L2 word accent production in Swedish:

An experimental study on adult learners of Swedish with non-tonal L1 background

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SPVR01 Language and Linguistics: Degree Project – Master's (Two Years) Thesis, 30 credits

October 2021

Abstract

Previous research has shown that intermediate-advanced L2 learners of Swedish with a non-tonal L1 can use word accents to predict the upcoming suffix as L1 Swedish speakers do. This was also the case of low-intermediate L2 learners who produced word accents after being instructed on the Swedish prosodic system. On the contrary, previous findings on L2 Swedish learners with a tonal L1 exhibited no significant differences in the production of word accents to be accurately identified by native speakers.

The present study examines L2 perception and production of word accents in Swedish in three proficiency levels. Beginner, intermediate and advanced participants of Swedish with a non-tonal language background were classified into different Swedish level groups according to an online language test. They performed a perception test where their response times and accuracy were measured. Their speech was also recorded during a production task in which the number of rises and falls as well as the timing of the F0 onset, peak, and fall latencies were calculated from word beginning. The results of the perception test exhibited that they could use word accent to predict the upcoming suffix in a manner like native speakers. No difference among the groups, however, was found regarding accuracy and response times. The results in production showed that the advanced learners made a difference when producing word accents 1 and 2 for the real noun condition and that they had a tendency toward producing word accent patterns comparable to that of the Central Swedish variety. Additional analyses of word accent timing in the real noun condition showed no similarities between the timing of the falls of L2 learners in both accents and that of L1 Swedish speakers. Lastly, advanced speakers unexpectedly produced pseudo nouns carrying an accent-2 suffix with a rising contour.

Keywords: *Second Language Acquisition, perception, production, prosody, fundamental frequency*

Acknowledgements

After a long and extremely bumpy road, I have reached this advanced step of my academic life. But this project could not have been completed without the help of many people.

First, and foremost, I would like to thank my supervisor, Mikael Roll, for his guidance and support on this idea. Thank you to each and every person who participated in the project and allowed me to do one of the things I like the most: experimenting with languages. I am incredibly grateful for the fact that 46 people willingly met me at Lund University despite the generally complicated situation. An extremely warm thank you to the Humanities Lab at Lund University for letting me conduct my experiment there; especially to Victoria Johansson, for her generous guidance on the carrying out of the project in the Lab as well as to any of the many inconveniences that happened along the way; to Peter Roslund, for showing and helping me set up the equipment at the LARM-studio; and to Joost van de Weijer, for setting up the perception test and for lending me a laptop for probably longer than I should have.

Thank you to my family for their unconditional support. Thank you to Leni, for providing the humour and linguistic discussions necessary for this ride. You guys made the darkest winter nights brighter.

A final and special thank you to those strangers and acquaintances who corrected my Swedish and, perhaps, word accent production. That was the final force that drove me to pursue this project. Without any of that curiosity as an L2 learner of Swedish, this project would not have come into existence.

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Abbreviations

ANOVA	Analysis of variance
dB.	Decibels
F0	Fundamental frequency
EEG	Past tense
ERP	Event-related potentials
ET	Exposure time to Swedish
IFGpo	Inferior frontal gyrus pars opercularis
IPast.	Invalid past
IPre.	Invalid present
L1	First language
L2	Second language
N400	Negativity effect
PrAN	Pre-activation negativity
P600	Late positivity effect
RN	Real nouns
RT	Response times
TS	Time living in Sweden
VPres	Validity present
VPast	Validity past

1. Introduction

Swedish word accents have been a focus of research for many years. There are only a few works, however, that focus on their perception and production from a second language perspective (L2 perspective henceforth) (Tronnier & Zetterholm, 2014; Gosselke et al., 2018; Hed, 2014; 2016; Hed et al., 2019; Schremm et al., 2017). To date, little is known about when, how, or whether L2 learners start to produce Swedish word accents or how their production and perception of word accents relate. It is from this point that this thesis starts; by examining both the perception and production of word accents by L2 learners of Swedish at different proficiency levels.

Words in Swedish are assigned one of two tones known as word accent 1 and word accent 2. The distribution and tonal alignment of these accents are governed greatly by prosodic and morphological features and rules such as stress or suffixes and their alignment pattern varies depending on the dialect in question. For instance, while an accent 1's tonal alignment in Central Swedish consists of a low-pitched tone (L*) in the stressed syllable followed by a high-pitched tone (H), it is quite the opposite in Southern Swedish (H*L), if the word is focused. Hence, it may become an arduous task to know which word stems carry which accent. The reason for investigating Swedish word accents is that they cannot be easily perceived but are an important source of misunderstanding in communication (Schremm et al., 2016). Furthermore, a significant part of the literature frequently leans towards researching the acquisition and perception of lexical tones, found particularly in East-Asian languages (Gao, 2016; Hao, 2012; Pelzl et al., 2019; Wang, 2006), as opposed to pitch accents, like those in Swedish.

More in -depth, Swedish children are thought to be able to perceive and utter words with controlled pitch differences, just like adults, since they are 16–18 months old (Ota, 2006) while adult native speakers of Swedish can predict the upcoming suffix by identifying the tone that the word stem is carrying (Söderström et al., 2012). Extended research in the field exhibited that people could perceive and acquire grammar regularities to which they were exposed, without being aware of

their internalization (Schremm et al., 2016), to the point that it has been proposed that the native sound system is learnt implicitly, through an innate process which considers a phoneme's possibilities of occurring (Pierrehumbert, 2001). This is what would allow adult listeners to predict the upcoming suffix upon hearing a word-accented stem in Swedish. In the case of L2, previous psycholinguistic studies assume that sound perception at an initial stage can determine whether someone's learning will be complicated or simple (Schmidt, 2011). Such is the case that depending on an L1's prosodic aspects (i.e., its intonation, tonal contour or stress as well as whether it is a tonal language or not), the L2 prosodic features could be easily perceived or, on the contrary, we could be less sensitive to identifying them, as exemplified by Hallé et al. (2004) in their study about Mandarin Chinese and French speakers. Furthermore, Schmidt (2011) suggests that the difficulty in perceiving L2 sounds may be induced by "'errors' […] due to inaccurate perception of target language sounds." (p.16). This could be assumed to occur with Swedish word accents. Nevertheless, Schremm et al., (2016) claim that word accents are a feature which cannot be associated with the L1 or with having any transfer from "L1 speech comprehension strategies" as it is specific to L2 acquisition, especially in the case of non-tonal L1 speakers (p.69).

So far, the results of L2 Swedish learners have indicated that intermediate learners follow the native-like ability and predict the upcoming suffix when examining the perception of the present and past suffixes (Schremm et al., 2016). In addition, non-tonal L1 learners have a positive post-training perception of word accents as well as in their production of word accents, particularly from the Central Swedish dialect (Hed et al., 2019; Schremm et al., 2017). Nonetheless, when involving native speakers, the production of word accents by L2 learners of Swedish with tonal L1 is not identified nor rated as native-like (Tronnier & Zetterholm, 2014); neither did these L2 learners show to have an advantage over non-tonal L1 speakers to learn word accents (Tronnier & Zetterholm, 2013). Therefore, considering that the few studies of this nature have examined learners from different backgrounds and different proficiency levels separately, the novelty of this study will be in having Swedish learners of three different proficiency levels, especially advanced (C1-C2) learners of Swedish. Thus, the present study attempts to answer the following research questions:

RQ1 *Do learners of Swedish with non-tonal L1 perceive and produce the prosodic word accents of the Swedish language?*

RQ2 *If RQ1, do they show a difference between perception and production?*

RQ3 *If RQ1, when in their language acquisition process (according to CEFR[1]) do they begin to produce them?*

[1] Common European Framework of Reference (Council of Europe, 2001)

2.Theoretical background

This chapter introduces the theoretical background that motivates the research questions, hypotheses and predictions of this study. In section 2.1 an account of the Swedish prosodic system with a special focus on word accents (section 2.1.1) is presented. Section 2.1.2 introduces the perception of word accents in L1 whereas L2 perception of word accents is presented in section 2.2.1. Lastly, L2 production of word accents in Swedish is explained in Section 2.2.2 and Section 2.3 introduces an interpretation of the research questions presented in the Introduction (Chapter 1) as well as the hypotheses and predictions that guided this study.

2.1 Prosody

According to Astruc (2013), prosody comprises all the features of stress, rhythm, and intonation. He describes that one of the functions of prosody is to organize the units of phonology; that is, phonological units form a prosodic hierarchy (i.e., the combination of segments shape syllables, which form feet, and these can create multisyllabic prosodic words which can be used to build phonological phrases and intonational phrases). The prosody of a language is thus defined by these prosodic subsystems and by the following acoustic parameters: "(1) the duration of speech sounds; (2) the intensity of speech sounds; and, for voiced sounds, (3) the pitch, which corresponds to the fundamental frequency of vibration of the vocal folds." (p.127). Duration is usually characterized by the shortening or lengthening of speech sounds, intensity by loudness in decibels (dB) and intonation by pitch, which is measured through the analysis of fundamental frequency (F0).

Given these points and the number of languages in the world, not all are equipped with the same prosodic features, so there is room for variation. Since the focus of this project is on pitch, we should consider the division of languages into tonal and non-tonal languages. Only languages that have contrastive tones are considered tone languages. However, this is a coarse-grained distinction, which may be further subdivided into stress, tone, or pitch-accent languages. For instance, Chinese

is a tone language whose words are affected by pitch, whereas the contrast in English lies in stress. An example is the words record and record. (The underlined syllables show where the stress is.) In the case of Swedish, it is a language with stress differences, but also with pitch contrast. An example is *anden* ('the duck') and *anden* ('the ghost'), which have the same stress pattern but different word accents (Ladefoged & Johnson, 2015, pp. 270-271).

The prosody of Swedish is determined by the hierarchy mentioned above; that is, syllable, foot and prosodic word. To understand how each of these levels and word accents works, one needs to acknowledge that syllables are the smallest units that carry stress, and that stress is the main feature of the prosodic foot in Swedish (Riad, 2014). With this in mind, the functioning of stress in Swedish can be summarized as follows: Each word in Swedish encompasses primary stress on a particular syllable. In addition, there may be bi- or multisyllabic words with more than one stress (i.e., secondary stress). Such words include compound words or lexicalized phrases (Bruce, 1977). Determining a stressed syllable may not be so easy, as there is no fixed stress in the Swedish language. However, there is one stress in every minimal prosodic word (Riad, 2014). Moreover, this stressed syllable must be heavy (i.e., be associated with two mora). In the case of a stressed syllable, this could be two morae, resulting in either a long vowel or a short vowel followed by a long consonant. Therefore, Riad (2014), and others, describe the Swedish prosodic foot as bimoraic.

Riad (2014) explains the assignment of stress and tone in Swedish through the concept of a prosodic word, which consists of simple and complex forms. What divides the prosodic word into simple or complex is the complexity of the morphological structure. Simple and inflected words constitute a simple form and compounds constitute a complex form.

The prosodic word (ω) is formed by a minimal (ω^{min}) and a maximal projection (ω^{max}) and it is a culminative domain in Swedish. Culminativity being a criterion that requires *obligatoriness* (at least one stress in a word) and *culminativity* (at most one syllable marked with a stress in a minimal prosodic word) (Riad, 2012). Culminativity is represented differently in the minimal and maximal

prosodic words (Riad, 2014): in the minimal prosodic word, the head is the stress and in the maximal prosodic word, the tonal accent.

Having said this, a prosodic word is culminative because it has a head consisting of one stress (in the minimal prosodic word) and one accent (in the maximal prosodic word). Within the minimal prosodic word, it is easy to identify the assignment of stress and tone because there is only one stress. However, minimal prosodic words can also be grouped (as in compounds) to form a maximal prosodic word. Example 2 (Riad, 2014) illustrates the assignment of stress within some minimal and maximal prosodic words.

(2)

(e.lek.tri.fi.'e.ra)$_{\omega}$	'to electrify'
(e.pi.de.'mi)$_{\omega}$	'epidemic'
('hus)$_{\omega}$	'house'
('tetra)$_{\omega}$ -(ˌvinet)$_{\omega}$	'bag-in-box wine'
('bäck)$_{\omega}$ (raˌvinen)$_{\omega}$	'gully'

When it comes to tone, it is in the minimal prosodic word where the lexical tone is assigned and it is the suffixes that induce this lexical tone, which is eventually incorporated into the word stem. Only suffixes associated with accent 2 carry a lexical tone, while accent 1-associated suffixes are assumed to lack tone specification. Accent 2 suffixes can be both inflectional and derivational (Riad, 2014). If the suffix is then adjacent to the primary stress, this tone will be assigned to the primary stress. An example of this is the suffix /-lig$_2$/, which induces accent 2. The preceding stressed syllable will then carry the tone assigned by the accent 2-inducing suffix when it is incorporated into the minimal prosodic word: (^{2}'trev-lig)$_{\omega}$ 'pleasant'. Nevertheless, there is an additional feature that conditions the realization of word accents: prominence levels. These are referred to in Riad (2014) as word accented level (when the word is not in focus) and focus accented level (when the word is in focus). This is explained in more detail in the following section.

