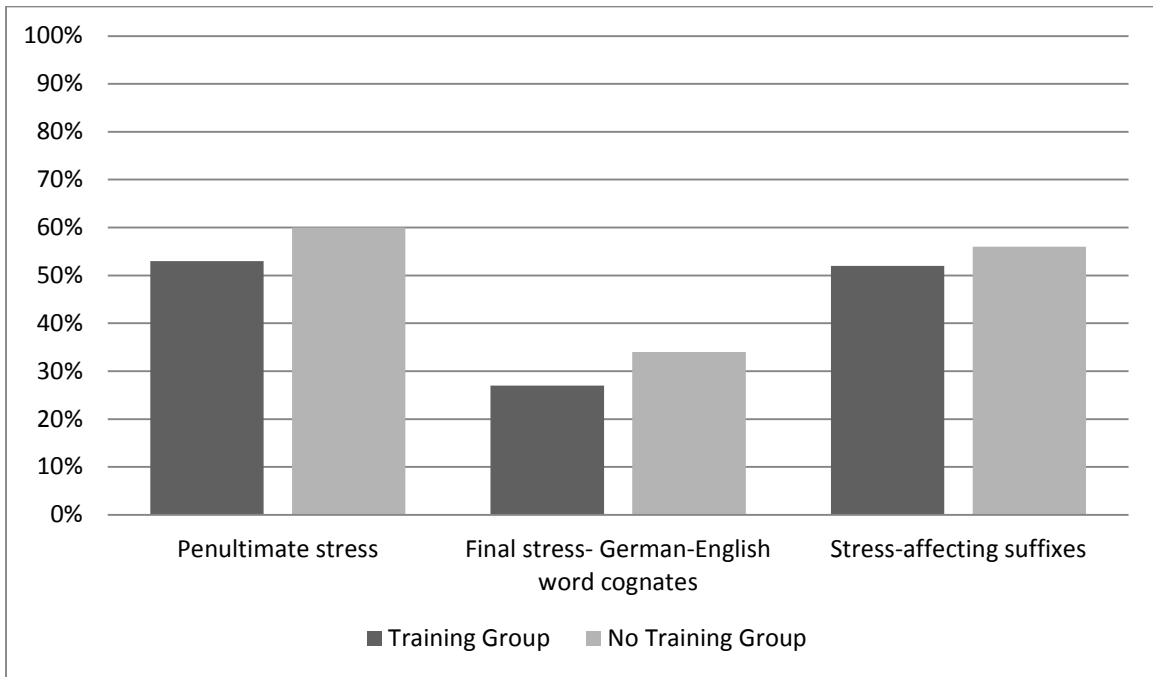


Figure 4.2 Mean accuracy scores by word type from the pre-test.

In conclusion, at the pre-test participants in both groups were significantly more nativelike in their assignment of lexical stress for words with penultimate stress and stress-affecting suffixes than for German-English cognates with final stress.

4.4.1.1 Correctness scores for word subtypes

Participants' accuracy scores differed not only for various word types but also among word subtypes. Moreover, as was shown in the previous section, looking at word subtypes may indicate significant differences in correct assignment among subtypes, when no difference was noted among word types.

The graphical illustration in figure 4.3 presents the mean accuracy scores at the pre-test for the training and no training group according to word subtype. In this section I will examine the difference in correctness scores across subtypes.

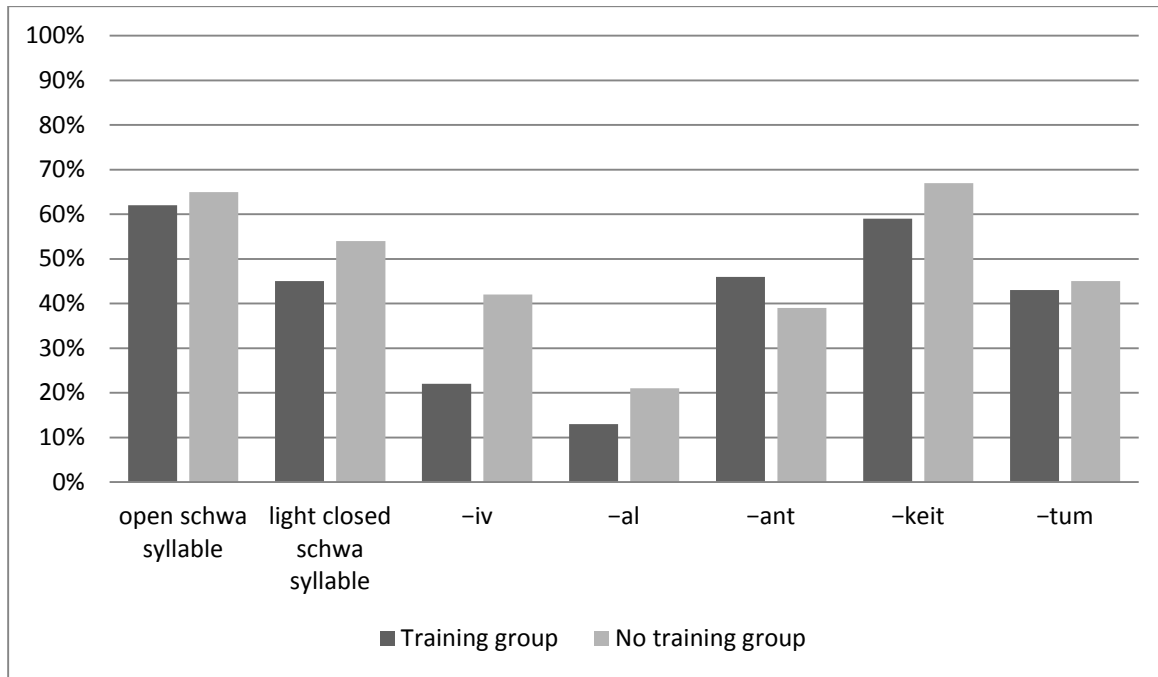


Figure 4.3 Mean accuracy scores by word subtypes from the pre-test.

The p-values from the Wald's Chi-Square Test in table 4.2 below indicate that there is no significant difference in the pre-test by group (training vs. no training) in correct stress assignment to words with open schwa syllables (T= 62%, NT= 54%) and closed schwa syllables (T=45%, NT=54%). However, there was a significant difference between words with open schwa syllables and words containing the suffix -al in both the training group and no training group ($p > .05$). Additionally, the accuracy scores for words ending in schwa syllables were significantly higher compared to words with the suffix -iv in the training group, and in the no

training group, participants were more accurate in their production of words ending in schwa than in words containing the suffixes -ant and -tum.

Moving on to the second subtype, words containing closed schwa syllables, the accuracy scores are once again significantly higher in the pre-test in both groups compared to words with the suffix -al ($T = p < .001$; $NT = p < .05$); moreover, in the training group the accuracy scores are significantly higher for words with closed schwa syllables compared to the suffix -iv ($p < .05$).

In the category German- English cognate words with final stress, the results from the production pre-test indicate that there is a noticeable transfer of stress pattern rules from participants' L1 (English), and accuracy scores are the lowest compared to two other types of words: words with penultimate stress and words with stress-affecting suffixes. The p-values generated from Wald Chi-Square Test for the training group presented in the table 4.2. indicate a significant difference in correctness scores between the subtype -iv and the subtype -ant ($p = .016$). In other words, the training group had significantly lower correctness scores for words ending with the suffix -iv (mean = .22) compared to words ending with -ant (mean = .46). However, there is no significant difference between suffix -iv and -al ($p = .510$). In addition, p-values show that both groups had significantly lower accuracy scores for words ending in the suffix -iv, when compared to those ending in the suffix -keit ($p < .05$). In both groups the correctness scores for words ending with -al are significantly lower compared to other word subtypes, except words with suffix -iv. As was mentioned before, participants from the no training group had more difficulties in assigning stress to words with suffix -al than to suffix -iv, although there is no difference in assigning stress to words with -al and -iv in training group.

Correctness scores for words ending with -keit/-heit and words ending with -tum were significantly different in both groups ($p > .05$). That is to say, participants had fewer problems with assigning stress to word subtype -keit/-heit than to word subtype -tum.

Meeting	Word subtype	Comparison	Mean correctness score		Sequential Sidak Sig.	
			Training	No Training	Training	No Training
Pre-test	Suffix -iv (mean training= 22%, mean no training= 42%)	Open schwa syllable	.62	.65	.000	.113
		Closed schwa syllable	.45	.54	.016	.944
		Suffix -al	.13	.21	.510	.075
		Suffix -ant	.46	.39	.016	.965
		Suffix -keit	.59	.67	.000	.030
		Suffix -tum	.43	.45	.214	.965
	Suffix -al (mean training= 13%, mean no training= 21%)	Open schwa syllable	.62	.65	.000	.000
		Closed schwa syllable	.45	.54	.000	.030
		Suffix -iv	.22	.42	.510	.075
		Suffix -ant	.46	.39	.009	.000

		Suffix -keit	.59	.67	.000	.000
		Suffix -tum	.43	.45	.002	.028
	Suffix –keit/- heit (mean training group=59% mean no training group= 67%)	Open schwa syllable	.62	.65	.985	.965
		Closed schwa syllable	.45	.54	.567	.702
		Suffix -iv	.22	.42	.000	.030
		Suffix –al	.13	.21	.000	.000
		Suffix -ant	.46	.39	.629	.001
		Suffix -tum	.43	.45	.016	.001
		Suffix –tum (mean training group=43%, mean no training group= 45%)	Open schwa syllable	.62	.65	.267
	Closed schwa syllable		.45	.54	.993	.948
	Suffix -iv		.22	.42	.214	.965
	Suffix –al		.46	.39	.002	.028
	Suffix -ant		.59	.67	.993	.948
	Suffix –keit/- heit		.59	.67	.016	.001

Table 4.2 Correctness scores according to word subtype in the production pre-test

To conclude, there was no significant group effect in the production pre-test.

Nonetheless, the results from the pre-test according to word type and subtype indicate that

participants were more accurate in assigning stress to words with penultimate stress. Moreover, they had significantly lower accuracy scores when they assigned stress to words ending in -al compared to other word subtypes: open schwa syllable, closed schwa syllable, suffixes -ant, -keit, -tum.