In the maximal prosodic word, tone accent is assigned differently depending on the morphological structure of the word. That is, a maximal prosodic word can either be "coextensive with the minimal prosodic word, or form a larger unit" (Riad, 2014, p. 126) with other minimal words. If it is coextensive, it means that there is one head for the minimal prosodic word (i.e., one stress) and one head for the maximal prosodic word (i.e., one tone accent). Considering the existence of only one stress, these words can be assigned accent 1 or accent 2 lexically (induced by a suffix as described above). Words with more than one stress are assigned accent 2 post-lexically. This is the case for compounds that have multiple stresses (i.e., minimal prosodic words). They are automatically assigned post-lexical accent 2.

2.1.1 Word accents

In both Swedish and Norwegian, words can change their meaning depending on their accent and pitch (Lundskaer-Nielsen et al., 2005; Rischel, 1963). In Swedish, there are two word accents in particular: 'accent 1' ('acute') and 'accent 2' ('grave'). Their names also refer to the tonal contour of the words assigned in intonation and their realizations vary across Swedish dialects. However, in the case of Central Swedish, accent 1 is characterized by having a low pitch associated with the stressed syllable (L*) (Figure 1), while the stressed syllable on accent 2 has a high-pitched tone (H*L), also in the case of compounds.

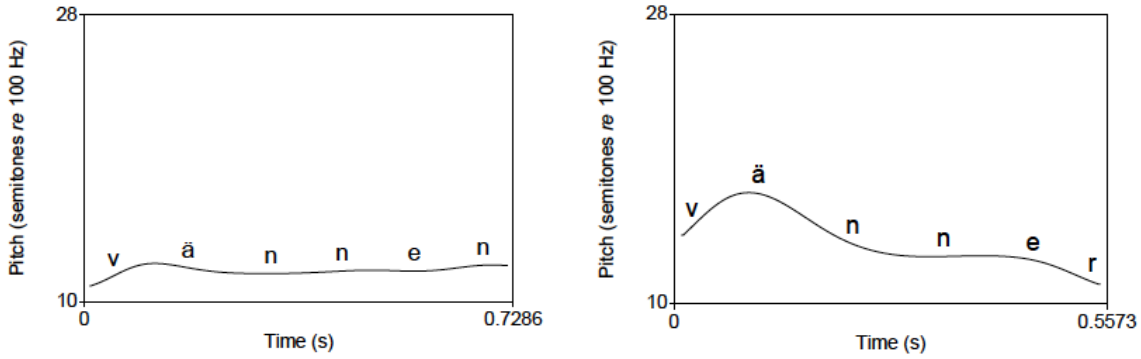

Figure 1: Central Swedish unfocused accent 1 and accent 2 realization for vännen 'the friend'(A1) and vänner 'friends'(A2) from Hed (2016)

As mentioned earlier, the realizations of word accents also vary according to the level of prominence, which results in a difference in their timing (Riad, 2014). Riad (2014) identifies two levels of prominence (Table 1): 'word accented' and 'focus accented' ('word accent' and 'sentence accent' for Bruce, (1977). Figure 1 shows the tonal contours associated with the word accented level (i.e., when words are not in focus position).

*Table 1: Prominence levels and word accents in Swedish according to Riad (2014). In bold, the distinctive tone between accent 1 and 2. * associates the accents to stressed syllables.*

Prominence level	*Accent 1*	*Accent 2*	*Accent 2 in compounds*
Focus accent	L*H	**H***LH	**H***L*H
Word accent	HL*	**H***L	**H***L

On the contrary, when words are in focus (i.e., when they are realized with a contrastive tone) accent 1 shows a low-pitched tone on the stressed syllable, followed by a high-pitched tone (L*H) and, accent 2 shows a high-pitched tone on the stressed syllable followed by a low rising tone (H*LH), except in compounds where a low tone precedes a high tone, and this low tone follows a high tone (H*L*H).

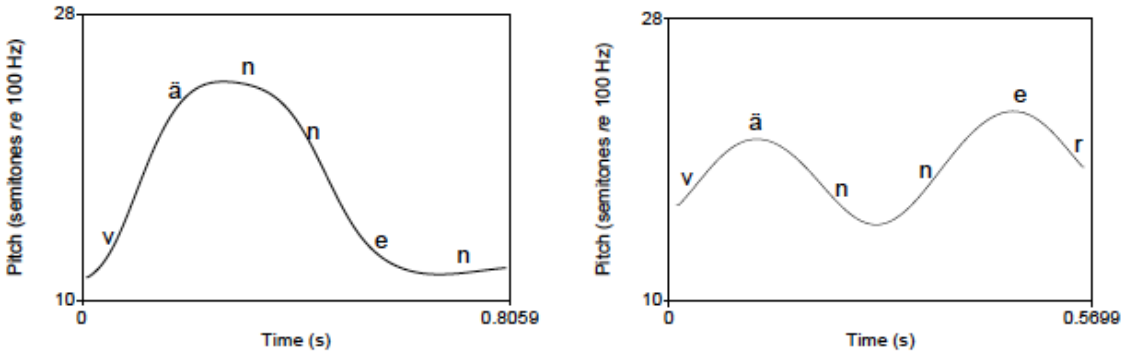

Figure 2: Central Swedish focused accent 1 and accent 2 realizations for vännen 'the friend' and vänner 'friends' from Hed (2016)

Bailey (1988) describes the distribution of word accents as "sensitive to phonological (number of syllables in the stem) and morphological (nature of suffix) information" (p. 103). Nevertheless, it is claimed that the word accent placement depends on the location of the primary stress (Bailey, 1988), especially for words bearing accent 2 (Riad, 2014). At this level, many researchers agree that one-stress words are assigned accent 1, while words with two or more stresses receive accent 2 (Bailey, 1988; Lundskaer-Nielsen et al., 2005; Riad, 2014). At the morphological level, similar rules may apply, such as the fact that monosyllabic stems tend to have accent 1 and disyllabic stems, accent 2 (Riad, 2014). However, there seem to be certain features that go beyond to facilitate the prediction of accent 1's placement, especially when suffixes are added. Since this is not the main purpose of this study, I will summarize the most important ones:

1. When adding the definite suffix *-en*, the word still carries accent 1.
2. When adding the plural suffix *-ar*, the word carries accent 2.
3. Present tense forms of the 2nd conjugation *-er* carry accent 1.
4. When adding past tense of the 2nd conjugation *(-te* /*-de*), words carry accent 2.

These rules imply that the same stems may carry different word accents depending on the suffix attached. For example, the word 'häst' (horse) carries a low-pitched tone (accent 1) when the definite article suffix *-en* is attached to it*;* however, when the plural suffix *-ar* is

attached, the stem carries a high-pitched tone (accent 2). For this reason, native speakers always associate the same word accent with a given stem and suffix combination (Schremm et al., 2016). That is, a verb with a present tense suffix attached will always have accent 1 whereas the past tense suffix (*-te* /*-de*) will always induce accent 2.

A final difference between the two accents is in the timing relative to the primary stressed syllable (Bruce, 1977); that is, the word accent's fall from the H to the L tone occurs earlier in accent 1 than in accent 2. In accent 1, the fall occurs in the initial part of the stressed vowel (i.e., in the consonant preceding the stressed vowel), whereas in accent 2, it varies, but it could occur in the CV boundary of the post-stressed syllable, or in the middle of the consonant after the stressed vowel. Therefore, the fall in words with accent 2 is relatively longer than in words with accent 1. This also applies when words are in focus position, which is the citation form here. In the case of accent 1, the rise occurs in the stressed syllable, but for accent 2 it could occur in the posttonic syllable or later. In addition, the final syllable of a word in focus and in final position (what Bruce (1977) calls 'terminal juncture') is also characterized by an additional pitch fall. For accent 2 in compound words in focus, the first peak is in the first stressed syllable and the second is associated with the secondary stress. Most researchers agree on this. However, the tonal representation of both accents has led to two different models: the Lund model and Riad's model. Riad's model has already been briefly described. Nevertheless, this model is distinguished by the fact that differentiates the word accent representations in terms of markedness. For Riad (2014), accent 2 is marked because it is the only one that carries a lexical tone, while accent 1 is unmarked due to its lack of lexical tone; instead, its pattern "is explained solely with prosodic (=post-lexical) phenomena" (Kochancikaite, 2019). Moreover, according to Riad (2014), it is the morphophonological elements that induce one accent or the other. Lastly, the true representations of these accents are realized in focus position. In the Lund model (Bruce, 1977), both accents share the same tonal representation, and both are lexical. Their representations without influence of the focus tone occur in non-focal positions. For Bruce (1977), however, the difference between the two word accents lies in their interaction with other intonational elements at the sentence level. When it comes to

the timing of each of the word accents, their differences lie in the latency of the fall and the latency of the rise. For these time points, Bruce (1977) provides an average fall duration (i.e., the duration from the onset of the fall until its end) of 93 ms for accent 2 and 68,5 ms for accent 1, for words in focal position. On the other hand, for the timing of the rise (i.e., the duration from the word beginning until the peak, he gives an average duration of 150. 33 ms for accent 2 and 115.66 ms for accent 1. The duration of the fall and rise for accent 1 and 2 in Swedish were calculated through the average fall/rise duration in every position in a sentence (i.e., there are up to three pre or post focal positions in the sentence) according to Bruce (1977)[2]. In the case of the duration of the rise, the numbers computed were extracted from the set A of the materials used in Bruce (1977), given that they were most similar to the material used in this thesis.

As for Southern Swedish, the tonal alignments are not as similar to their Central Swedish counterparts. In fact, they are just the opposite (Roll, 2015) (Table 2). However, their realizations remain the same whether the words are in focused or unfocused. Thus, accent 1 is characterized by a high-pitched tone associated with the stressed syllable (H*L) while accent 2 has a low-pitched associated with the primary stressed syllable (L*HL). As Hed et al. (2019) describe the difference between the word accents and their prominence levels in the Southern Swedish dialect lies on the F0 range; that is, word accents in the focus level are performed with a larger F0 range as well as with a longer duration.

*Table 2: Southern Swedish word accents tone alignment and prominence levels for accent 1, accent 2 and compounds. In bold, the distinctive tone between accent 1 and 2. * associates the accents to stressed syllables.*

Prominence levels	*Accent 1*	*Accent 2*
Focus accent	**H***L	**L***HL
Word accent	**H***L	**L***HL

[2] In the case of the duration of the fall for accent 1, the reason for there not being a duration is that it was hard to calculate the duration of the fall in accent 1 words in 2nd position given that there was a minimal range of the fall (Bruce, 1977, p.75). Therefore, two fall durations were used out of the three different positions in a sentence for each of the accents.

Figures 3 and 4 show the phonological realization of the word accents in Southern Swedish according to their prominence levels.

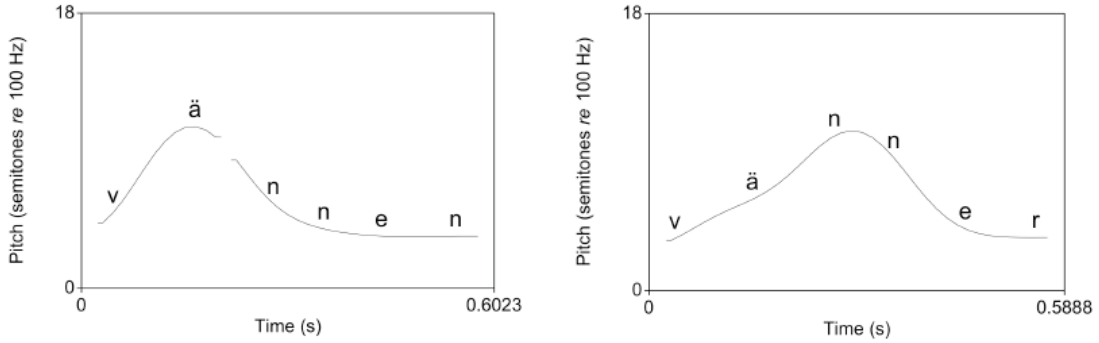

Figure 3: Southern Swedish unfocused accent 1 and accent 2 realizations for vännen 'the friend' and vänner 'friends' from Hed (2016)

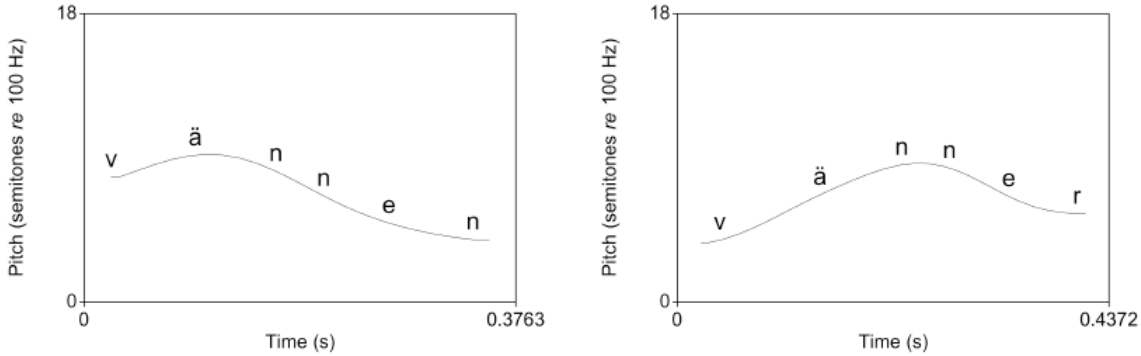

Figure 4: Southern Swedish focused accent 1 and accent 2 realizations for vännen 'the friend' and vänner 'friends' from Hed (2016)

2.1.2 Perception in L1

In native speech, word accents are associated with a certain suffix and word stem combination. Thus, while the word stem carries the tone, the word accent is determined by the suffix. This allows listeners to predict which suffix will follow (Roll et al, 2015). Hence, the combination of an invalid word accent and word stem-suffix is likely to be considered incorrect by native speakers, even though the meaning of the word would still be understood (Roll et al., 2010; Schremm et al., 2016).

This association served as inspiration for experimental and neurolinguistic studies, which found that native Swedish speakers rely on these features to predict and facilitate the processing of word accents (Schremm et al., 2016). Evidence from neurolinguistic studies suggest that the tones that word stems carry pre-activate the upcoming possibility of suffixes in the brain (Roll, 2015; Roll et al, 2015 and Söderström et al., 2017). Söderström et al. (2012) found that both accent 1 and accent 2 are used for the prediction of an upcoming suffix associated with the respective word accents. Additionally, there is further evidence that the processing of accent 2 with its suffix combination takes longer than that of accent 1. Before this finding, it was assumed that only the processing of the mismatching accent 2 suffixes and words took longer than the mismatching of accent 1 suffixes and words (Söderström et al., 2012). This is due to the assumption that accent 1 is a default accent while when accent 2 occurs, there is an increased processing load due to the activation of lexical information (Roll et al., 2010; Söderström et al., 2012). This assumption comes from the fact that accent 1 has a very limited set of suffixes to be associated with, as opposed to accent 2 which not only is associated with more suffixes but also with compounds (Roll et al., 2010; Roll, 2015; Söderström et al, 2016). Due to the association between accent 1 and a limited number of suffixes, there is higher certainty and greater pre-activation of the associated suffixes in the brain when hearing an accent 1 tone than when hearing an accent 2 tone (Roll et al., 2015). Therefore, a greater preactivation negativity (PrAN) was found for the processing of accent 1 than for accent 2 (Roll, 2015). In this regard, Kochancikaite (2019) found that accent 1 is represented "holistically in whole-word forms" in the mental lexicon while accent 2 could be interpreted as a "feature of suffix morphemes" (p.40).

In that sense, it has been found that the way in which words are processed in the brain is in fact related to the frequency in which they occur rather than being a distinction between accent 1 and accent 2 and how they are represented in the mental lexicon. That is, only familiar lexical items are processed and represented in a whole-word form in the brain while when there is a lack of familiarity with a word and its whole form is not available, it tends to be processed in a decompositional way (Schremm et al., 2018). This was examined through the use of real and pseudo words, which carried tonal information even though they did not exist in the Swedish

language. Not only was it discovered that tone-processing is associated with whole-word and decompositional forms depending on the lexical status of the word but also that tone processing tends to occur in the planum temporale, an area in the left hemisphere of the brain thought to be involved in auditory processing.

When comparing both word accents, native speakers took longer to respond to past tense suffixes (accent 2) than present tense suffixes (accent 1) (Söderström et al., 2012). While Ambrazaitis (2009) found longer response times for accent-1 verbs with a mismatching accent-2 suffix, but not the opposite (i.e., accent-2 verbs with a mismatching accent 1 suffix) in an identification task to judge whether the sentences expressed new or confirming information. All of this adds to the notion that accent 1 has less lexically specified information than accent 2 and, therefore, produces a greater pre-activation during their processing. That is, we have thought of it as accent 1 being associated with a lower number of word endings, which can make the listener be more certain about the continuation, and therefore it gives shorter response times.

Evidence from brain-imaging studies also indicates that word accents are mainly processed in the left side of the brain (Roll et al., 2015; Schremm, et al., 2018) and that there is a greater reliance on the prediction of upcoming suffixes when the cortex in the planum temporale (a region known to be involved in the processing of Swedish word stems and suffixes [Roll et al., 2015]) is thicker (Schremm et al., 2018). In fact, it has been observed that brain areas, specifically the pars opercularis of the left inferior frontal gyrus (IFGpo) related to word structure processing, are activated when using Swedish word accents, especially when dealing with pseudowords (Roll, et al., 2015; Söderström et al., 2017). Lastly, Schremm et al. (2018) found a relative increase in response times for invalid real nouns when the cortex in the left planum temporale was thicker.

2.2 Second language perception and production

2.2.1 Perception of Swedish word accents in L2

It is widely known that word accents are not a linguistic feature studied and/or trained in Swedish as a second language courses since they are not believed to be important for the acquisition of Swedish and the general comprehension of this language (Hed et al., 2019). In addition, they are also considered one of the most difficult features for learners of Swedish as a second language to master (Lundskaer-Nielsen et al., 2005). Therefore, it could be assumed that it is not essential to acquire word accents or to make use of them in order to be understood. This argument is also in line with the realization of word accents, which vary from dialect to dialect, with some not even possessing this feature; such is the variety of Swedish spoken in Finland. Nevertheless, Lundskaer-Nielsen et al., (2005) bring up some key arguments such as avoiding any misunderstanding or attempting to sound like a native speaker for L2 learners to master the use of Swedish word accents. In addition, Schremm et al., (2017) claim that using the incorrect word accents interfere greatly "with communication with Swedish native speakers" (p.210).

Because L2 perception of word accents may not be as simple as L1, their perception and production of word accents are unlikely to be as that of adult native speakers or even children. As mentioned in the introduction, several perception models (e.g., the Perception Assimilation Model (Best, 1995, p.193 as cited in Schmidt, 2011,p.16)) claim that it is at the initial stage of the L2's language learning when the difficulty or easiness of the learning is determined through the L1's prosodic features. That is, if you have a tonal L1, it should be easier to learn the L2's tonal features, whereas if you have a non-tonal L1, the L2's prosodic features may be harder to perceive. So far, L2 research on Swedish word accent has found different results depending on whether the participants had a tonal L1 or not.

Starting with the studies involving non-tonal L1 learners, which may be subdivided into those which provided some instruction on word accents and those who did not, it was found that

intermediate learners of Swedish with no explicit instruction of word accents were able to acquire the tone-suffix association in a manner like L1 speakers (Schremm et al., 2016). Participants were asked to answer as quickly as possible if 80 real and pseudo verbs presented in the test were in the present or past tense. The stimuli consisted of verbs in present and past tense with valid and invalid tone-suffix combinations. That is, the same word stem of verbs was followed by a valid suffix for present tense suffix *-er* (accent 1) and a valid suffix for past tense *-te* (accent 2), only in the validly cued conditions. In the invalidly cued conditions, the suffixes were attached to word stems carrying the opposite tone (accent 1 for past, accent 2 for present). The results showed that L2 speakers at an intermediate level used word accents as predictors for upcoming suffixes in a manner like L1 speakers of Swedish: they generally answered faster and more accurately to the stimuli than native speakers. Nevertheless, both L2 learners and native speakers took a longer time to process invalidly cued suffixes with word accents than validly cued ones.

On the contrary, beginner learners exhibited that they were not yet able to use the pre-activation features for processing word accents in a native-like manner, after being instructed on word accents (Gosselke Berthelsen et al., 2018). Even though they had similar results to native speakers in accuracy for both the pitch discrimination and the word accent tasks, their RTs were longer than native speakers' and they showed no differences for all the suffixes when processing word accents, probably due to their level of proficiency. Lastly, what exhibited that they were not able to use word accents to predict the upcoming suffixes was their ERP and EEG results, which only exhibited a late negativity for accent 1, whereas native speakers of Swedish had a PrAN effect for accent 1 as compared to accent 2, followed by a P600 for word accent-suffix mismatch, in line with previous findings.

Additional studies using a training game on word accents as well as ERP data discovered that low to intermediate learners of Swedish used tones as suffixes-predictors to a greater extent after their training (Schremm et al., 2017; Hed et al., 2019). The participants' accuracy and RT increased and decreased, respectively, as they progressed in the game, suggesting that participants became better and learned the association between suffix and word accents as they progressed in the game, with

an increase of accuracy of 76% by the final rounds (Schremm et al., 2017, Hed et al., 2019). However, they did not resemble that of native speakers (i.e.., shorter RT for validity as opposed to invalidity). Instead, they exhibited longer response times in validity for the definite singular suffix *-en*. Furthermore, they exhibited a pre-activation negativity effect (PrAN) as well as a left anterior negativity (LAN) for invalidly cued stimuli after their training, indicating that participants had internalized the tone-suffix association and suggesting that they process it decompositionally, as in the case of native speakers with pseudowords (Söderström et al., 2017). Nevertheless, a P600 effect was not found for invalidity. This would have suggested that the participants reprocessed ungrammaticality by having an increased morphological processing load (Roll, 2015; Roll et al., 2013), as in the case of native speakers. Possibly, because those participants could have waited to hear the suffix before they "retrieved the grammatical meaning" (Hed et al., 2019, p.116).

2.2.2 Production of Swedish word accent in L2

Research in L2 production in Swedish is relatively limited but the few studies which investigated this phenomenon have found a wide range of results. Similarly, to the perception studies, these studies can also be subdivided based on the tonality of the participants' L1. Schremm et al., (2017)'s production task is an example of a study with non-tonal L1 learners. Participants were recorded while they read out loud 20 carrier sentences in Swedish preceded by a context question. Half of the sentences contained nouns with the singular definite article -en (accent 1) and the plural indefinite suffix -ar (accent 2) while the other half contained verbs in present -er (accent 1) and past -te/-de (accent 2) tenses. Results found an increase of accuracy post-training, suggesting that L2 learners could have acquired the rule of tone-suffix assignment for novel words instead of the intonation of individual words as a whole. This was indicated through the production of the correct word accent in words that were not present in the training. Furthermore, accuracy was higher for accent 1 than for accent 2. Overall, the participants who took part in this study produced Central Swedish word accent patterns, except for three participants who occasionally exhibited patterns similar to those in the Southern Swedish dialect (Hed, 2016).

When it comes to studies with tonal L1, it was proposed that there is no evidence to suggest that speakers with a tonal L1 have an advantage to produce word accents in Swedish over speakers of non-tonal L1 (Tronnier & Zetterholm, 2013). Instead, it would be a matter of what kind of tonal language the L1 is that would have a more significant role in the production of word accents. By comparing word accent production of speakers of Farsi (stress-accent language), Thai (lexical tones), Vietnamese (lexical tones) and Somali (tone-accent), they found that only the latter produced such difference more consistently. Given that Somali's tone accentuation was closer in tonality and function to word accents in Swedish, they concluded that there was a connection that made it easier to produce similar patterns to those of word accents in Swedish. Nevertheless, when comparing word accent production of Somali speakers (with proficiency in Swedish) and Swedish native speakers in identification and rating tasks, results indicated that native speakers of Swedish did not identify nor rated the L2 Swedish learners' speech as native-like (Tronnier & Zetterholm, 2014). In fact, correct identifications were higher for the utterances performed by native speakers of Swedish whereas misidentification occurred more regularly for the L2 learners. In addition, L2 learners' production was often perceived as more difficult on the rating tasks. A similar perception test on the production of Norwegian word tones by native speakers of Mandarin and German (with a beginner level of Norwegian) was conducted (van Dommelen & Husby, 2009). In this case, the L2 learners were to identify Norwegian word tones, some with previous training and others without any training on word accents. Results indicated that the Mandarin Chinese speakers had a better performance than German speakers in both tasks.

While few studies have been carried out in the perception and, especially, production of word accents, far more have been conducted for tonal languages, indicating that speakers with a tonal L1 (Taiwan Mandarin Chinese) perceive Mandarin tones better than those with a non-tonal L1 (French) possibly because French speakers perceive tones as "non-linguistic melodic variations" (Hallé et al, 2004, p.416) since French does not have tones as part of their core phonological system. Nevertheless, there are contrasting views (Hao, 2012), proposing that there are no differences between the tonal and non-tonal L1 groups in a discrimination task of Mandarin Chinese tones. Lastly, considering that advanced learners tend to show better and, possibly, similar

results to those of native speakers, Pelzl et al. (2019) examined advanced learners' perception of lexical tones using ERP; concluding that L2 learners were highly proficient in the classification of lexical tones. However, the results exhibited a general difficulty in perceiving Mandarin tones, which they claim not to be due to the perception of tone categories but to "lexical encoding and retrieval of tones in multisyllabic words" (p.83).

To sum up, previous research on non-tonal L1 learners have found that advanced speakers show similar results to those of native speakers' perception as well as low to intermediate learners of Swedish after being instructed on word accents. In the case of participants with a tonal L1, previous research discovered that it may depend on the language's tonality what makes an L2 learner of Swedish have the advantage to perceive and produce word accents in Swedish. Nevertheless, word accents produced by proficient learners of Swedish is not yet as native-like to be accurately identified by native speakers.