4.4.2 Post-test differences by group

The performance on the post-test by group is shown in figure 4.4. The results of the Wald Chi-Square Test on the post-test results indicate that trained participants performed significantly better than the untrained participants on German-English cognates ($\chi^2(1) = 14.279$; $p < .01$, mean dif. = .40, SE = .106). Similarly, these same participants were significantly more likely to produce words containing stress-affecting suffixes in a more nativelike way than were untrained participants ($\chi^2(1) = 5.197$; $p < .05$, mean dif. = .16, SE = .069). However, there is no statistical significance between the training and no training group in the production of words with penultimate stress ($\chi^2(1) = 2.122$; $p > .05$, mean dif. = .09, SE = .065). That is to say, participants who did not receive any training assigned lexical stress similarly to participants in the training group in words with penultimate stress.

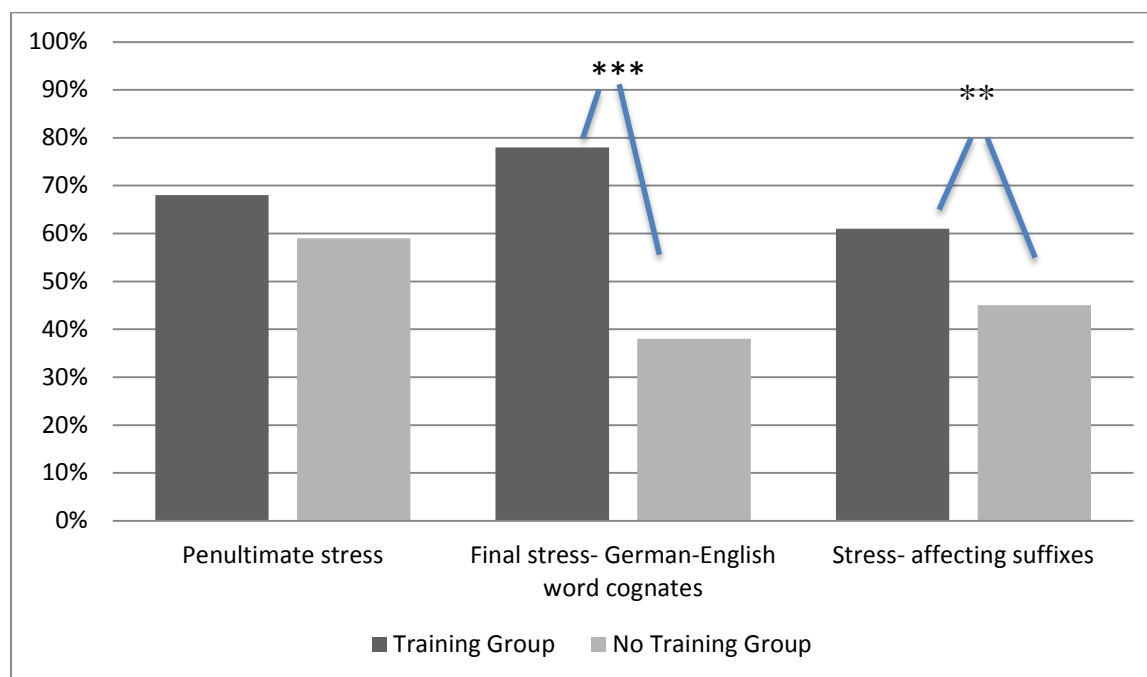


Figure 4.4 Mean accuracy scores by word types from the post-test

Performance by group broken down by word type is presented in table 4.3.

Meeting	Word Type	Training Group	No Training Group	Wald Chi-Square	df	Sig.
Post-Test	Penultimate stress	.68	.59	2.122	2	.145
	German-English cognates	.78	.38	14.279	2	.000
	Stress-affecting suffixes	.61	.45	5.197	2	.023

Table 4.3 Performance by group and word type

The results from the production post-test indicate that the training group improved after receiving input-based instruction. There is a significant difference between the trained and untrained group in word cognates with final stress and words with stress-affecting suffixes. Nonetheless, both groups performed similarly in assigning stress to words with penultimate stress.

4.4.2.1 Correctness scores for word subtypes

An analysis of the post-test production data according to word subtypes reveals that there were significant differences between groups. The effect of subtype on correctness was significant for both groups (T: $\chi^2(6) = 37.415$, $p = .000$; NT: $\chi^2(6) = 53.681$, $p = .000$). That is to say, participants' correctness scores varied overall according to subtype. The differences between the training and no training group in the production post-test according to word subtypes are shown in figure 4.5. Participants who received training had significantly higher accuracy scores for four subtypes (light closed syllables and the stressed cognate suffixes: -iv, -al and -ant).

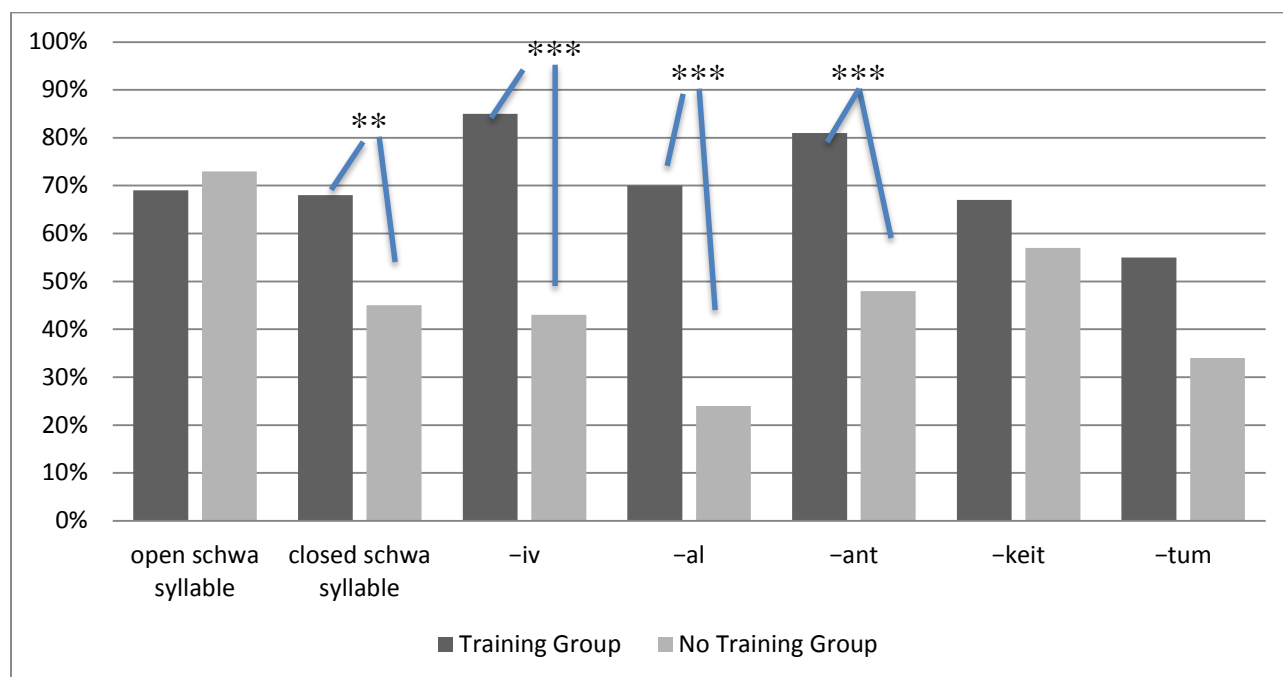


Figure 4.5 Mean accuracy scores by word subtypes from the post-test

The results of Wald Chi-Square Test on the effect of group according to word subtypes can be seen in table 4.4.

Type	Subtype	Group		Wald Chi-Square	df	Sig.
		Training	No Training			
Penultimate stress	open schwa syllable	.69	.73	.433	1	0.510
	light closed schwa syllable	.68	.45	6.270	1	0.012
Final stress-German-English cognates	-iv	.85	.43	11.036	1	0.001
	-al	.70	.24	15.360	1	0.000
	-ant	.81	.48	10.002	1	0.002
Stress-affecting suffixes	-keit	.67	.57	1.974	1	0.160
	-tum	.55	.34	3.671	1	0.055

Table 4.4 Effect of group in the post-test according to word subtype

There was no significant difference between the training and no training groups in the production of words with penultimate stress. Nonetheless, the Wald Chi-Square Test on word subtypes indicates that the groups differed in correct stress assignment for words with closed schwa syllables ($\chi^2(1)=6.270$; $p=.012$, mean dif.= .23, SE= .090). That is to say, participants who received training achieved higher accuracy scores (mean= .68) than participants, who did not receive any training (mean= .45) on words like *Kar´funkel* (“carbuncle”) or *Pose´muckel* (“Podunk”). The results for German-English cognates show that trained participants assigned stress more accurately for all three word subtypes: -iv ($\chi^2(1)= 11.036$, $p= .001$, mean dif.= .41, SE= .124), -al ($\chi^2(1)=15.360$, $p= .000$, mean dif.= .46, SE=.118), -ant ($\chi^2(1)=10.002$, $p=.002$, mean dif.= .33, SE= .103) than participants without training.

As mentioned above, the groups did not differ in the production of words with stress-affecting suffixes overall. Although the groups did not differ in the production of words ending in -keit/-heit, the differences between the groups approached significance in the production of words ending in -tum ($\chi^2(1)=3.671$; $p=.055$, mean dif.= .21, SE= .110).

4.4.3 Summary

The Wald Chi-Square Test on the post-test data showed there was no significant difference in correctness scores for the trained group among word types: penultimate stress, German-English word cognates, and stress-affecting suffixes ($\chi^2= 5.638$, $p= .060$). That is to say, after training, participants in the trained group performed similarly well in their production of all three types of words. However, there was a significant difference among word types for the untrained group ($\chi^2= 7.140$, $p=.028$). As in the pre-test, at the post-test the untrained participants assigned stress

more accurately to words with penultimate stress and stress-affecting suffixes than to German-English cognates with final stress.

In conclusion, these results show that the training group had significantly higher accuracy scores for German-English cognates and words with stress-affecting suffixes after receiving input-based stress assignment training than untrained participants. In addition, the trained participants performed significantly better in assigning stress to words with closed schwa syllables, even though the overall results for words with penultimate stress indicate that there is no significant difference between the two groups.

4.4.4 Retention of knowledge: Results of the delayed post-test

Only ten participants in the training group participated in the delayed post-test. The Wald Chi-Square Test results showed that there was a significant difference only between the post-test and delayed post-test in words with penultimate stress ($p < .028$, mean dif. = .10, SE = .056). That is to say, participants performed worse in their production of words with penultimate stress in the delayed post-test compared to the production post-test. No significant difference between the post-test and delayed post-test was found for German-English cognates or words with stress affecting-suffixes. The training group improved in the post-test after receiving Pi-inspired input-based instructions. Moreover, the difference between the post-test and delayed post-test indicates that the effect of the training was maintained.

No statistical difference was found in performance among the three word types in the delayed post-test. However, the results from Wald Chi-Square Test show that there are significant differences among some of the word subtypes. The mean accuracy scores for word

subtypes at the delayed post-test are presented in the table 4.5. The results from Wald Chi-Square Test on the showed that there was a significant difference in accuracy scores for words with open schwa syllables and words with closed schwa syllables ($p < .01$, mean dif.= .29, SE=.065). This indicates that trained participants assigned stress more accurately to words with open schwa syllables compared to those with closed schwa syllables.

In German-English cognates with final stress, a significant difference in correctness scores was found only between words ending in the suffixes -iv and -al ($p < .05$, mean dif. = .020, SE= .063). Trained participants produced words ending in -iv more accurately than words ending in -al at the delayed post-test. That is to say, participants performed better in assigning stress to suffix -iv (mean= 76%) compared to words ending in the suffix -al (mean=56%) ($p > .05$, mean dif.= .20, SE= .063). There was no statistical difference in performance on words ending in the suffixes -iv and -ant ($p > .05$, mean dif.= .03, SE= .984). In words with stress-affecting suffixes, the accuracy scores were not significantly different for words ending in the -heit/-keit and -tum ($p = 1.000$, mean dif.= .00, SE= .064). In addition, there was no statistical difference between performance on words with stress-affecting suffixes and the suffixes -iv and -ant, and also open and closed schwa syllables. This indicates that trained participants had similar accuracy scores for words with open schwa syllables and the suffixes -iv, -ant, -keit and -heit. Performance accuracy is presented in table 4.5.

Type	Subtype	Mean accuracy
Penultimate stress	open schwa syllable	.77
	light closed schwa syllable	.48
Final stress- German- English cognates	-iv	.76
	-al	.56
	-ant	.73
Stress-affecting suffixes	-keit	.60
	-tum	.60

Table 4.5 Results from the delayed post-test.

In conclusion, the significant difference between the post-test and delayed post-test was found only for words with penultimate stress. Participants performed worse on words with closed schwa syllables than open schwa syllables. Moreover, participants had fewer difficulties with assigning stress to words with the suffixes -iv and -ant, whereas suffix -al seems to pose major problems.

4.4.5 Training group: pre-test vs. post-test vs. delayed post-test

In the previous sections I compared the training and no training group and also presented the results from the delayed post-test. In the following section I will show how the training group performed in production over time, comparing the pre-test, post-test and delayed post-test results in order to show that there was a significant improvement in the production of L2 word stress after receiving input-based instructions. The results of the Wald Chi-Square Test showed that

there was a significant meeting (pre-test, post-test, or delayed post-test) effect ($\chi^2(2)= 89.147$, $p= 0.000$) and meeting by type interaction effect ($\chi^2(4)= 60.620$, $p= .000$); however there was no significant effect of type ($\chi^2(2)= .530$, $p= .767$). Table 4.6. presents the results of the Wald Chi-Square test, comparing the pre-test and post-test and post-test and delayed post-test results according to word type and subtype.

Type	Comparison	Sig.	Subtype	Comparison	Sig.
Penultimate stress	Pre-test	.000	open schwa syllable	Pre-test	.007
				Delayed post-test	
	Post-test			Post-test	.081
				Delayed post-test	
	Post-test	.028	light closed schwa syllable	Pre-test	.501
				Delayed post-test	
	Pre-test	.026		Post-test	.000
				Delayed post-test	
Final stress- German- English cognates	Pre-test	.000	suffix -iv	Pre-test	.000
				Delayed post-test	
	Post-test			Post-test	.122
				Delayed post-test	
	Post-test	.065	suffix -al	Pre-test	.001
				Delayed post-test	
Post-test				.049	

	Delayed post-test			Delayed post-test		
			suffix -ant	Pre-test	.015	
				Delayed post-test		
	Pre-test	.000			Post-test	.199
	Delayed post-test				Delayed post-test	
Stress-affecting suffixes	Pre-test	.054	suffix-keit/-heit	Pre-test	.839	
						Delayed post-test
	Post-test				Post-test	.426
					Delayed post-test	
	Post-test	.843	suffix -tum	Pre-test	.037	
	Delayed post-test					Delayed post-test
	Pre-test	.262			Post-test	.317
	Delayed post-test				Delayed post-test	

Table 4.6 The effect of meeting according to word type and subtype

A significant difference in correct stress placement comparing the results from the pre-test to those of the post-test was noted for words with penultimate stress (mean dif.= .15, $p < .001$, SE= .032) and final stress (mean dif.= .52, $p < .001$, SE= .050). The results for words with stress-affecting suffixes neared significance (mean dif.= .10, $p > .05$, SE= .043). It means that participants had significantly higher accuracy scores for those word types in the post-test compared to the pre-test. The difference between the production post-test and the delayed post-test is significant for words with penultimate stress (mean dif.= .06, $p < .05$, SE= .025). The significant difference according to word subtype was noted only for words with closed schwa

syllables (mean dif.= .23, $p < .001$, SE= .040). There is no significant difference between post-test and delayed post-test results for the word types German-English cognates with final stress and words with stress-affecting suffixes. There is also no significant difference between post-test and delayed post-test results for the subtypes -iv and -ant. The only significant difference that exists between the post-test and delayed post-test was for the subtype -al (mean dif.= .15, $p < .05$, SE= .074). It means that at the delayed post-test participants had significantly lower accuracy scores for suffix -al compared to the production post-test. For the subtypes containing the suffixes -keit/-heit and -tum there is also no significant difference between the post-test and the delayed post-test. That is to say, participants neither improved nor get worse on their production of words ending with -keit/-heit and -tum from the post-test to the delayed post-test, indicating that the effect of training was maintained.

To conclude, trained participants performed significantly better in the delayed post-test compared to the production pre-test. A significant difference was noted for words with penultimate stress (mean dif.= .10, $p < .05$, SE= .039) and German-English cognates with final stress (mean dif.= .41, $p < .001$, SE= .094). There was no significant difference between pre-test and delayed post test results for words with stress-affecting suffixes; however, participants had significantly higher accuracy scores in the delayed post-test for words with the suffix -tum (mean dif.= .17, $p < .05$, SE= .068).

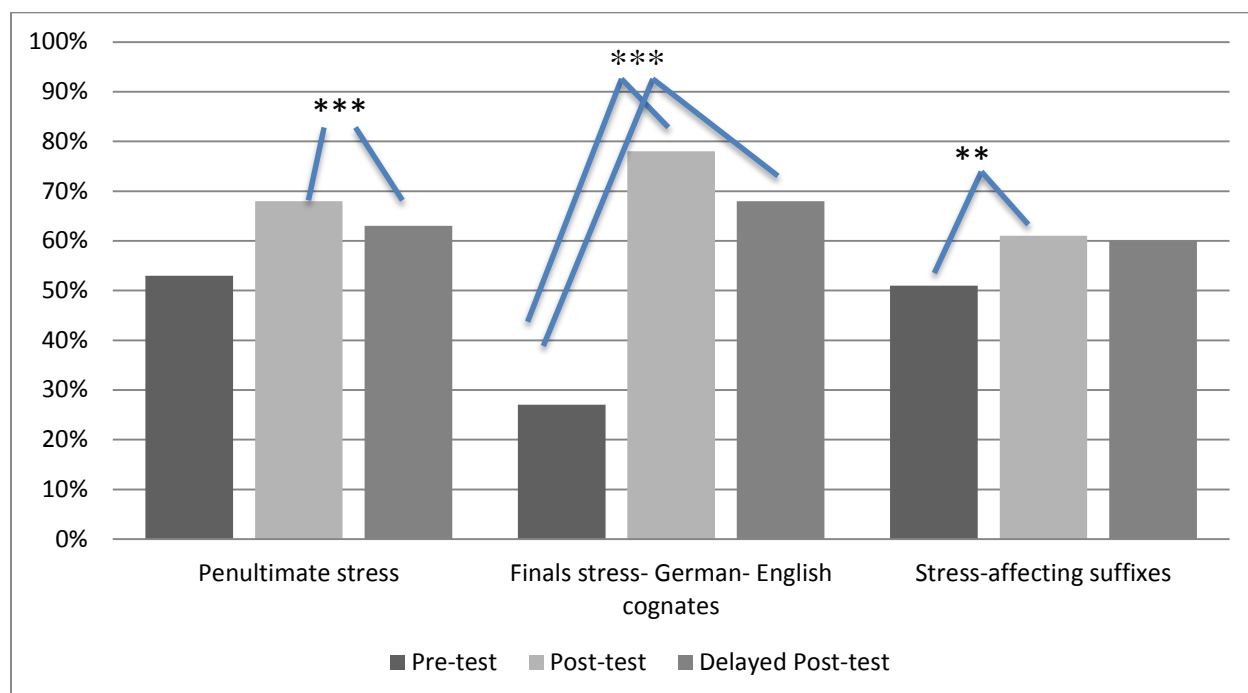


Figure 4.6 Mean correctness scores for the training group

The results from the production pre-test and post-test showed that the group that received training performed significantly better than untrained group. In addition, even though the accuracy scores in the delayed post-test were lower in some instances compared to the production post-test, the difference is not significant. Moreover, there is no significant difference between the production post-test and delayed post-test, which indicates that the effects of training were maintained.