2.3 The present study

In this chapter, I presented the prosodic system of Swedish and its word accents together with the most relevant studies on L1 perception and L2 perception and production of Swedish. Some studies on tonal perception and production have also been included to give a deeper overview of other accounts in the field of Swedish word accent production. This section aims to elaborate on the research questions posed in the Introduction and to present the hypotheses investigated in this study.

The literature review showed that non-tonal L1 learners are likely to perceive and produce word accents in Swedish depending on their proficiency level and if they were instructed on word accents or not, with the exception of beginner (Gosselke Berthelsen et al., 2018). However, these studies examined whether learners of Swedish can perceive and/or produce word accents rather than *when* they started doing so. For this reason, the novelty of this study is to include all

participant levels to investigate when they begin using these prosodic features and whether there is a relationship between their perception and production of word accents in Swedish. Finally, previous studies show that perception precedes production (Buchsbaum et al., 2001; Buchsbaum et al., 2005b, 2005c; Hickok et al., 2003; Hickok et al., 2009b; Okada & Hickok, 2006b; as cited in Kemmerer, 2015, p. 136). Therefore, it is important to examine the possibility of having different outcomes for the perception and production of word accents in Swedish. Considering that previous studies (Gosselke Berthelsen et al., 2018; Hed et al., 2015; Schremm et al., 2016; Schremm et al., 2017) examined beginner, intermediate and low to intermediate groups (without classifying them into different groups), it would be of special interest to explore if there are differences among the three groups proposed in this project. Therefore, the following research questions were formulated:

RQ1 *Do learners of Swedish with a non-tonal L1 perceive and produce the prosodic word accents of the Swedish language?*

RQ2 *If RQ1, do they show a difference between perception and production?*

RQ3 *If RQ1, when in their language acquisition process (according to CEFR[3]) do they begin to produce them?*

2.4.1 Hypotheses and predictions

Having in mind the research questions explained above and considering the results found in previous research, the following hypotheses and predictions have been proposed:

H1 : Advanced L2 learners of Swedish will perceive the difference between accent 1 and accent 2 in terms of response times and accuracy.

H2 : Advanced L2 learners of Swedish will make a difference in the production of accent 1 and accent 2 in terms of tonal patterns and timing.

[3] Common European Framework of Reference (Council of Europe, 2001)

In previous studies, it was found that low-level learners did not exhibit production results comparable to native speakers (Gosselke Berthelsen et al., 2018), but proficient learners were better at accurately producing one of the tonal patterns (accent 1 of CS) in Swedish both before (68.75%) and after training (73.18%) compared to accent 2 (pre-training: 16.12%; post-training: 26.01%) (Hed, 2016; Schremm et al., 2017). Hence, H2 was based on the results of these studies. At the same time, these considerations lead to several expected predictions for this study. For the perception task, response times and accuracy will be measured (explained in the methods chapter). The results of previous studies (Schremm et al., 2016; Gosselke Berthelsen et al., 2018) indicated that advanced participants exhibited even shorter response times than native speakers of Swedish, and beginner-level participants showed not to be able to use pre-activation features to process and predict the upcoming suffix in a manner like native speakers. Hence, results are expected to show a difference in the duration of response times among groups. Similarly, the accuracy of the advanced and intermediate groups is expected to be higher than that of the beginner group. As Gosselke Berthelsen et al. (2018) proposed in their study, learners at a beginner level may not be able to distinguish the different suffixes associated with each word accent and might not have learned them. Hence, in the present study, participants at a beginner level are expected to have a lower accuracy rate at identifying the correct word accent-suffix combinations for both accent 1 and accent 2.

Perception

P1: The *advanced group will have overall the shortest response times, but especially shorter to validly cued conditions than invalidly cued conditions in comparison with the other two groups of L2 learners*

P2: *Advanced and intermediate learners associate a higher number of valid combinations between word accent and verb tense suffix than invalid ones for both accent 1 and accent 2*

The production task measured the number of rises and falls in each group for each word accent as well as the latency of F0 onset, of the peak and the fall (more details in the methods chapter). In previous literature, Schremm et al., (2017) found that their participants generally produced one

tonal pattern more accurately than the other (accent 1 compared to accent 2), possibly due to their low-intermediate levels of Swedish. Given that beginner and intermediate learners do not know the meaning of all words and the tone/suffix association, beginners and intermediate learners are expected to show one pattern for both word accents overall: more specifically a pattern like that of accent 1, as well as no significant difference between the timing of accent 1 and 2. In addition, Schremm et al. (2016) claimed that participants with low to intermediate proficiency in Swedish are generally not instructed on word accents. Hence, this is a further argument about why participants of these levels are not expected to show any differences neither in tonal patterns nor timing. In the case of advanced speakers, the literature only exhibited that they had native-like abilities in perception. Nevertheless, Schremm et al., (2017)'s participants, who were classified as intermediate participants could be considered as highly intermediate-advanced given that the course they attended is of high intensity. Hence, the predictions for this group were based on this literature, too.

Production

P3*: Advanced learners of Swedish will produce different tonal patterns (rise or fall) for accent 1 and accent 2*

P4*: Beginner and intermediate learners of Swedish will be able to produce one pattern for both word accents overall.*

3.Methods

This chapter introduces the methods used to carry out a study of the perception and production of word accents by learners of Swedish with non-tonal L1 to address the hypotheses and research questions presented in Chapters 1 and 0 and bring some light into the discussions of whether non-tonal L1s speakers can perceive and/or produce pitch accents, in this case.

This chapter is structured as follows: Section 3.1 gives an account of the participants and their L1 and L2s. The materials and designs for the perception and production tasks that the participants were asked to perform are discussed in section 3.2, while a more detailed account of how the data was collected is described in section 3.3 Finally, section 3.4 discusses the ethical issues which this project may have brought up, and Section 3.5 describes the steps taken when analyzing the data.

3.1 Participants

A total of 46 adult learners of Swedish (*15 males and 31 females*) from different levels participated in the project. They were between 18 and 50 years of age (*M: 26.15 y SD:6.08*) and resided in Skåne Län (particularly in Malmö, Lund or nearby areas). They had been living in Sweden for an average of 25.44 months (*SD: 34.97*). They were native speakers of 26 different non-tonal languages (*Arabic, Bengali, Czech, Dutch, English, German, Greek, Hindi, Indonesian, Italian, Persian, Portuguese, Russian, Spanish, Tamil* and *Telugu*) and not bilingual. Among these participants, only 2 had previously learnt a tonal language before. At the moment of the recordings, all the participants were attending or about to attend a Swedish course either at Lund University or at SFI (Swedish for Immigrants). Their knowledge of Swedish was assessed through an online language test (see section 3.3.3). In addition, students registered in both an on-campus and online

course[4] were eligible for the study. Some of them had studied Swedish before arriving in Sweden and some others started once they were in Sweden (see Appendix 1 for a more extensive account of the participant information). Furthermore, they had an average exposure to Swedish of 24.50 months (*SD: 25.76*).

In addition to their native language and Swedish, participants reported being multilingual in other non-native languages. For most of them, English was the second most proficient non-native language, except 10 participants who were native speakers of English (n = 4) and had good knowledge of Hindi, German or Tamil; native speakers of Russian (n = 2) and had good knowledge of Ukrainian; native speakers of Telugu (n = 2) with good knowledge of Tamil and a native speaker of Dutch with good knowledge of French. Twenty-four participants reported having knowledge of three (n = 18) or more languages (n = 6). Excluding Swedish or English, these languages consisted of German (n = 6), Romance languages (French, n = 2; Italian, n = 2, Spanish, n = 3), Danish (n = 1) Hindi (n = 8), Arabic (n = 2), Chinese (n = 1), Japanese (n = 2), Korean (n = 1) Marathi (n = 1), Malayalam (n = 1), Telugu (n = 1) and Kannada (n = 1). Additional information regarding their target dialect in Swedish and that of their L2 teachers, if native, were also requested to account for exposure factors.

Participants were compensated with a 49SEK online cinema ticket after their participation. Given that over a quarter of the participants had already taken part in the project when the funding aid was approved, a form for the reception of their tickets was also given to the participants to sign.

3.2 Materials

Perception

The stimuli and procedure were the same as in Söderström et al. (2012) and Schremm et al. (2016). The stimuli consisted of 20 sentences (see a complete list of the sentences in Schremm et al., 2016)

[4] This applied to courses which were converted to an online form given the measures regarding covid-19.

in each of the 4 conditions (Validly cued-present, Validly cued-past, Invalidly cued-present and Invalidly cued-past). They consisted of the subject *han* ('he') and a verb in either present or past tense and were paired with either accent 1 or accent 2. For the target stimuli, in the validly cued conditions, the word accent-suffix combination was correct (i.e., *-er*, for the present tense (accent 1), and *-te* for the past tense (accent 2)). For the invalidly cued conditions, the word accents were combined with the mismatching suffixes; that is, *-er* to accent 2 and *-te* to accent 1. To make it clearer, an example of the sentences with the four conditions and word accents was included in table 2.

Table 3: The four experimental conditions in the perception test in terms of stem tone and suffix combinations with example sentences.

Condition	Stem tones + suffix	Example
Validly cued-present	Accent 1 + present tense	Han tänk$_1$ + er. 'He thinks.'
Validly cued-past	Accent 2 + past tense	Han tänk$_2$ + te. 'He thought.'
*Invalidly cued-present	Accent 2 + present tense	*Han tänk$_2$ + er. 'He thinks.'
*Invalidly cued-past	Accent 1 + past tense	*Han tänk$_1$ + te. 'He thought.'

Lastly, since it is the timing of accent 1 and accent 2 that mainly distinguish them, the conditions that share the same stem tone have an equal duration of their stem, as Schremm et al., (2016) clarifies.

Production

28 trials were used as elicitation material for this project: 14 real words, 14 pseudowords. They consisted of verbs (6 real verbs, 6 pseudo verbs), nouns (6 real nouns, 6 pseudo nouns) and 2-syllable-compounds (2 real, 2 pseudo compounds). Both verbs and nouns varied in tense and number; that is, present (accent 1) and past tense (accent2) and definite singular (accent 1) and plural (accent 2), grouping a total of 6 trials (3 real and 3 pseudo) per condition. To avoid other focal rises than those in the target words, these words were later put into full sentences preceded

by a context question of the kind: "*Vad gör han? Han springer"* (for verbs) and *"Vad är det? Det är en klocka"* (for nouns and compounds) (Roll M. , Prosodic cues to the syntactic structure of subordinate clauses in Swedish, 2004). Examples are given in Table 4 and the full lists are given in Appendix 2 and Appendix 3. For clarification purposes, a morphological analysis (i.e., broken into stem and suffixes) of nouns with suffix -*en* (singular) and -*ar* (plural) as well as of compounds in isolation was inserted in brackets at the end of sentences.

Table 4: Examples of sentences in production task.

Context questions	Sentences with target stimuli in focus position
Vad gör hon? *'What is she doing?'*	Hon drömmer *'She is dreaming.'*
Vilken är den? '*What is it?'*	Det är munnen *'It is the mouth.'*
Vilka är dem? *'What are they?'*	De är domar *'They are judgement.'*

As previously mentioned in chapter 2 (section

Riad (2014) explains the assignment of stress and tone in Swedish through the concept of a prosodic word, which consists of simple and complex forms. What divides the prosodic word into simple or complex is the complexity of the morphological structure. Simple and inflected words constitute a simple form and compounds constitute a complex form.

The prosodic word (ω) is formed by a minimal (ω^{min}) and a maximal projection (ω^{max}) and it is a culminative domain in Swedish. Culminativity being a criterion that requires *obligatoriness* (at least one stress in a word) and *culminativity* (at most one syllable marked with a stress in a minimal prosodic word) (Riad, 2012). Culminativity is represented differently in the minimal and maximal prosodic words (Riad, 2014): in the minimal prosodic word, the head is the stress and in the maximal prosodic word, the tonal accent.

Having said this, a prosodic word is culminative because it has a head consisting of one stress (in the minimal prosodic word) and one accent (in the maximal prosodic word). Within the minimal prosodic word, it is easy to identify the assignment of stress and tone because there is only one stress. However, minimal prosodic words can also be grouped (as in compounds) to form a maximal prosodic word. Example 2 (Riad, 2014) illustrates the assignment of stress within some minimal and maximal prosodic words.

(2)

(e.lek.tri.fi.'e.ra)$_{\omega}$	'to electrify'
(e.pi.de.'mi)$_{\omega}$	'epidemic'
('hus)$_{\omega}$	'house'
('tetra)$_{\omega}$ -(ˌvinet)$_{\omega}$	'bag-in-box wine'
('bäck)$_{\omega}$ (raˌvinen)$_{\omega}$	'gully'

When it comes to tone, it is in the minimal prosodic word where the lexical tone is assigned and it is the suffixes that induce this lexical tone, which is eventually incorporated into the word stem. Only suffixes associated with accent 2 carry a lexical tone, while accent 1-associated suffixes are assumed to lack tone specification. Accent 2 suffixes can be both inflectional and derivational (Riad, 2014). If the suffix is then adjacent to the primary stress, this tone will be assigned to the primary stress. An example of this is the suffix /-lig$_2$/, which induces accent 2. The preceding stressed syllable will then carry the tone assigned by the accent 2-inducing suffix when it is incorporated into the minimal prosodic word: (^{2}'trev-lig)$_{\omega}$ 'pleasant'. Nevertheless, there is an additional feature that conditions the realization of word accents: prominence levels. These are referred to in Riad (2014) as word accented level (when the word is not in focus) and focus accented level (when the word is in focus). This is explained in more detail in the following section.