4.5 Research Question 2a

The second research question that guided my study is the following:

What kind of rules do English-German L2 learners follow when they apply word stress

German words from three distinct categories:

- native German words with a regular (penultimate) stress pattern (e.g., Fo´relle, Para´deiser)
- German- English cognate words (e.g., lukra´tiv, ambu´lant, harmo´nal)
- native German words with predictable stress patterns due to stress-affecting suffixes they contain (e.g., ´Bösartigkeit, ´Tätigkeit)

Therefore, in the following section I will present participants' tendencies in assigning stress to words from three categories:

- native German words with penultimate stress
- German- English word cognates with final stress
- words containing stress-affecting suffixes

In the previous section I focused on participants' performance (trained vs. untrained) and their accuracy scores in the production pre-test and post-test and delayed post-test. This section will present data on the kind of stress patterns participants tended to apply when they assigned stress incorrectly. Since the aim is to show learners' stress pattern tendencies I will present the results from both groups together.

4.5.1 Overall stress patterns

The results from an analysis of stress assignment patterns indicate that participants' incorrect stress patterns were not based on random guesses. In general, in their inaccurate productions, there were tendencies to stress the same syllable within one category:

- 1) words with penultimate stress: first syllable in three-syllable words, first or second syllable in four-syllable words
- 2) German–English cognates: transfer from L1 (English)
- 3) words with stress-affecting suffixes (-keit/-heit, -tum): second syllable in 3-syllable words, second or third syllable in 4-syllable words

4.5.2 Penultimate stress

As indicated in the literature review, schwa at the end of a word is never stressed in either English or German (see table 2.1.). Hence, as hypothesised, in the production pre- and post-tests most of the participants did not stress the last syllable, which was schwa. Moreover, the accuracy scores for words with stress on the penultimate syllable in the pre-test were higher than for other word types. However, as can be seen in table 4.7, when participants assigned stress incorrectly, most of them tended to stress the initial syllable in 3-syllable words: *ˈKarnickel* (“rabbit”) vs. the correct *Karˈnickel*, *ˈKarfunkel* (“carbuncle”) vs. the correct *Karˈfunkel*, *ˈSchablone* (“stencil”) vs. the correct *Schaˈblone* or *ˈSchabracke* (“saddlecloth”) vs. the correct *Schaˈbracke*. In 4-syllable words, the stress was assigned either to the initial syllable e.g., *ˈFrikadelle* (“meatball”) or antepenultimate (second) syllable *Friˈkadelle* vs. the correct *Frikaˈdelle*. Interestingly, almost all participants assigned stress correctly to the words *Foˈrelle* (“trout”) and *Paraˈdeiser* (“tomato”).

The table below provides a summary of how many participants¹⁴ in the pre-test and post-test tended to stress the first or second syllable when they assigned lexical stress incorrectly to words with penultimate stress.

Number of syllables	Word	Stressed syllable	Pre-test Frequency	Total incorrect Pre-test	Post-test Frequency ¹⁵
3 syllables	Karfunkel	1 st	9	9	8
	Karnickel	1 st	13	13	8
	Schablone	1 st	13	13	7
	Schabracke	1 st	11	11	10
	Tentakel	1 st	13	15	9
4 syllables	Menetekel	1 st	3	12	0
		2 nd	6		8
	Frikadelle	1 st	7	16	5
		2 nd	9		6
	Posemuckel	1 st	14	14	5
	Exmatrikel	2 nd	7	13	8

Table 4.7 Stress pattern tendencies for incorrectly stressed words with penultimate stress in the pre-test and post-test.

It can be concluded that participants who incorrectly stressed words with penultimate stress tended to assign stress to the first syllable in 3-syllable words, whereas in 4-syllable words the lexical stress is assigned either to the first or second syllable. As mentioned, schwa syllables

¹⁴ The total number possible for each word in each test is 26.

¹⁵ In this case the number of total incorrect is the same as post-test frequency of incorrectly stressed words.

do not receive stress both in German and English; therefore stress on the last syllable (schwa) was very rare.

4.5.3 German-English word cognates with final stress

The results from Wald Chi-Square Test at the production pre-test, presented in section 4.4.1 indicate that participants had difficulties especially with assigning stress to German-English cognates with final stress. I hypothesized that the main reason for learners' problems with assigning stress to these words would be transfer of stress pattern rules from their L1. In order to show that participants mainly transferred stress patterns from English, I will focus on participants' stress pattern tendencies when they assigned stress incorrectly.

4.5.4 Words ending with the suffix -iv

Participants who incorrectly stressed words ending in -iv tended to transfer the stress pattern from English. As can be seen in table 4.8 participants assigned stress to the same syllable that is stressed in English.

Number of syllables	Stress pattern in English	Stress pattern transferred from L1	Pre-test freq.	Post-test freq.	New stress pattern	Pre-test freq.	Post-test freq.	Stress pattern in German
3-syllable words	´formative	´formativ	13	7	for´mativ	0	1	forma´tiv
	´putative	´putativ	19	10	pu´tativ	3	0	puta´tiv
	´lucrative	´lukrativ	16	8	lu´krativ	1	1	lukra´tiv
	´fricative	´frikativ	15	13	fri´kativ	4	0	frika´tiv
4-syllable words	al´ternative	al´ternativ	16	3	alter´nativ	1	1	alterna´tiv
	as´sociative	as´soziativ	10	9	asso´ziativ	3	0	assozia´tiv
	de´clarative	de´klarativ	14	7	´deklarativ	2	0	deklara´tiv
					dekla´rativ	1	1	
de´rivative	de´rivativ	16	10	deri´vativ	1	0	deriva´tiv	

Table 4.8 Stress patterns for words ending with the suffix -iv

As can be seen in table 4.8, participants assigned stress to either the initial syllable in three-syllable words (e.g., *ˈformativ* for English *ˈformative* and *ˈputativ* for the English *ˈputative*) or to the antepenultimate syllable in four-syllable words (e.g., *deˈrivativ* “derivative”, *alˈternativ* “alternative”, instead of stressing the final syllable). It indicates that participants relied primarily on the stress pattern from English when they were assigning stress to German- English cognates.

4.5.5 Words ending with the suffix -al

Moving to the suffix -al, stress pattern tendencies that are presented in table 4.9 indicate that most of the participants rely on stress pattern rules from English.

Number of syllables	Stress pattern in English	Stress pattern transferred from L1	Pre-test freq.	Post-test freq.	New stress pattern	Pre-test freq.	Post-test freq.	Stress pattern in German
3-syllable words	la'ryngal	la'ryngal	16	12	laryngal	6	3	laryn'gal
	har'monal	har'monal	23	20	0	0	0	harmo'nal
	a'tonal	a'tonal	23	13	0	0	0	ato'nal
	'clerical	'klerikal	20	12	0	0	0	kleri'kal
4-syllable words	pon'tifical	pon'tifikal	12	5	ponti' f ikal	3	2	pontifi'kal
					' p ontifikal	1	1	
	pro'nominal	pro'nominal	18	10	prono' m inal	2	1	pronomi'nal
	cen'tripetal	zen'tripetal	16	7	zentri' p etal	7	5	zentripe'tal
	centri'fugal	zentri'fugal	17	19	zen' t rifugal	6	0	zentrifu'gal

Table 4.9 Pre- and post-test stress patterns for words ending with the suffix -al.

Similarly to words with the suffix –iv, participants transferred stress patterns for words ending with the suffix –al from English. The number of incorrectly stressed words and stress patterns transferred from English is higher for this suffix. Participants had the tendency to stress the second syllable as in *la'ryngal* or *'klerikal*. However, some of the participants did not transfer the stress pattern from English; instead, they set up a new stress pattern as presented in the table above. For example, they stressed penultimate syllable in *zentri'petal* or antepenultimate in *zen'trifugal*. The new stress pattern was applied mainly for words consisting of four syllables.

The results indicate that participants had fewer difficulties with correct stress assignment to 4-syllable words (e.g., *pontifi'kal*, *pronomi'nal*) than to 3-syllable words (e.g., *hormo'nal*, *ato'nal*) ending in -al. Nonetheless, participants tended to transfer stress pattern from English and they set up an intermediate stress pattern in particular for 4-syllable words.

4.5.6 Words ending with -ant

The general tendency when participants incorrectly stressed words ending in –ant was to transfer the stress pattern from their L1, although there are some examples of a new stress pattern presented in the table 4.10. It is worthy of note that participants had fewer difficulties in assigning stress to 4-syllable words than to 3-syllable words.

It can be concluded that participants tended to transfer the stress pattern from English, although some of them applied a new stress pattern, which is different from the one in their L1 or L2.

Number of syllables	Stress pattern in English	Stress pattern transferred from L1	Pre-test freq.	Post-test freq.	New stress pattern	Pre-test freq.	Post-test freq.	Stress pattern in German
3-syllable words	ámbulant	ámbulant	11	3	am ˈ bulant	4	3	ambuˈlant
	áintrigant	áintrigant	8	1	in ˈ trigant	6	6	intriˈgant
	áadjutant	áadjutant	3	5	a ˈ djutant	18	10	adjuˈtant
	conˈsignment	konˈsignant	17	7	ˈ konsignant	0	3	konsiˈgnant
4-syllable words	sigˈnificant	sigˈnifikant	10	5	-	-	-	signifiˈkant
	conˈcomitant	konˈkomitant	7	6	konko ˈ mitant	6	4	konkomiˈtant
					ˈ konkomitant	0	1	
	interˈpellant	interˈpelant	11	6	in ˈ terpelant	1	1	interpeˈlant
					ˈ interpelant	4	0	
	conˈcelebrant	konˈzelebrant	8	9	konze ˈ lebrant	7	1	konzeleˈbrant
					ˈ konzelebrant	0	1	

Table 4.10 Stress patterns for words ending with the suffix -ant.

4.5.7 Words with stress-affecting suffixes

This word category consisted of words with stress-affecting suffixes: -keit/-heit and -tum. Participants assigned stress more accurately to 3-syllable words when compared to 4-syllable words. They had more difficulties in assigning stress correctly to 3- and 4-syllable words ending with -tum compared to 3-syllable words ending with -keit/-heit. Moreover, almost all participants assigned stress correctly to the words *ˈSeltenheit* (“rarity”) (N =24 out of 26) and *ˈFeuchtigkeit* (“humidity”) (N =24 out of 26). The main stress patterns for these words are presented in table 4.11.¹⁶

I will indicate some interesting tendencies that can be observed for this word category. Since in English there is a tendency to stress the initial syllable (Hyman, 1977) we would not expect participants to stress the last syllable if they are transferring stress patterns from their L1. As the results showed, participants preferred to stress the antepenultimate syllable in words ending with -keit/-heit e.g., *Bösˈartigkeit* (“viciousness”); however in some cases suffix -keit received stress. In 3- and 4-syllable words ending with -tum, there was a tendency among participants to stress the syllable immediately preceding the suffix (penultimate) e.g., *Heroˈentum* (“heorism”), *Germaˈnentum* (“teutonicism”), *Streˈbertum* (“ambition”). This is in spite of the fact that this is a schwa syllable, and schwa syllables do not receive stress in either English or German. However, it should be emphasized that participants followed the default stress pattern and stressed the penultimate syllable.

¹⁶ Though the total of incorrectly stressed syllables may suggest that participants also stressed other syllables, please note that syllable deletions were taken into consideration but this is not presented in the table.

Number of syllables	Stress pattern in German	New stress pattern	Pre-test Frequency	Total incorrect	Post-test Frequency	Total incorrect
3- syllable words	˘Bürgertum	Bür´gertum	5	5	4	6
	˘Fürstentum	Fürs´tentum	14	14	18	20
	˘Priestertum	Pries´tertum	12	13	8	12
		Priester´tum	0		4	
	˘Strebertum	Stre´bertum	17	17	18	19
	˘Magerkeit	Ma´gerkeit	4	10	0	3
		Mager´keit	5		3	
	˘Tätigkeit	Tä´tigkeit	3	4	1	4
Tätig´keit		0	3			
4-syllable words	He´roentum	Hero´entum	12	13	15	19
	Ger´manentum	Germa´nentum	11	13	11	12
	Mor´monentum	Mormo´nentum	14	15	12	13
	Sol´datentum	Solda´tentum	15	20	16	17
	˘Bösartigkeit	Bös´artigkeit	16	21	14	18
		Bösartig´keit	1		3	
	˘Dusseligkeit	Dus´seligkeit	3	3	4	5
	˘Ernsthaftigkeit	Ernst´haftigkeit	8	10	16	22
		Ernsthaftig´keit	1		4	
	˘Mutlosigkeit	Mut´losigkeit	16	22	13	14
Mutlo´sigkeit		4	0			
Mutlosig´keit		1	1			

Table 4.11 Stress patterns for words ending with the suffixes: –tum, -keit/-heit.

Overall, participants performed better in assigning stress to words with the suffixes –keit/-heit and in particular to *Seltenheit* (“rarity”) and *Feuchtigkeit* (“humidity”). However, the

results from the production pre-test and post-test show that when they assigned stress incorrectly there was a tendency among participants to stress the second syllable for 3-syllable words and the third syllable for 4-syllable words. Words ending in the suffix –tum seemed to be very problematic for participants, and usually the incorrect stress pattern was on the penultimate syllable.

4.5.8 Summary

In summary, words with penultimate stress were never stressed on the last syllable. This may be because schwa is never stressed both in German and English. As such, participants showed the tendency to produce stress on the penultimate syllable. Though participants seemed to have fewer problems with correct stress assignment to these words, when they assigned stress incorrectly there was a tendency to stress the initial syllable or the antepenultimate syllable.

The most problematic words were German- English cognates with final stress. Here participants usually transferred the stress pattern from English with a few examples of intermediate stress.

In terms of words with stress-affecting suffixes, participants performed better in assigning stress to words with suffixes -keit/-heit than to words with the suffix –tum. Nonetheless, when they assigned stress incorrectly to words ending with -keit/-heit, the stress was on the antepenultimate syllable. Participants tended to follow the default stress pattern when they were assigning stress to words with the suffix -tum and they stressed the penultimate syllable (schwa syllable) instead of the syllable before.

4.6 Research Question 2b: Think-aloud protocol

The second part of the research question 2 is as follows:

Are trained participants aware of the stress rules that they apply when assigning stress to German words?

The results from the think-aloud protocol revealed what kind of rules the trained participants followed when they assigned stress to German words. When they completed the think-aloud protocol, participants listened to their productions and were asked to indicate whether their stress was correct or incorrect and to elaborate on the stress rules that they applied. Only participants in the training group completed the think-aloud protocol, and they completed it both after the post-test and after the delayed post-test.

The results from Wald Chi-Square Test on applied stress rules revealed that there was a significant effect of meeting ($\chi(1)= 22.102, p < .001$) and word type ($\chi(2)= 16.765, p < .001$). There was also a significant meeting by type interaction effect ($\chi(2)= 8.927, p < .05$). Participants had significantly less difficulties with applying word stress rules for words with stress-affecting suffixes in the production post-test (96%) compared to the delayed post-test (49%) (mean dif. = .47, SE= .110, $p < .001$).

Moreover results of the Wald Chi-Square Test shows that there was a significant effect of meeting ($\chi(1)= 477.430, p < .001$) and word subtype ($\chi(6)= 706.250, p < .001$), though there was no meeting by subtype interaction effect ($\chi(4)= 8.684, p > .05$). The effect of meeting was significant for the following subtypes: open schwa syllables ($\chi(1)= 3.864, p < .05$), the suffixes -keit/ -heit ($\chi(1)= 15.715, p < .001$) and the suffix -tum ($\chi(1)= 9.648, p < .05$). This indicates that participants applied word stress rules better in the think-aloud protocol completed after the post-

test for words with open schwa syllables (99%), the suffixes -keit/-heit (96%) and -tum (96%) than in the think aloud protocol after the delayed post-test (words with suffix -keit/-heit: 42%; words with suffix -tum : 56%). This means that participants had difficulties with applying word stress rules during the delayed post-test, and many of them overgeneralized stress pattern rules for words with stress-affecting suffixes (-keit/-heit, -tum).

In general, the results of the analysis of the think-aloud protocol completed after the production post-test indicate that participants were aware of the rules they applied when they were assigning stress to German words. That is to say, participants were able to state a rule about the stress they had applied. Additional statistical analyses were run to determine whether participants' evaluation of their word stress assignment is the same as their judgments. The results revealed that participants recognized 58.2 % of their words as stressed correctly and 17% as stressed incorrectly. Nonetheless, participants did not recognize 12.3 % of words that they had stressed correctly; 12.6 % of words were assessed by participants as stressed correctly, although the stress was incorrect. The results are presented in the table 4.12.

	Words stressed correctly	Words stressed incorrectly
Recognized stress	58.2%	17%
Not recognized stress	12.3%	-
Recognized as correct	-	12.6%

Table 4.12 Results from participants' correctness vs. their judgments after the post-test.

The results from think-aloud protocol performed after the post-test show that participants recognized correct stress assignment for words with final stress (79.1%) and penultimate stress (72.0 %) better than for words with stress-affecting suffixes (54%). The results can be observed in the figure 4.7. Moreover, participants were able to say a stress rule for 97.2 % of words.

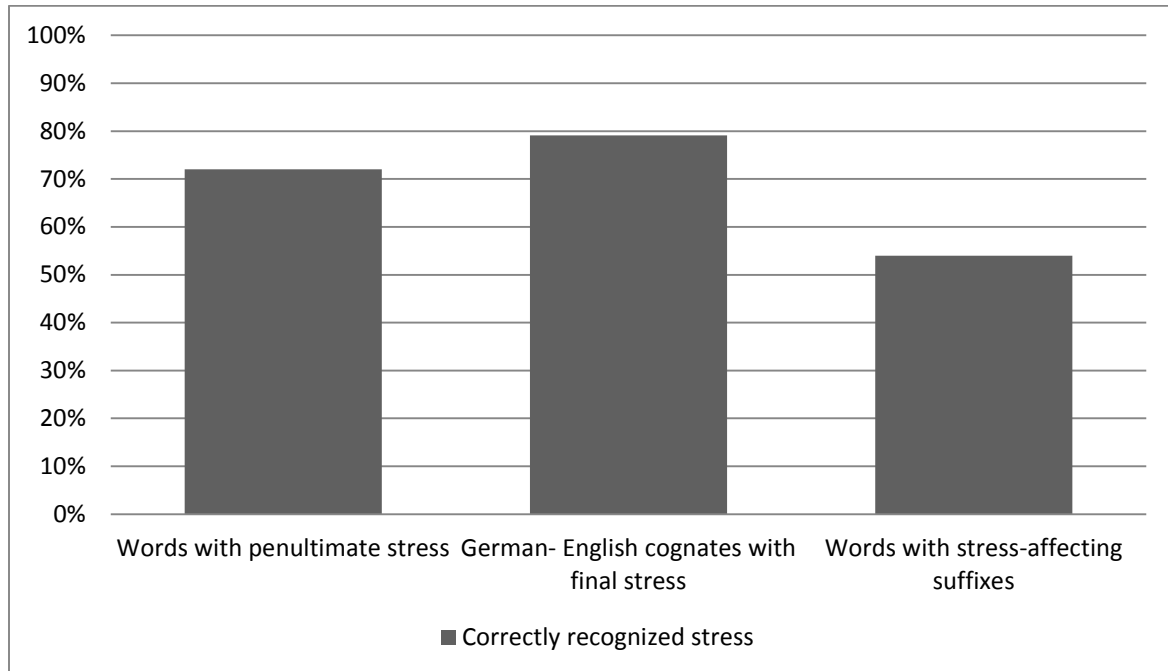


Figure 4.7 Correctly recognized stress according to word type at the post-test

The think-aloud protocol conducted after the delayed post-test revealed many overgeneralizations of stress pattern rules, especially in the case of words with unstressed suffixes and stress-affecting suffixes. As shown in table 4.13, participants were able to recognize 53% of words that they stressed correctly in the delayed post-test and 17% of those with incorrect stress. In addition participants were able to say word stress rules for 72.7 % of words.

	Words stressed correctly	Words stressed incorrectly
Recognized stress	53%	17%
Not recognized stress	11.5%	-
Recognized as correct	-	18.5%

Table 4.13 Results from participants' correctness vs. their judgments after the delayed post-test.