In the maximal prosodic word, tone accent is assigned differently depending on the morphological structure of the word. That is, a maximal prosodic word can either be "coextensive with the minimal prosodic word, or form a larger unit" (Riad, 2014, p. 126) with other minimal words. If it

is coextensive, it means that there is one head for the minimal prosodic word (i.e., one stress) and one head for the maximal prosodic word (i.e., one tone accent). Considering the existence of only one stress, these words can be assigned accent 1 or accent 2 lexically (induced by a suffix as described above). Words with more than one stress are assigned accent 2 post-lexically. This is the case for compounds that have multiple stresses (i.e., minimal prosodic words). They are automatically assigned post-lexical accent 2.

2.1.1), there are no strict rules to apply word accents based on the stem of the word, but they rather differ depending on their suffix. Hence, nouns with the definite singular suffix *-en* and verbs with the present tense suffix *-er* were chosen to elicit accent 1, whereas nouns with the plural suffix *-ar* and verbs with the past tense suffix *-te* and compounds were selected to elicit accent 2. Additionally, pseudostems with real suffixes were included to examine if the participants learn to produce word accents similarly to native speakers (i.e., by learning the tone-suffix associations (Roll et al., 2013)) or they learn them by memorizing the word and the word accent attached to it as a whole. Due to a typing error, the original trial word *barnmun* included an extra vowel (barnamun) in its full sentence, while in the clarification brackets it was still shown in its original form. Hence, some participants pronounced it as barnmun (n =12) and others as barnamun (n = 34). Nevertheless, in both cases, the word should still elicit accent 2. For this reason, it was not excluded from the data.

Lastly, two different lists were created with the stimuli, randomized and presented in paper form. Depending on their participation number, participants were offered list 1 (odd participant numbers) and list 2 (even participant numbers). Approximately half of the participants used list 1 and the other half used list 2.

Both the production and perception tasks were created to answer RQ1 and RQ2, which investigate whether learners of Swedish with a non-tonal L1 can perceive and/or produce pitch accents in Swedish as well as if there is any difference between perception and production.

3.3 Data collection

The entire experiment was carried out at the Humanities Lab at Lund University, in a quiet and sound-proof room, specifically at the LARM-studio at the LUX building (November-January) and Studio 2 at the SOL building (January-April). Before beginning the experiments, all participants filled in a participant background form, signed an informed consent[5] and answered a language background questionnaire.

With regards to the experimental setups in both studios (Figure 5 for LARM-studio and Figure 6 for Studio 2), I attempted to arrange them as similar as possible. However, they differed not only in that the experimenter was only allowed in studio 2 for the recording of the sentences (2-4 minutes), given that the size of the room was considerably smaller, but the communication and the form to deliver instructions were also dissimilar. That is, in studio 2, the experimenter remained and gave instructions to the participant from the control room[6]. Nevertheless, the steps to follow during the procedure were the same in both studios and for all the participants (except for the first 4 participants who performed the perception test before the recordings.)

[5] It also contained information about a series of measures for the prevention of covid-19 before, during and after the participation. These measures were also printed out and placed in each of the tables at the recording studios.

[6] The experiment was conducted this way so as to fulfill the measures against covid-19 agreed upon by the Humanities Lab (Humanities Lab (Lund University), 2021)

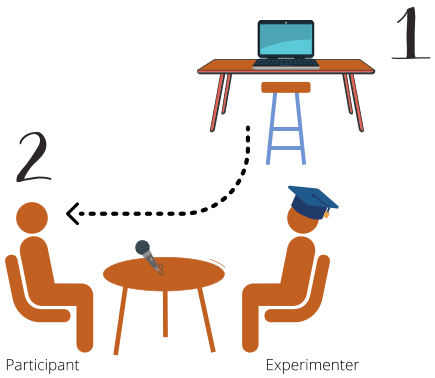

Figure 5: Overview of the experimental set-up at LARM-studio

As illustrated in Figures 5 and 6, the participants first sat by the table to the top right (number 1) to perform a language assessment test in Swedish to be classified into different CEFR ([Common European Framework of Reference] Council of Europe, 2001) levels. To carry out the audio recordings, they sat at another table opposite the experimenter. They were asked to read out loud 28 sentences in Swedish from a list they had been given before the recording while their speech was recorded with a hand recorder controlled by the experimenter. Lastly, they would sit at the initial table to carry out a perception test in Swedish on a computer using E-prime software (Psychology Software Tools, Pittsburgh, PA).

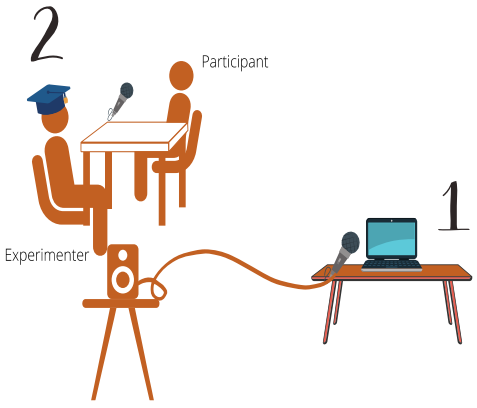

Figure 6: Overview of the experimental set-up at Studio 2 in SOL

3.3.2 Language background questionnaire

A language background questionnaire (see Appendix 4) with a total of 22 questions was given to the participants to obtain sufficient knowledge about their L1 and L2 contexts. This form included questions about when, where and how they learnt their L1 and L2s, their exposure to other languages and their current exposure time (in months) to the Swedish language, how long they had been living in Sweden as well a list of courses they were doing/have done and the frequency of use of Swedish (in weekly hours). What this questionnaire aimed to provide was information about their L1 and L2s which may have influenced their learning. In this case, most of the information was used to provide a detailed description of the participant group and to investigate whether there was any correlation between their exposure to Swedish and their time living in Sweden and their processing and production of word accents.

3.3.3 Language assessment test

Each participant was then classified into three different language levels (beginner, intermediate and advanced) through an online 40-multiple-choice-questions grammar test in Swedish (Cactus Worldwide Ltd, 2015) to answer RQ3, which examined whether there was a connection between their proficiency level and when they started to produce word accents if they did. The levels followed those from CEFR (Council of Europe, 2001):

The language assessment test grouped the participants according to their scores (Figure 7). However, to have more evenly distributed groups, a new score classification was created (Figure 8) classifying 15 participants into the beginner level, 14 into the intermediate and 17 into the advanced group:

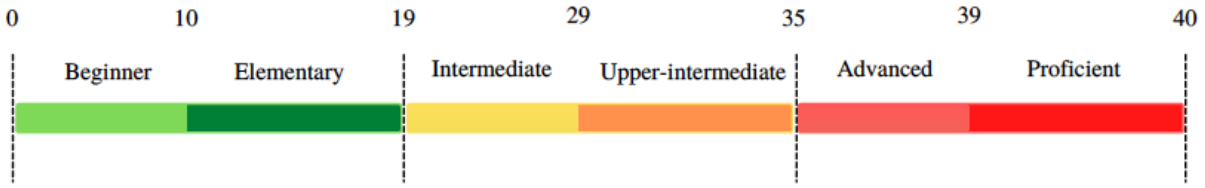

Figure 7: Scores and CEFR levels according to online language test

Figure 8: Scores and CEFR level classification used in this project

3.3.4 Production procedure

The recordings were carried out using a professional recorder, from the Humanities Lab at Lund University (H5 Handy recorder, ZOOM), attached to a triple (Manfrotto). Before the recording, the participants were given a list (list 1 or 2) of 28 randomized sentences in Swedish and instructions on how to proceed. No time was given to familiarize themselves with the sentences; nevertheless, the participants recorded the sentences twice so the last one would be analyzed, given that it would contain a better performance.

3.3.5 Perception procedure

The audio-perception test in Swedish was performed on a laptop with E-prime software (Psychology Software Tools, Pittsburgh, PA.) and E-run. The test consisted of a training session of 10 trials and 80 test sentences. Before the training session, the participants were given instructions in Swedish. In addition, those participants with a very basic level of Swedish were given instructions in English after they had read the instructions displayed on the screen. After the

initial training session, the test sentences were presented auditorily via the laptop's speakers in 4 blocks of 20 utterances with short breaks in between the blocks. The participants' task was to decide as quickly as possible whether the stimuli were presented in *nutid* ('present tense') or *dåtid* ('past tense') by pressing the keys 1 or 2 on the keyboard. As with the list of sentences, for half of the participants key 1 represented present tense and key 2 past tense while for the other half key 1 was for past tense and key 2 for present tense. What the participants saw on the screen was a fixation cross that would appear after the stimuli were presented and it would disappear once they pressed on one of the chosen keyboards. Both their accuracy and response times were measured. The point from which the response times were measured was when the stimuli with the same stem were to differ.

3.4 Ethical considerations

This project, like any other, is likely to raise some ethical issues. Some of these potential issues such as deception, anonymity and data storage, will be addressed in this section.

One of the most important values to share with a participant is indeed trust, which is very much connected with the concept of consent. These concepts were ensured during the production of this study because participants were recruited in a manner to gain their trust by explaining to them what exactly they would be doing, answering any questions if they had before they agreed to participate and through letting them know a general idea of what the study was about. Once they were on the premises to participate, the same instructions were given to them and they also read through a consent form that stated the purpose of the study, what tasks they would be performing and what measures would be calculated from those tasks. In addition, participants were informed that they could cease their participation at any time to ensure that they were willingly participating in this study.

With regards to the financial compensation offered, it was a way to thank them for their help during the total duration of their participation. Considering that the compensation was provided after their participation, and in some cases, months after it, I believe their help was kept voluntary and as what was aimed for, a way to acknowledge their time and help.

It is important to discuss the concept of anonymity. Each participant filled in a form (participant background form) containing information about their age, name and gender to provide a better description of the sample group used in this project. However, in that same form, they were given a participation number to keep their anonymity. Eckert (2013) argues that "the importance of consent depends on the potential effect the research may have on the participant or the participant's community" (p.14). In this case, learners of Swedish with non-tonal L1 were involved and their language background could express ethnic information, affecting participants somehow. For this reason, participants were kept anonymous during the research. In the case of the language background questionnaire and the participant background form, an extra measure to take will be that of destroying them and any personal information as well as soon as a grade for this project is reported.

A fourth issue that is important to address in this type of study is data storage, which will be resolved by storing the recordings and their back-ups safely on a university server for potential future research. This information was also stated in the consent form.

3.5 Data analysis

Perception

Response times (RT) and accuracy rates were measured for the audio perception test. They were extracted using the e-DataAid feature from the E-Prime software (Psychology Software Tools, Pittsburgh, PA.) Average accuracy per condition: Validity (validly vs invalidly) and Suffix (present tense and past tense) were calculated by participant and group level. Repeated measures

ANOVAs were performed with Validity (valid, invalid) and Tense (present, past) as within-subjects factors and Group (Beginner, Intermediate, Advanced) as a between-subjects factor for both RT and accuracy. In addition, repeated-measures ANOVAs were also performed under the same conditions but using Validity and Word accent (accent 1, accent 2) instead. To see if there was any correlation between the processing of the words and the exposure time to Swedish (ET) and/or the time the participants had spent living in Sweden (TLS), a repeated-measures ANOVA was performed (with same conditions as before) and using ET and TLS as co-variants.

Production

Each of the 28 trial sentences was extracted from the second recording for each of the participants and were analyzed with Praat (Boersma & Weenink, 2021). Only the previous word (*hon* ('she'), *ett* ('a/an'), *en* ('a/an') or *är* ('is')) and the target word was segmented. They were annotated and both time points and fundamental frequency (F0) information from the first syllable of each of the target words were extracted from them. For the time points, the peak and fall latencies, as well as the F0 onset latency, were extracted in milliseconds (ms.), from word beginning. Information about whether they had a falling or a rising contour at the end of the first syllable was also annotated. In addition, to provide an average point for the peaks and falls per participant and per group, the endpoint of either falling contoured-stressed syllables or rising contoured-stressed syllables was extracted as well. The words were measured in semitones (re 100hz). In addition, the tone alignment of the target words was audio-visually analyzed and annotated and a similar code classification dialect to that in (Hed et al., 2019) for the realization of the word accents was used; depending on what accent the participants produced and the dialect: focused accent 1 (1), focused accent 2 (2) were used if the participants performed accent 1 or 2 like that in the Central Swedish variety, and focused accent 1 (3) and focused accent 2 (4) for those that were similar to the Southern Swedish variety. Lastly, when the tonal alignment of the words did not resemble any of the varieties or the author was not sure, the code (5) was used.

Some recordings from several participants were excluded due to creaky voice. In the case of *barnmun*, the measures were taken up to the final consonant of the first syllable (n) whereas for

barnamun they were taken up to the final vowel (a). Lastly, in most cases, some initial consonants caused what is known as micro prosody. That is, small pitch variations uncontrolled by the speaker (Birkholz & Xinyu, 2020, p.8099). Considering this feature and depending on the variations, the F0 onset latency and semitones were taken a few milliseconds ahead.

For the analysis of the production data, the mean number of rises and falls was calculated per condition and participant together with the average of peak and fall latencies. ANOVA tests were conducted with Word class (nouns, verbs), Lexicality (real, pseudo) and Word accent (accent 1, accent 2) as within-subjects factors, and Group as a between-subjects factor for the number of rises and falls. The average duration of the peak and fall from the real nouns with rising contour were measured to account for differences with native speakers.

4. Results

This chapter presents a summary of the results for the perception and production tasks. The outline consists of two sections: Section 4.1 presents the results obtained in the perception task in terms of response times and accuracy for each of the groups examined and section 4.2. describes the results in the production task for time points (peak and fall latencies) and word accents (number of rises or falls) per level group.

4.1 Perception

Accuracy

Overall accuracy was very high and relatively similar among the three proficiency groups with the Beginner having a percentage of 93.66%, the Intermediate 99.11% and the Advanced 99.46%. The repeated measures ANOVA for within-subjects (factor Validity and Tense) and between subjects (factor Group) exhibited no effects for Validity ($F(1,43) = 1.11$, $p = .264$) or Tense ($F(1,43) = 3.40$, $p = .057$), nor any interactions. Hence, no further analyses were conducted. The results suggest that participants identified the correct and incorrect word accent-suffix combinations based on the suffixes and that there was no difference among the proficiency levels (see also Figure 9). However, it is worth mentioning the nearly significant tense effect, suggesting that participants almost had more difficulties with one of the tenses, the past tense, as can be observed in Figure 10. Including covariates ET or TLS in the analysis produced a Validity×Exposure to Swedish interaction ($F(1,1) = 10.42$, $p = .005$). These results suggest that the time of exposure to Swedish for the Beginner and Intermediate learners had an effect on them identifying the present and past tenses.

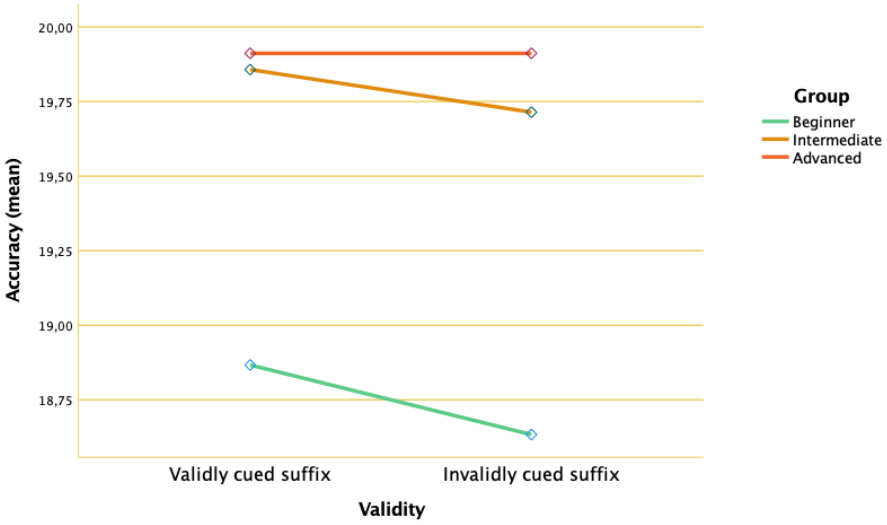

Figure 9: Mean accuracy for validly cued and invalidly cued conditions across the three proficiency level groups

Figure 10 illustrates the accuracy for the accent 1 verbs in the present tense (suffix *-er*) and accent 2 verbs in the past tense (suffix *-te*).

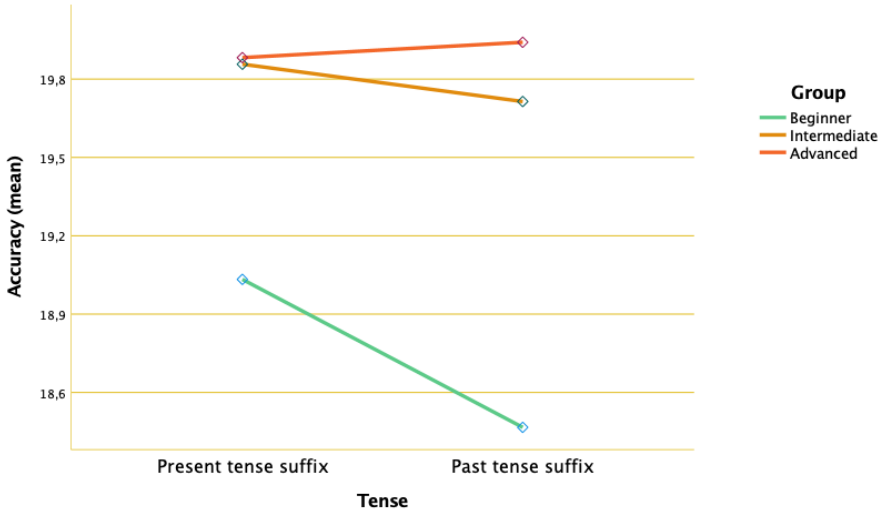

Figure 10: Mean accuracy for validly cued-present suffix and validly cued-past suffix across the three proficiency groups

Response times

There was only a main effect of Validity ($F(1,43) = 4.83$, $p = .033$) in the ANOVA test comparing the Beginner, Intermediate and Advanced groups, i.e. no effect of Group ($F1(2,43) = .158$, $p = .854$; $F2\ (2,43) = .502$, $p = .609$), and neither of Tense ($F(1,43) = 0.181$, $p = .673$), indicating that the participants responded faster to the validly-cued suffixes than invalidly cued suffixes and that they had similar RTs for both present and past regardless of their proficiency level (Figure 11). Therefore, no further tests were performed. However, as Figures 11 and 12 illustrate, advanced learners seemed to have a faster response than the Intermediate or Beginner groups. To see if there were other significant effects, a repeated-measures ANOVA was performed on Validity and Word accent, which exhibited an effect of Validity ($F(1,43) = 4.83$, $p = .033$) but no significant effect of Word accent ($F(1,43) = 1.11$, $p = .297$) was found, indicating that the participants identify the matching suffix and word accent associations but there is no distinguishable difference between word accents for them. Given that these results did not suggest any significant differences among the Beginner, Intermediate and Advanced level groups regarding Validity and Suffix influencing the processing of word accents, no further analyses were conducted.

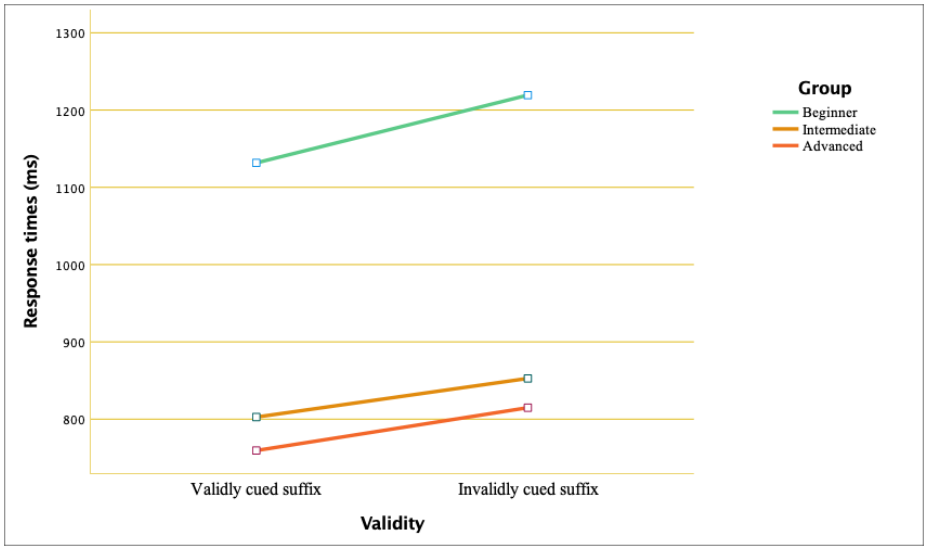

Figure 11: Mean response times for validly cued and invalidly cued conditions across the three proficiency level groups

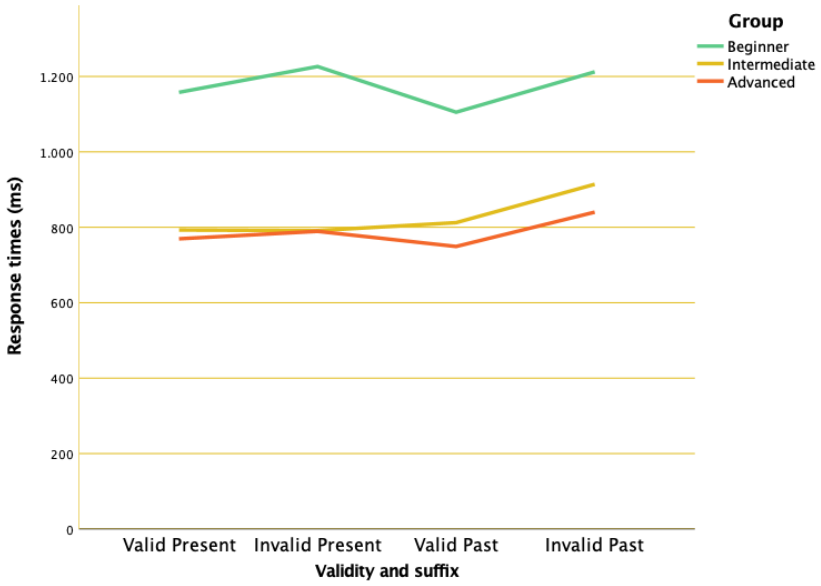

Figure 12: Mean response times for present tense and past tense suffixes across the three proficiency level groups

To offer a better account of the data illustrated in Figure 12, Table 5 shows the mean response times (ms.) for the valid and invalid present and past conditions for the three L2 level groups.

Table 5: Mean response times in milliseconds per condition and group

	Mean response times (ms)		
Conditions	**Beginner**	**Intermediate**	**Advanced**
Validly cued-present	1158	793	769
Validly cued-past	1105	812	749
***Invalidly cued-present**	1226	791	789
***Invalidly cued-past**	1212	914	840

4.2 Production

Tonal alignment realization

Rising contours

The repeated-measures ANOVAs with within-subjects and between-subjects variables of rising contours exhibited a main interaction of Word class×Lexicality×Word accent×Group ($F(2,43)$ =

4.19, p = .022). These results suggest that there is a difference in producing the word accents between the proficiency groups in the conditions used and depending on their word-class and lexicality status. Separate repeated-measures ANOVAs were performed to examine this interaction further. For the Beginner group, the Word class×Lexicality×Word accent effect was not significant (F(1,14) = .135, p=.719) and the results were similar for the Word class×Lexicality×Word accent interaction in the Intermediate group, i.e. not significant (F(1,13) = 2.48, p=.139). For the Advanced group, there was a significant Word class×Lexicality×Word accent interaction (F(1,16) = 7.62, p=.014). Considering that these results indicated a difference between the advanced group and the two others in the production of word accents, further analyses were conducted for this group.

Table 6: Total number of rises and falls per participant in the advanced group within the real noun conditions for accent 1 and accent 2.

Participant number	Rises accent 1_RN	Falls accent 1_RN	Rises accent 1_RN	Falls accent 2_RN
1	3	0	0	3
2	0	3	0	3
6	0	3	0	3
9	2	1	1	2
13	0	3	0	3
15	2	1	0	3
16	1	2	1	2
18	3	0	1	2
20	**0**	3	0	3
23	0	3	0	3
25	2	1	1	2
29	0	3	0	3
30	0	3	0	3
31	0	3	0	3
35	0	3	0	3
41	0	3	0	3
43	0	3	0	3

Advanced group

Rising contours

Previous results showed that the advanced group produced a difference between word accents depending mainly on their word class. Hence, repeated measures ANOVAs were performed on nouns and verbs separately. The ANOVA for nouns with a rising contour with Lexicality and Word accent as within-subjects factors revealed a Lexicality×Word accent interaction ($F(1,16) = 8.91$, $p=.009$). In the case of verbs, the ANOVA test performed on with Lexicality and Word accent as between-subjects factors revealed no interaction between Lexicality×Word accent ($F(1,16) <.001$, $p>.999$). Given that there were no significant interactions for the verb condition, further analyses were conducted for nouns focusing on their lexicality status. The ANOVA on real nouns with Word accent as within-subject factor exhibited a main effect of Word accent for this condition ($F(1,16) =5.35$, $p=.034$). An additional statistical descriptive analysis exhibited that the advanced group produced a higher number of rises for accent 1 real nouns (*M*: 0.76; *SD*:1,14) than accent 2 real nouns (*M*: 0.24; *SD*: .437). The same test for the pseudo noun condition showed a significant Word accent effect ($F(1,16) =5.76$, $p=.029$), revealing that advanced participants produced more pseudo nouns with a rising contour for accent 2-suffix words (*M*=1.76; *SD*=1,34) than for accent 1 (*M*= .71; *SD*=1.94). These results indicate that the advanced group produce accent 1 with a rising contour for the real noun condition.