In what follows, I will highlight some individual findings from the think-aloud protocol performed after the delayed post-test, as many participants overgeneralized stress pattern rules and the results presented above indicate that they had difficulties with applying stress rules correctly when compared to the post-test. Participant #1 set up and followed one rule for all words containing stressed suffixes and words with unstressed suffixes. Regardless of type of suffix, this participant claimed that words ending with the suffixes -keit/-heit, -tum, -al/-ant/-iv should receive stress on the syllable before the suffix (i.e., on the penult). This is because all of these suffixes are unstressed (e.g., Bösar'tigkeit instead of the correct version ́Bösartigkeit). Hence, even when participant #1 correctly stressed those words in the production delayed post-test, she scored her own stress pattern as incorrect (26.9 % of words). Participant #3 also overgeneralized rules for words with unstressed suffixes; however, overall results show that he recognized if his stress was correct for 65.4 % of words. Another participant , #11, stressed the first syllable in words ending with -ant, -iv, -al. This participant had more difficulties recognizing if his own stress assignment was correct or not (50 % of words). After the post-test, participant #11 knew the stress rule for 100% of words, whereas after the delayed post-test he was able to articulate the stress rules only for 48.1 % of words.

Nonetheless, some of the participants were able to recognize the rules they applied after listening to more words. For example, during the think-aloud protocol after the delayed post-test, at the very beginning participant #3 was not aware of the rule applied for words with the suffix -tum; however, he was able to say which syllable was stressed, even though he could not say if he assigned stress correctly or not. Nonetheless, after listening to more words from this category, participant #3 realized that not only the suffix -tum is unstressed, but also that the syllable before the suffix does not receive stress, as it is schwa syllable. Though during the think-aloud protocol after the post-test most of the participants were able to correct themselves, the results from think-aloud protocol conducted after the delayed post-test show that participant #3 was an exception.

In conclusion, the results from the think-aloud protocol provide insight into learners' metalinguistic awareness. Learners are able to say what kind of rules they apply when they assign lexical stress in the L2. Moreover, they are able to assess their own word stress productions and say if their stress assignment was correct or not. In the current study participants had an opportunity to listen to their own productions and think about and evaluate the way they stress words. Therefore, when they heard that they assigned stress to a different syllable than should be stressed, many of participants indicated that they had stressed different syllable from those they should have stressed and then repeated the word, stressing the correct syllable.

Chapter Five: DISCUSSION AND CONCLUSION

5.1 Introduction

The aim of this study was to determine whether input-based training would have an effect on participants' ability to assign lexical stress in German. In addition, I hoped to investigate how English beginner learners of German assign stress patterns to German words of different types and to determine what kind of rules they follow in assigning the stress patterns. In the following sections I will briefly summarize the results from the pre-test, post-test and delayed post-test. Then, I will discuss how the findings from the current study relate to previous research on L2 word stress. Finally, I will offer some practical classroom implications from the experiment.

5.2 Summary of the findings

The results from the production pre-test, post-test and delayed post-test provide insight into stress pattern rules that L2 learners follow when they assign stress in their L2 German. The results of the pre-test indicate that participants had difficulties in assigning stress correctly to German-English cognate words (with stressed suffixes) compared to German words with penultimate stress or to words with initial stress. As in Lord (2001), most of the participants transferred stress patterns from their L1 (English) when they were assigning stress to cognates. However, there were some examples of new stress patterns, along the lines of those found in Erdmann (1973), who claimed that learners set up an "intermediate stress pattern", which is different from the stress pattern from an L2 or one from their L1. Nonetheless, intermediate stress assignment patterns were somewhat random, and the general tendency was for participants to transfer the stress pattern from the L1.

The post-test showed that the participants who received PI-inspired input-based instructions significantly improved their performance from the pre-test and achieved higher correctness scores than participants who did not receive any training. Although the results from the delayed post-test (in terms of percentage of words correctly stressed) indicate a tendency for participants to assign stress less accurately than in the post-test, the difference in overall accuracy scores between post-test and delayed post-test is not significant; therefore, it can be concluded that the effect of training was maintained.

5.3 Discussion

5.3.1 Research Question 1: The Effects of Training

The first hypothesis proposes that the training group would perform better than the untrained group in the production post-test. The statistical analysis confirmed that there is a significant difference between the trained and untrained groups for two word categories: German- English cognates and words with stress-affecting suffixes. However, there was no significant difference for native German words with penultimate (default) stress. The results of the delayed post-test, performed 4-6 weeks later reveal that there was a prolonged effect of training. That is to say, although the accuracy scores were slightly lower in the delayed post-test, there was no significant difference between production post-test and delayed post-test. Therefore, participants were able to assign word stress correctly not only right after the training session but also after longer period of time.

In the study by Gonzales-Bueno and Quintana-Lara (2011), participants who received nine weeks of processing pronunciation instructions improved only to some extent in the post-

test compared to the pre-test. Learners who received processing pronunciation instruction were engaged in various perception tasks every day for 10 minutes during the nine-week instruction session. The results indicate that participants performed better only in the production of certain sounds, but overall there was no improvement over time. In addition, subjects who received traditional listen-and-repeat instructions improved in the post-test. The results of the current study indicate that input-based instruction based on processing instruction may indeed contribute to better production results. In contrast to Gonzales-Bueno and Quintana-Lara (2011), the trained participants in the current study performed significantly better over time, even though the training session included only two meetings. Moreover, the untrained group did not improve in their stress assignment in the production post-test.

The results of the current study may also coincide with those from Thomson (2011), in which participants' production of the most difficult vowels was more intelligible after perceptual training. Thomson (2011) points out that Mandarin learners of English in that study were able to discriminate sounds expected to pose the greatest difficulties for them (i.e., vowels acoustically least similar to Mandarin sounds), whereas sounds that were similar to their L1 (i.e., lengthened vowel group), participants recognized more accurately already in the pre-test.

Flege's (1995) SLM predicts that similar sounds in an L1 and L2 will pose difficulties for L2 learners, as there will be an interference with their L1s, whereas sounds that are different in the L1 and L2 will be less problematic, as there will be not negative transfer from the L1, and learners will set up a separate category for these sounds. Therefore, in the current study I expected that words that are similar in German and English (i.e., German-English cognate words), but have different stress patterns to be the most problematic for L2 learners. The results indicated that training especially improved aspects that are the most problematic for L2 learners:

i.e., German-English cognates with final stress, as the stress pattern is different in English.

However, the accuracy scores for words ending with schwa syllable and penultimate stress were higher already in the production pre-test. In addition, participants had higher accuracy scores for words with stress-affecting suffixes, as there was no interference with their native language.

The current study differs from studies that incorporated traditional pronunciation instruction. For example, although a study by Lord (2005) on the effect of pronunciation instruction showed significant improvement in learners' pronunciation of certain sounds at the end of the semester, it should be mentioned that there was no control group. A later study by Lord (2013) investigated the effect of input-based training, in which trained participants were analyzing their own productions and also shared recordings and analysis with other students. The results indicate that after comparing the training group with the control group there is no clear effect of training. Hardison (2004) conducted two experiments and investigated the effect of training on novel sentences. Though participants significantly improved in prosody and segmental accuracy, there was no significant improvement in both prosody and segmental accuracy to novel sentences. In contrast to Hardison (2004), participants in my study performed significantly better in the production of words that were not included in the training session. Moreover, since there was no control group, it would be interesting to examine if the training group performed significantly better compared to group that did not receive any training. The current study suggests that PI-inspired input-based training contributes to improvement in learners' production of L2 lexical stress and also raises their awareness.

5.3.2 Research Question 2: Stress patterns

5.3.2.1 Cognate words

With regards to the second hypothesis, that is, that learners will apply stress pattern rules from their L1, the results from the study show that participants tended to transfer stress pattern rules from their L1. Only some of them set up an intermediate stress pattern, which is different from the stress pattern existing in the L1 or the L2. These results coincide to some extent with the results from the study by Erdmann (1973), who found that German learners of English apply a “quasi-English rule”, as they shift the stress in words with Romance suffixes (-al, -ative, -able, -atory) one syllable to the left. Participants from the current study tended to transfer the stress pattern one syllable to the right if the stress pattern in English 4-syllable words falls on the second syllable e.g., *kle´rikal* vs. English *´klerikal*; however, if the stress pattern in English falls on the second syllable and the word consists of 3-syllables, participants shifted the stress pattern one syllable to the left as in *´atonal* vs. English *a´tonal*. Caspers and Kepinska (2011) also reported that participants tend to overgeneralize stress pattern rules. Their study explored how intermediate speakers of Dutch with the L1s of Hungarian, French and Polish assign stress to Dutch words. Their results indicated that there was no clear transfer from participants’ L1s. Instead, participants overgeneralized stress rules. Moreover, certain regularities in stress patterns applied to Dutch words may suggest that L2 learners were able to develop stress rules in an L2 unconsciously, as participants had fewer problems with assigning stress to words with regular stress patterns than to words with irregular stress. Nonetheless, it should be emphasized that participants in Erdmann’s (1973) and Casper and Kepinska’s (2011) study were on the intermediate level, whereas participants in the current study were beginners. The less

experienced second language learners in the current study tended to transfer the stress pattern rules from their L1 as opposed to setting up a new stress pattern for German-English cognates with final stress.

The results from this study show that cognate words cause interference in stress assignment when the stress patterns are different in the L1 and the L2, which aligns with previous studies (Erdmann, 1973; Flege & Bohn, 1989; Lord, 2001). Lord (2001), who investigated the production of Spanish lexical stress by English native speakers, found that especially beginner learners assign stress less accurately to lexical cognates that do not share the same stress patterns in the L1 and L2. Since words included in this study were only lexical cognates with different stress patterns in German and English, the results align with those of Lord (2001). Paschke (2013), who compared stress production of words with the same stress pattern in L1 and L2, found that there was a positive effect of transfer from the L1. Nonetheless, since cognate words in the current research were only cognates with different stress patterns in the L1 and L2, the results of the current study neither support nor refute this finding.

5.3.2.2 Penultimate stress

Participants in the current study most accurately stressed words ending in schwa syllables. The results from the current experiment coincide with those from the study by Paschke (2013): even in the pre-test participants stressed these words more accurately than words with final or initial stress patterns. The accurate stress assignment may be a result of transfer of L1 stress rules, since schwa syllables at the end of an English word are unstressed, and stress falls on the syllable before schwa (i.e., the penultimate syllable). Archibald (1998) also found that

learners transfer stress pattern rules from their L1 or apply the stress pattern that is dominant in their L1. Nonetheless, although accuracy scores in the pre-test, as expected, were the highest for words with penultimate stress and a schwa syllable at the end, participants tended to stress schwa syllables when a suffix occurs after schwa at the end of a word. This indicates that participants rely rather on the default stress rule than on the schwa rule (i.e., schwa never attracts stress).

5.3.2.3 Words with stress-affecting suffixes

In the German word stress system, final heavy syllables are usually stressed, however there are exceptions like in words ending with -keit/-heit. Since primary stress in these words is assigned to the stem, these suffixes remain unstressed. Participants tended to assign stress correctly to words with suffixes -keit/-heit. Nonetheless, when they assigned stress incorrectly, they stressed the antepenultimate syllable and never the final syllable.

5.3.3 *Summary*

The results of the current study may be viewed in light of Flege's (1995) Speech Learning Model. The premise of the model is that L2 learners will experience fewer problems setting up a new category for L2 sounds that are different from the L1 than for those sounds which are similar. In the current study, new stress patterns were for words with stress affecting suffixes: words ending with -keit/-heit and -tum. Thus, following Flege's (1995) Speech Learning Model, participants should assign stress accurately to these words as it does not cause interference with their native language stress patterns.

According to the SLM, patterns that are the same across the two languages should not pose difficulty for learners. As was mentioned in the literature review, similarly to German,

English schwa syllables never receive stress. Therefore, participants were expected to perform better in stress assignment for this type than for others, since the patterns are the same across the two languages. Since in the pre-test, participants had the highest accuracy scores for words with penultimate stress (with schwa syllable), there was no significant improvement for these words after the training.

In reference to German- English cognates with final stress, as was mentioned before, participants had great difficulties in correct stress assignment, as these words look similar in both languages but differ in stress patterns. Extending Flege's (1995) SLM, words that are similar in the L1 and L2 but have different stress patterns should be especially problematic for L2 learners. Hence, the results from the production pre-test showed that the accuracy scores were the lowest for German-English cognates compared to two other word types. It should be emphasized though, that participants who received input-based instructions significantly improved and had the highest accuracy scores for this word type. In conclusion, word cognates are problematic for L2 learners; however input-based instructions contributed to improvement in learners' production of L2 stress.

At this point it should be explained how learners' perception of lexical stress affects L2 production. As was indicated by Altmann and Vogel's (2002) SDM, learners with stress languages (e.g., English) have more difficulties with correct stress perception compared to learners that L1s are non-stress languages. Therefore, stress languages cause interference in L2 perception, as learners are looking for similarities with their L1. However, the results from the current study show that English learners of German who participated in the input-based training improved not only in their production of L2 stress but they were also able to recognize if their

stress assignment is correct or not. To conclude, Processing Instruction contributes to improvement in L2 production and makes learners more aware of stress rules that they apply when they assign stress in the L2.

5.4 Implications

The results from the current study showed that cognates pose major difficulties for L2 learners, as the stress patterns are very often different in the L1 and the L2. Learners, who may judge cognates to be similar words in the L1 and the L2, tend to transfer stress pattern from their native language when they assign word stress in the L2. Therefore, we should raise learners' awareness of stress rules and explain differences between stress system in their L1 and L2. Moreover, many learners in the current study seemed to have problems with stress perception (i.e., they could not say which syllable they heard as the most prominent). However, their perception improved after the training, when they had listened to native speakers' productions and completed number of tasks focused on the processing of the input. The think-aloud protocol performed after the post-test showed that participants were able to say which syllable they stressed and whether their stress assignment was correct or not. In addition to that, they were able to correct themselves, which indicates that learners' awareness of their stress production improved after the input-based training.

Previous research has shown that correct stress production is an important factor for native speakers' understanding of non-native speakers' speech (Munro & Derwing, 1995; Trofimovich, 2012), and yet it is still often neglected in classroom instruction (Gonzales-Bueno and Quintana-Lara, 2011). In this section I will present classroom implications of the current

study for L2 German instructors who are teaching native speakers of English. However, these suggestions may also be applied in the teaching other L2s.

The core of the Input Processing Model introduced by VanPatten (1996) is raising learners' awareness and focusing on the meaning-form connection. VanPatten (1996) postulates that learners should be engaged in different activities and tasks in order to process the input and they should be taught only one item at a time. When teaching L2 stress, it means teaching only one stress rule at a time and involving learners in processing the input through appropriate activities that focus first on perception (e.g., recognizing which syllable was stressed in a word or distinguishing correctly and incorrectly stressed words).

At this point, I would like to make some suggestions for L2 teachers. As was mentioned previously, very often learners indicate problems with stress perception. Therefore, I would advise engaging learners mentally and trying various approaches. It is crucial to raise learners' awareness of stress: once they know which syllable should be stressed, they should listen to examples with incorrect stress placement and then decide which word was produced with correct stress. Moreover, we should always ask learners to justify their answers to make sure that these are not their random guesses and they actually know the rule.

In the present study participants were given word stress instructions during only two sessions. Nonetheless, the results from the post-test indicate significant improvement in word stress assignment and prolonged effects of training after 4-6 weeks. During the training session participants were listening to a native speaker of German's productions and underlining which syllable was stressed or which syllables were unstressed. Moreover, participants were asked to

set up a stress rule for presented words (e.g., schwa syllable at the end of a word never receives stress). Practically speaking, second language teachers do not have to devote additional lessons to teach word stress. The ideal time to introduce word stress may be, for example, when introducing new vocabulary. At that time teachers can employ the above-mentioned activities and ask students to figure out the stress rule for themselves. A good idea may be underlining stressed syllables and categorizing new vocabulary according to word stress patterns.

Although not all L2 learners will master the stress rules perfectly, the current study indicates that overall the effect of training is significant. Therefore, teaching stress rules may help learners to produce more comprehensible speech and potentially encourage them to become more confident L2 speakers.

5.5 Limitations

There are a number of limitations in the current study. One of these is that participants were only from one proficiency level: beginners. In order to limit the scope, in this study I recruited only those participants who were enrolled in a second-semester German course with little knowledge of German. Including participants from different proficiency levels would enable us to determine whether there are any differences in stress pattern rules among more advanced students. Additionally, we could see whether and how training affects participants from various proficiency levels.

In the current study, test words were limited only to three word types: words with penultimate stress, German-English cognates, and words with stress-affecting suffixes. Also, there were no German-English cognates with the same stress pattern in the L1 and the L2.

Therefore, we cannot compare the full range of cognate effects with those of other studies like Lord (2001) or Paschke (2013) and determine whether learners transfer stress pattern rules from their L1 when stress patterns are the same. For example, Lord (2001) found that participants' accuracy was higher when stress placement was the same in cognates, which indicates that there was a positive transfer of stress rules from the L1 in these instances.

Another limitation of this study is that only one group received training and that this training was only PI-inspired input-based training. Comparing two groups, one with traditional listen-repeat training and the other one with perceptual training, would allow us to examine the effectiveness of input-based training compared to traditional production (output-based) training.

5.6 Conclusion

The results from the present research showed that L2 learners have some difficulties with correct word stress assignment in the L2. The most problematic are cognate words that have different stress patterns the L1 and the L2, as learners transfer stress patterns from their L1. Nonetheless, giving learners PI-inspired input-based instruction contributed to their improvement in correct stress assignment, and results of the delayed post-test showed that there is a prolonged effect of training. The fact that participants only took part in two training sessions indicates that even a small amount of training may be effective. L2 teachers do not have to prepare comprehensive lessons to teach word stress. It is quite possible to incorporate lexical stress instruction into normal classes, for example, when we introduce new vocabulary.

Second language learners who never received stress instructions are usually not aware of stress rules in their L2 German. Participants in my pilot study who were asked to elaborate on

stress rules in German words that they produced, were not able to say if their stress is correct or not and many of them had problems with correct stress perception (i.e., they did not hear which syllable is the most prominent in a word until they hear the stress on different syllables). In fact, some of these untrained participants said that they remember from classes that “umlauted” vowels are stressed, which is simply untrue.

In spite of the results of the previous perception and production study by Gonzales-Bueno and Quintana-Lara (2011), which showed that participants who received input-based training did not perform significantly better than participants with traditional training or the group that did not receive any training, beginner English learners of German in the current study performed significantly better in the production post-test than the no training group. Therefore, these results indicate that PI-inspired input-based training, in which learners are only exposed to native-speakers’ production and complete perception tasks, significantly improves their L2 word stress production.

References

- Altmann, H. (2006). The perception and production of second language stress: across-linguistic experimental study. Ph. D. Thesis, Univ. of Delaware, Newark.
- Altmann, H. & Vogel, I. (2002). L2 acquisition of stress: The role of L1. Paper presented at the DGfS Annual Meeting "Multilingualism Today" in Mannheim, Germany, March 2002.
- Archibald, J. (1992). Transfer of L1 Parameter Settings: Some Empirical Evidence from Polish Metrics. *Canadian Journal of Linguistics*, 37(3), 301-339.
- Archibald, J. (1993). The learnability of English metrical parameters by adult Spanish speakers. *International Review of Applied Linguistics and Language Teaching*, 31/32, 129-142.
- Archibald, J. (1997). The acquisition of English stress by speakers of nonaccentual languages: lexical storage versus computation of stress. *Linguistics*, 35, 167-181.
- Archibald, J. (1998). *Second Language Phonology*. Amsterdam, AN/ Philadelphia, PA: John Benjamins.
- Baese-Berk, M. M. (2010). An examination between speech perception and production. Ph. D. Thesis. Northwestern University, Evanston, Illinois.
- Bissiri, M. P., Pfitzinger, H. R. & Tillman, H.G. (2007). Lexical stress perception of German morphologically complex words by Italian speakers. *In: Proceedings of the speech prosody 2008 conference*, 639-642. Campinas, Brazil.
- Boersma, P. & Weenik, D. (2014). *Praat*. Retrieved from http://www.fon.hum.uva.nl/praat/download_win.html

- Caspers, J., & Kepinska, O. (2011). The influence of word-level prosodic structure of the mother tongue on production of word stress in Dutch as a second language. *Proceedings of the 17th International Congress of Phonetic Sciences*, 420-423. Hong Kong.
- Chomsky, N., & Halle, M. (1968). *The sound pattern of English*. New York, NY: Harper & Row.
- Counselman, D. (2010). Improving pronunciation instruction in the second language classroom. Unpublished Ph.D. Thesis, Pennsylvania State University.
- Cutler, A. (1984). Stress and accent in language production and understanding. In: D. Gibbon & H. Richter (eds.). *Intonation, Accent and Rhythm: Studies in Discourse Phonology* (pp. 77-90). Berlin: Walter de Gruyter.
- Dupoux, E., Pallier, C., Sebastian, N., & Mehler, J. (1997). A Destressing 'Deafness' in French? *Journal of Memory and Language*, 36, 406-421.
- Dupoux, E., Peperkamp, S., & Sebastian-Galles, N. (2001). A robust method to study stress "deafness". *The Journal of the Acoustical Society of America*, 110(3), 1606-1618.
- Derwing, T., Munro, M., & Wiebe, G. (1998). Evidence in factor of a broad framework for pronunciation instruction. *Language Learning*, 48(3), 393-410.
- Erdmann, P. H. (1973). Patterns of Stress-Transfer in English and German. *IRAL, International Review of Applied Linguistics in Language Teaching*, 11(3), 229-241.
- Field, J. (2005). Intelligibility and the listener: The role of lexical stress. *TESOL Quarterly*, 39(3), 399-423.