Figure 13 illustrates the differences observed in the ANOVA within the advanced group for both rising and falling contours. Most of the word classes are performed with a rising accent-1 contour in the stressed syllable, for both real and pseudo utterances. However, only the real noun condition was observed to have statistically significant results. In the opposite case, pseudo nouns with accent-2 suffix were observed to be produced with a rising contour.

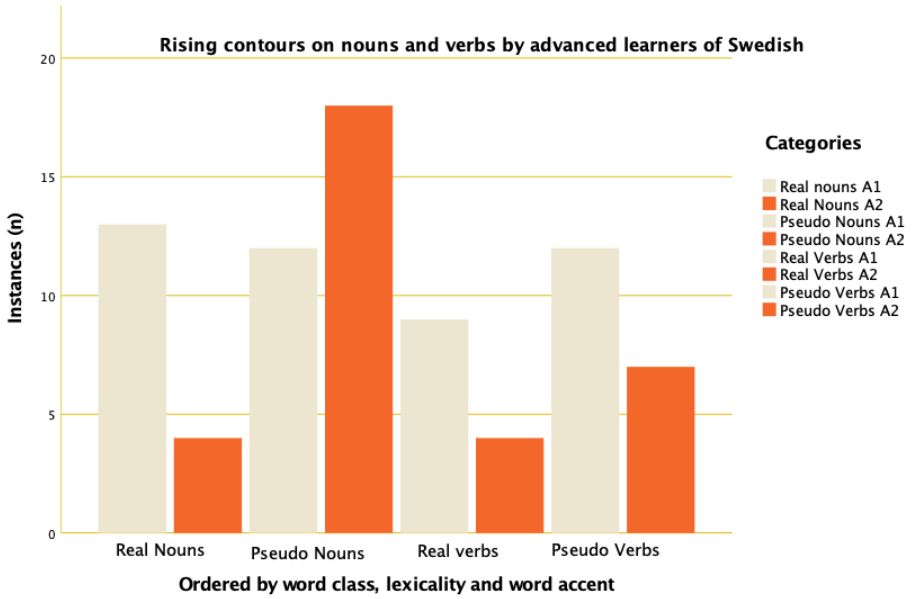

Figure 13: Production data according to the order used in ANOVA (per word class, lexicality and word accent) for rising contours.

Figure 14 shows how advanced learners produced accent 1 and accent 2 real nouns as well as the number of instances in each of the word accents. It also includes the rise and fall latencies with which the advanced participants performed accent-1 words and accent-2 words.

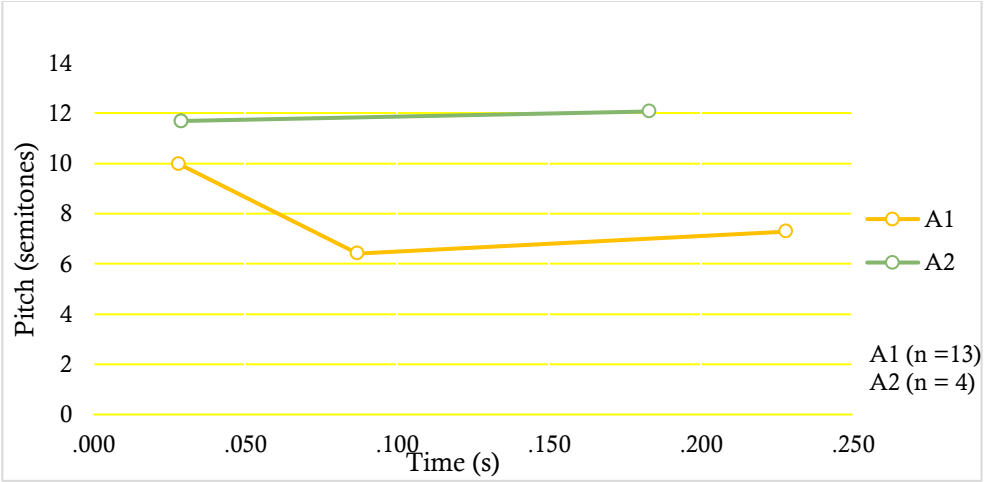

Figure 14: Average of peak and fall durations as well as their starting and end pointsfor the real nouns condition in accent 1 and accent 2 produced with a rising contour together with the number of instances

Falling contours

For the falling contours, the repeated measures ANOVA suggested similar results to those produced with a rising tone, when comparing the three proficiency groups. There was a significant interaction of all the factors: Word class×Lexicality×Word accent×Group effect (F(2,43) = 3.45, p=.040). These results indicate a difference in the production of the word accent within the three-level groups. That is, some of the groups could produce different word accents depending on the word class of the target word and if they are real or pseudo. Further analyses were conducted individually, showing no Word class×Lexicality×Word accent interaction in neither the Beginner (F(1,14) = .427, p=.524) nor the Intermediate group (F(1,13) = 2.48, p=.139). On the contrary, the Advanced group exhibited an interaction of Word class×Lexicality×Word accent (F(1,16) = 6.96, p=.018), and an interaction between Lexicality×Word accent (F(1,43) = 6.05, p=.026). Separate analyses for the advanced group were performed given that the previous results indicate that the advanced group produced a difference in the production of word accents' tonal contours depending on their word class, lexicality status and word accent.

Advanced group

Because results showed that advanced speakers produced a difference depending on the word class, lexicality and word accent, repeated measures ANOVAs were performed first on the noun and verb conditions separately, and with Lexicality and Word accent as within-subjects factors. In the case of nouns, the test exhibited an interaction between Lexicality×Word accent (F(1,16) =8.20, p=.011). For verbs, the ANOVA indicated no significant Lexicality×Word accent interaction (F(1,16) < .001; p>.999). Hence, no further tests were conducted for this condition. Further ANOVAs were performed for real nouns and pseudo nouns separately with Word accent as a factor. For the real noun condition, it exhibited a main effect of Word accent (F(1,16) =5.35, p=.034) whereas the Word effect was also significant for the pseudo noun condition (F(1,16) =6.66, p=.020). Considering that the descriptive statistics revealed that accent-2 real nouns were performed with a falling contour in a higher number of words (M:2.76; SD:.437) than accent-1 nouns (M:2.24; SD:1.14), whereas in the pseudo noun condition, falls were produced in a lower number of accent-2 pseudo nouns (M:1.94; SD: 1.34) than accent-1 pseudo nouns (M:2.24;

SD:1.03), this effect indicates that the advanced group tended to produce pseudo nouns with an accent 1 falling contour and real nouns with a falling accent 2. Overall, results suggest that the advanced group produce accent 2 with a falling contour in real nouns.

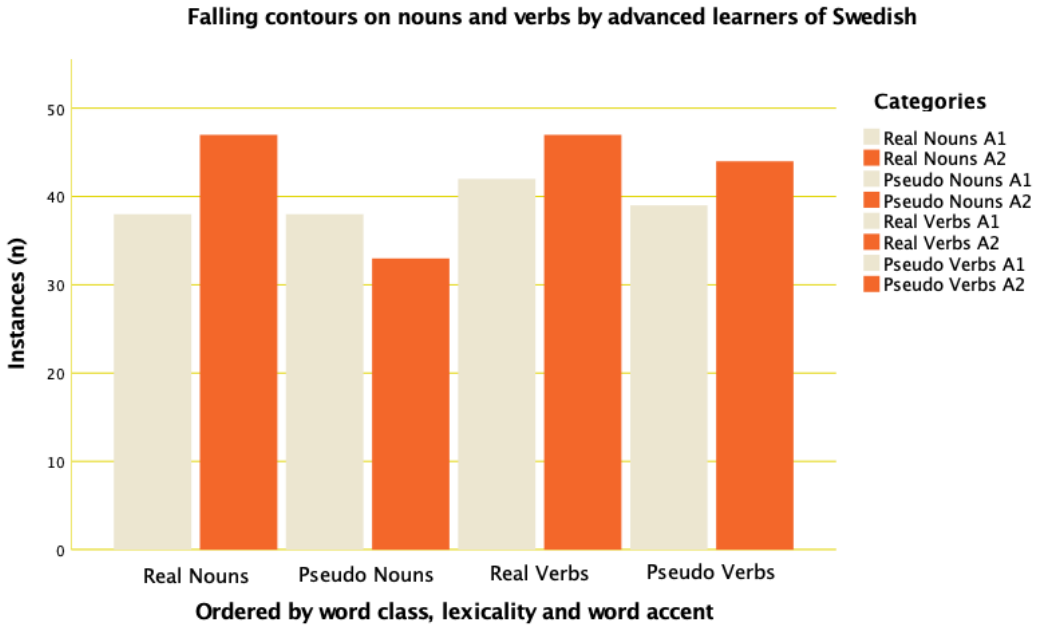

Figure 15: Production data according to the order used in ANOVA (per word class, lexicality and word accent) for falling contours.

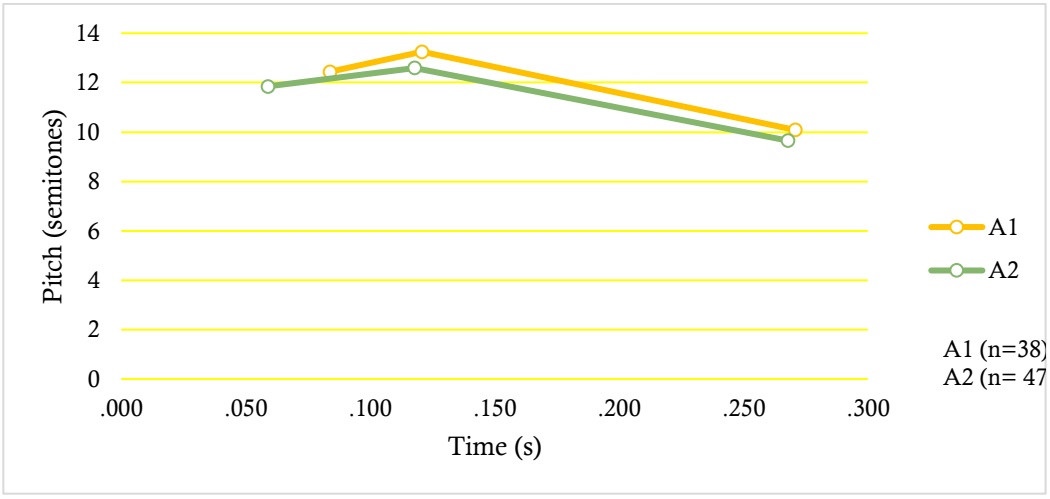

Figure 16: Average of peak and fall durations as well as their starting and end points for the real nouns condition in accent 1 and accent 2 produced with a falling contour together with the number of instances

Timepoints

Because advanced L2 learners showed a difference in the production of word accents within the real noun condition, further analyses were conducted by comparing the time points of those utterances with that of native speakers in Bruce (1977). The F0 contour of the real noun condition exhibited that when produced with a rising contour (LH), the advanced learners of Swedish tended to have a peak duration of 228 ms and a fall duration of 87ms. In the case of the falling contours (HL), participants produced a peak duration of 271ms and a fall duration of 121ms. Figure 17 shows the two different patterns advanced participants used for accent 1 and accent 2 real nouns in the cases where they make a difference.

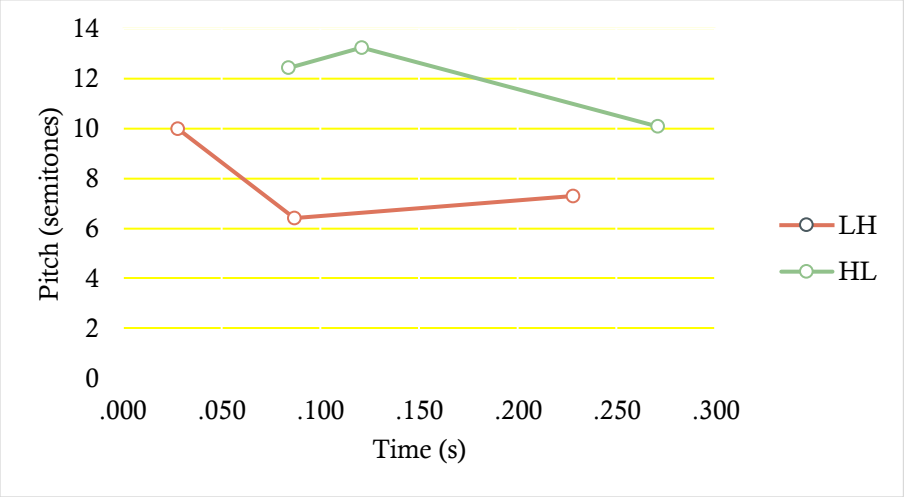

Figure 17: Realization of word accent 1 (LH) and 2 (HL) in the real noun condition for the advanced group. The X-axis shows the average duration as well as the starting and end points for the peak and the fall in milliseconds and Y-axis shows the average pitch frequency.

From the analysis and classification of tonal alignment, an interesting aspect found among several participants was their production of a tonal alignment resembling accent 1 in focus position in the Southern Swedish dialect (H*L) (Figure 17). This was observed mainly in a few advanced speakers but also in intermediate and beginner learners.