Flege, J. E. (1995). Second language speech learning theory, findings and problems. In W. Strange (Ed.) *Speech Perception and Linguistics Experience: Issues in Cross Language Research* (pp. 233-277). Baltimore, MD: York Press.

Flege, J. E. & Bohn, O-S. (1989). An instrumental study of vowel reduction and stress placement in Spanish- accented English. *Studies in Second Language Acquisition*, 11, 35-62.

Fry, D. B. (1958). Experiments in the perception of stress. *Language and Speech*, 1, 126–152.

Gaeta, L. (1998). Stress and loan words in German. *Rivistadi Linguistica*, 10(2), 355-392.

Gonzales-Bueno, M., & Quintana-Lara, M. (2011). The teaching of L2 pronunciation through processing instruction. *Applied Language Learning*, 21, 57-82.

Hahn, Laura D. (2004). Primary stress and intelligibility: Research to motivate the teaching of suprasegmentals. *TESOL Quarterly*, 38(2), 201-223.

Hall, T. A. (1992). *Syllable structure and syllable-related processes in German*. Tübingen: Max Niemeyer Verlag.

Hardison, M. (2004). Generalization of computer- assisted prosody training: Quantitative and qualitative findings. *Language Learning and Technology*, 8, 34-52.

Hyman, L. M. (1977a). On the nature of linguistic stress. In L. M. Hyman, ed. (1977b).

Hyman, L. M., ed. (1977b). *Studies in stress and accent*, Southern California Occasional Papers In Linguistics 4, University of Southern California, Los Angeles, California.

Jakobson, R. (1971). *Selected Writings I*. Mouton, The Hague, 614-625.

- Jangjamras, J. (2011). Perception and production of English lexical stress by Thai speakers. Ph.D. Thesis, Univ. of Florida.
- Lord, G. (2001). The second language acquisition of Spanish stress: derivational, analogical or lexical? Ph.D. Thesis, The Pennsylvania State University.
- Lord, G. (2005). (How) can we teach foreign language pronunciation? The effects of a phonetics class on second language pronunciation. *Hispania*, 88, 557–567.
- Lord, G. (2013). Online Communities of Practice and Second Language Phonological Acquisition. *International Journal of Computer-Assisted Language Learning and Teaching*, 3(3), 34-55.
- Munro, M., & Derwing, T. (1995). Foreign accent, comprehensibility, and intelligibility in the speech of second language learners. *Language Learning*, 45(1), 73-97.
- Munro, M. J., & Derwing, T. M. (1999). Foreign accent, comprehensibility, and intelligibility in the speech of second language learners. *Language Learning*, 49, 285–310.
- Osbourne, A.G. (2003). Pronunciation strategies of advanced ESOL learners. *International Review of Applied Linguistics in Language Teaching*, 41, 131-143.
- Paschke, P. (2010). Akzentuierung von Internationalismen: Überlegungen zur empirischen Untersuchung bei fortgeschrittenen Italophonen Deutschlernenden. *Zeitschrift für interkulturellen Fremdsprachenunterricht*, 15 (2), 151-168.
- Paschke, P. (2013) Wortakzent im Spannungsfeld von L1 und L2. *Zeitschrift für interkulturellen Fremdsprachenunterricht*, 18(1), 93-131.

Peperkamp, S. & Vendelin, I. & Dupoux, E. (2002). A typological study of stress 'deafness'. In C. Gussenhoven & N. Warner (Eds.), *Laboratory Phonology & Phonetics* (pp. 203-240). New York: Mouton de Gruyter.

Peperkamp, S. & Vendelin, I. & Dupoux, E. (2010). Perception of predictable stress: A cross-linguistic investigation. *Journal of Phonetics*, 38, 422-430.

Schwab, S. & Llisterri, J. (2011). The perception of Spanish lexical stress by French speakers: stress identification and time cost. In M. Wrembel, M. Kul, & K. Dziubalska-Kolaczyk (Eds.), *Achievements and perspectives in SLA of speech new sounds 2010*. Vol.1. (pp. 229-42). Frankfurt am Main: Peter Lang.

Thomson, R. I. (2011). Computer assisted pronunciation training: Targeting second language vowel perception improves pronunciation. *CALICO Journal*, 28, 744-765.

Tremblay, A. (2009). Phonetic variability and the variable perception of L2 stress by French Canadian listeners. *International Journal of Bilingualism*, 13(1), 35-62.

Trofimovich, P. & Isaacs, T. (2012). Disentangling accent from comprehensibility. *Bilingualism: Language and Cognition*. Vol. 15. (pp. 905-916).

Trubetzkoy, N. S. (2001). *N.S. Trubetzkoy: Studies in general linguistics and language structure*. Edited with an introduction by Anatoly Liberman. Durham, NC: Duke University Press.

VanPatten, B. (2004). *Processing Instruction: Theory, Research, and Commentary*. Mahwah, NJ: Lawrence Erlbaum.

Wang, Qian. (2008). Perception of English stress by Mandarin Chinese learners of English: An acoustic study. Ph.D. Thesis, Univ. of Victoria.

Wiese, Richard. (2000). *The Phonology of German*. New York, NY: Oxford University Press

Zhang, Y., Nissen, S., & Francis, A. (2008). Acoustic characteristics of English lexical stress produced by native Mandarin speakers. *The Journal of the Acoustical Society of America*, *123*(6), 4498-4513.

Zhang, Y., & Francis, A. (2010). The weightening of vowel quality in native and non-native listeners' perception of English lexical stress. *Journal of Phonetics*, *38*, 260-271.

APPENDIX A: MEAN SCORES FOR THE WORD FAMILIARITY TEST

Word category	Word	Q1: Do you know the meaning of this word	Q2: Have you heard this word before
German words with penultimate stress	Forelle	1.4	1.6
	Schablone	1.1	1.2
	Frikandelle	1.7	1.4
	Karfunkel	1	1.3
	Karnickel	1.4	1.3
	etepetete	1.1	1.3
	Menetekel	1.2	1.2
	Tentakel	2.2	1.4
	Schabracke	1.6	1.4
	Paradeiser	2.3	1.4
	Posemuckel	0.9	1.1
Exmatrikel	1.4	1.1	
German-English cognates	Adjutant	1.7	1.6
	Konsignant	2.2	1.6
	Interpelant	1.6	1.3
	Konkomitant	1.4	1.1
	signifikant	3.2	2.3

	Intrigant	1.9	1.4
	Ambulant	1.9	1.5
	Konzelebrant	1.5	1.2
	lukrativ	2.5	1.5
	derivativ	3.4	1.8
	deklarativ	3.1	1.8
	frikativ	2.1	1.4
	formativ	2.7	2.3
	assoziativ	2.9	1.9
	alternativ	3.5	2.0
	putativ	1.8	1.4
	laryngal	1.5	1.2
	zentripetal	1.9	1.2
	pontifikal	1.8	1.3
	atonal	3	1.9
	klerikal	2.7	1.8
	harmonal	2.5	1.5
	pronominal	1.9	1.4
	zentrifugal	2.8	1.7
	Dusseligkeit	1.9	1.9
	Feuchtigkeit	1.7	1.6
	Ernsthaftigkeit	2.1	1.7

German words with different suffixes	Tätigkeit	2.1	1.7
	Bösartigkeit	1.2	1.1
	Mutlosigkeit	1.1	1.1
	Magerkeit	1.1	1.1
	Seltenheit	1.2	1.3
	Soldatentum	1.7	1.5
	Bürgertum	1.5	1.5
	Fürstentum	1.4	1.2
	Germanentum	1.8	1.3
	Strebertum	1.8	1.5
	Heroentum	2.2	1.7
	Mormonentum	1.7	1.3
Priestertum	1.9	1.3	

APPENDIX B: TEST WORDS WITH FILLERS

Forelle	Konsignant	lukrativ
Ambulant	Automatisch	Suppe
Langweilig	formativ	Karnickel
Laryngeal	Märchen	spannend
Tisch	Feuchtigkeit	Fürstentum
Dusseligkeit	Käse	Wohnung
Durchwahl	Schabracke	Interpelant
Assoziativ	Urlaub	streng
Aufgabe	pronominal	alternativ
Karfunkel	Katze	Schüler
Briefe	Ernsthaftigkeit	Tentakel
Harmonal	Geschenk	Elefant
Gedächtnis	signifikant	Bürgertum
Germanentum	Bananen	Komode
Rosen	Posemuckel	Priestertum
Schablone	Schrank	Gespräch
Prüfung	Strebertum	Magerkeit
Intrigant	Husten	Leute
Sicherlich	putativ	frikativ
Menetekel	klein	faul
Wörterbuch	zentripetal	Exmatrikel
derivativ	Prospekte	dumm
Blätter	Etepetete	Tätigkeit
Frikandelle	lustig	Schwimmbad
Regel	zentrifugal	Soldatentum
Mutlosigkeit	romantisch	Konkurrenz
gefährlich	Konkomitant	Konzelebrant
Mormonentum	Lehrer	Hochzeit
wirklich	Paradeiser	
klerikal	komisch	
musikalisch		