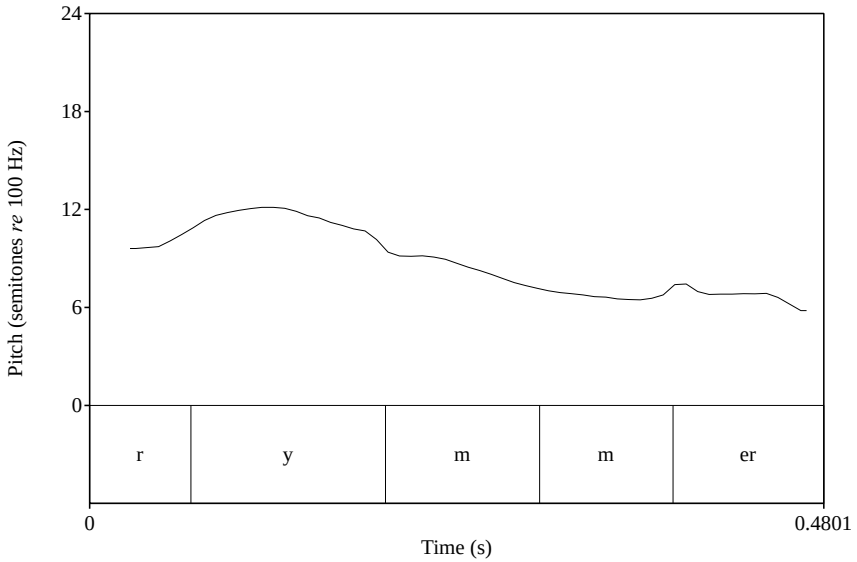

*Figure 18: accent-1 target word produced with Southern Swedish focal pattern (H*L)*

A final remark is that compound words (*sammasättningar*) were included in the production material, but they were not analyzed due to space limitations.

Correlations

Correlations were performed between the time advanced participants had spent in the language environment of their target language, validly cued-suffixes and invalidly cued-suffixes (r = .359, p = .172) as well as for present and past tenses (r = .326, p =.201).

5. Discussion

In this chapter, I discuss the results obtained in the previous section following the research questions and hypotheses provided in Chapters 1 and 2. The main purpose of this study was to examine whether L2 learners of Swedish perceive and/or produce word accents in Swedish as well as to at which proficiency level that would begin to occur. In addition, RQ2 explored whether the results differed in the perception and production tasks. The advanced group was hypothesized to perceive the prosodic differences between accent 1 and 2 (H1) and to be able to produce a difference between accent 1 and accent 2 in terms of tonal patterns and timings (H2).

5.1 Perception

Starting with the perception task, RTs and accuracy were measured for two conditions in accent 1, and two conditions in accent 2 in terms of validity (valid, invalid) and suffix (present tense, past tense). For each accent, one condition was validly matched in tone and suffix (present suffix *-er*, for accent 1 and past suffix *-te* for accent 2), and the other was invalidly matched in tone and suffix (present suffix *-er* for accent 2 and the past suffix *-te* for accent 1).

Regarding the accuracy results, participants accurately identified the matching tone-suffix combinations and the mismatching ones, showing no difference within the proficiency groups. Accuracy was overall very high for all the groups; however, the advanced group exhibited the highest (99.46%), followed by the intermediate group (99.11%) and the beginner (93.66%). This is in line with the predictions and hypotheses presented in chapter 2. However, the ANOVA performed suggested that participants relied on the suffixes to identify the correct and incorrect conditions and that the lack of a suffix effect indicated that they had difficulties identifying one of the tenses, possibly the past tense.

In the case of previous studies, the results of intermediate and advanced participants in this study are fairly similar to that of Schremm et al., (2016). Their intermediate participants had slightly higher accuracy rates than the ones in this study (99.56%), and even higher than native speakers (98.19%). Therefore, these results are in line with this study for the group of intermediate and advanced L2 learners. In the case of the beginner group, their accuracy is lower than the one for the low to intermediate L2 learners in Hed et al., (2019) but not so far off from their pre-training results 95.30% (accent 1) and 93.89% (accent 2). The non-significant effect of tense found in this study indicated that the results were similar for present and past tenses within the valid and invalid conditions for all the groups. This is not in accordance with a previous study that found an effect on suffix (Schremm et al., 2016). A lower proficiency level among the groups than those performed in Schremm et al., (2016) could explain their difficulties with one of these tenses, which judging from the data presented in Table 5 and Figure 12 could have been the past tense. In line with this, Hed et al., (2019) and Schremm et al., (2017) found that their participants went through some difficulties during the in-between levels of their game, which instructed on word accents: participants perform better on separate word-class tasks; however, they had more difficulties in the levels in which they were exposed to both nouns and verbs. It is worth mentioning, however, that the effect of tense was nearly significant, perhaps suggesting that participants might have waited upon hearing the suffix to identify the correct and incorrect conditions. Hed et al., (2019) proposed that even though predictive processing occurred during their perception task, their participants might still have waited until hearing the suffix to retrieve the grammatical meaning. This would explain the non-significant effect of validity on RTs encountered in this study, which suggested that participants based their identification of the present and past tenses depending on the suffix, similarly to native speakers (Hed et al., 2019).

When it comes to the RT results, for validity, the tests performed showed that participants responded faster to the valid conditions than the invalid ones, regardless of their proficiency level, and that they had similar RTs for the present and past suffixes, given the lack of a suffix effect. This suggests that they process the valid tone-suffix associations faster and take more time to respond to invalid tone-suffix combinations, possibly due to reprocessing (Roll et al., 2013). These

results are mostly in line with Schremm et al. (2016) who examined word accent perception in intermediate learners of Swedish and native speakers. They found that L2 learners reacted faster to validity than invalidity and they exhibited no suffix effect, resulting in similar response times for words in the present and past tenses. This holds mostly true for this study as well, which indicates that L2 learners use word accents to predict the upcoming suffixes, somewhat similarly to native speakers and, in this case, regardless of their group level.

The reason for there not to be a suffix effect, which was present in Schremm et al., (2016)'s native speakers group, could be explained through multiple factors, but as they explain, one of them could be the fact that most of the participants reported being multilingual. That is, even though their acquisition of other languages could have facilitated perception, it is not the case of Swedish word accents, which are not present in their other languages. Furthermore, given the similarity between English and Swedish, Swedish morphology could resemble that of English making participants rely on their English skills more. In fact, depending on whether their L1 has a rich morphology or not, their way of processing inflected words could vary in either breaking them down into stem and suffix or processing them as whole words, as Schremm et al., (2016) explain. Moreover, advanced speakers had the fastest response times (*M*: 786.75 ms) among the groups for both validity and invalidity, with intermediate speakers having somewhat slower response times (*M*: 827.76ms) than advanced speakers and beginner learners having the slowest (*M*: 1175.56ms) of the three groups. This is in line with the first hypothesis and the predictions proposed in chapter 2 as well as with previous findings (Gosselke Berthelsen et al., 2018; Hed, 2016; Schremm et al., 2016). However, considering that no group interaction was observed in ANOVA, these results are not statistically significant to corroborate the first hypothesis.

For suffix, even though no group interaction was found, the intermediate and advanced groups showed faster response times to present tense than past tense while the beginner group exhibited the opposite effect. This suggests that for intermediate and advanced learners, the accent-1 present tense *-er* suffix is easier to process than accent-2 past tense *-te* suffix, while beginner speakers seem to process accent-2 suffix faster. Nevertheless, there seem to be some group differences when

processing suffixes which are important to mention. Overall RTs show that all the groups process present tense suffix *-en* faster than the past tense suffix *-te* (except for the within validity condition for advanced learners). This has been found in previous studies (Hed, 2016; Schremm et al., 2016), but especially for L1 studies (Söderström et al., 2012). In the case of L2 studies, Schremm et al. (2016) found that their native speakers had faster responses to the present tense while L2 learners had the opposite response, concluding that Swedish native speakers regard the past tense as a more complex form. In the case of L1 studies, it was found that native speakers found it easier to process accent 1 words than accent 2 words in terms of their faster response times for the former accent. This is due to the limited possibilities of suffixes that accent-1 words would have as opposed to accent-2 words. In fact, accent 1 is thought to be a default accent while accent 2 carries far more lexical information. Therefore, upon hearing a word stem carrying accent 2, the brain preactivates all this lexical information, causing an increase of processing load (Roll et al., 2010; Söderström et al., 2012).

The opposite effect occurred in the beginners' group, who had very similar RTs for processing present and past tense suffixes for both validity options (VPre:1100ms; IPre:1226ms; VPast:1100ms; IPast:1300ms). An explanation for this would be their basic knowledge of Swedish grammar: It is quite common that beginner learners of Swedish are still not acquainted with the tense system of Swedish and do not distinguish the present and past suffixes accurately. In fact, when processing a language other than our native language, our working load increases (as Gosselke Berthelsen et al., 2018, summarize). This would explain the similar results in the beginner group and the overall longer response times in comparison with native speakers, whose RTs lie between 600-700ms for validity within the present tense and 675-730 ms for validity within the past tense (Schremm et al., 2016). Considering that the beginner group was also faster to respond to valid past than valid present, this could indicate that they find the past tense suffix *-te* easier to identify, which is in accordance with what Schremm et al. (2016) found in their study with intermediate learners. This has been explained by the fact that the past tense presented in the perception task is the most frequently taught in language courses and the simplest since the suffix is attached to the verb stem and, hence, it does not involve any auxiliary verbs (Schremm et al.,

2016). In fact, they could perceive the past tense faster than the present tense because, unlike in languages like English and Spanish, Swedish present tense expresses both a progressive and a simple form. Nevertheless, the results of the intermediate group in this study do not show this pattern, possibly because the learners in this study could have had more exposure to the language than those in Schremm, et al., (2016). A similar result to that of the beginner group was found in Gosselke Berthelsen et al. (2018)'s study, whose results showed no considerable differences in the RTs when processing word accents. This would possibly also be the case of the intermediate learners' RTs for validity/invalidity and for present tense which are very close to each other: valid present being 793ms and invalid present 791ms. Interestingly, Hed et al., (2019), who looked into beginner to intermediate L2 learners' perception of word accent before and after training with a melody game, did not find these results: their participants exhibited longer response times for invalid accent 2 than invalid accent 1 both pre- and post-training, just like native speakers of Swedish.

If we were to compare the beginners' results with Hed et al., (2019)'s, their group of participants showed similar RT results on the pre-training data. In their case, their response times were faster for validity than invalidity and longer for a valid accent 1 than for a valid accent 2, which holds for this study. Therefore, the lack of instruction on Swedish word accents in their language courses would be another possible explanation, considering that Hed et al., (2019)'s participants decreased their RTs after their training.

5.2 Production

When it comes to the production task, the number of rising and falling patterns were calculated by word accent and condition. Conditions were based on word class (nouns, verbs), lexicality (real, pseudo) and word accent (accent 1, accent 2). Advanced L2 learners were found to have a difference in the production of tonal patterns for accent 1 and accent 2 within the real noun condition. That is, the advanced participants tended to produce real nouns attached to accent-1

suffixes (*-en*) with a rising pattern and real nouns attached to accent-2 suffixes (*-ar*) with a falling pattern. Comparing these results with the tonal patterns patterns described in Table 1 and Table 2 in Chapter 0, results indicate that the advanced group tended to produce real nouns with a rising accent 1 and a falling accent 2, which is characteristic of the focal accent in the Central Swedish dialect.

The fact that the advanced participants produced these differences exclusively on real nouns, i.e., based on their lexical status, poses some questions as to a reason or as to how they learn the tone-suffix combinations. Söderström et al., (2017) in their study about the processing of Swedish tone-suffix connections with pseudowords found that these connections are independent of the lexical status of the stem and that people can use such connections to pre-activate the upcoming suffixes regardless of their lexical status. Applied to the current study, this would mean that the L2 learners in this study did not learn the tone-suffix associations (i.e., how to produce the word accent as such); but rather the full-form along with its associated word accent. That is, if they were also producing these differences in pseudo nouns as well, some similarity would arise between the L2 group, and the way native speakers use these neural tone-suffix associations. Therefore, the fact that the differences in tone patterns only occurred with real nouns implies that L2 learners learn to produce word accents differently. This argument was previously discussed in Hed et al., (2019), who proposed that L2 speakers' storage of full word-form is weaker than native speakers' due to less lexical knowledge. This would make that the tone-suffix associations consolidate as L2 speakers progress in their language learning, suggesting that these associations might appear at an advanced level. This argument could perhaps also explain the unexpectedly significant word accent effect found for pseudo nouns with an accent 2 suffix, which advanced participants produced with a rising contour. Thus, there is the possibility that participants associated the accent-2 *-ar* suffix with possible words having the same ending but carrying a rising-contoured accent 1, and, therefore, they learnt the full form word together with the word accent 1 instead of the accent 1 entirely. Some possible words ending in *-ar* and carrying accent 1 are male names such as Gunnar, Runar or Fjalar. In the case of the *-en* suffix, there could be an association with the participle ending in *-en* but carrying accent 2 (i.e., sliten, skjuten, etc.)

An explanation for why participants produced these differences in nouns and not in other conditions present in the recording material, such as verbs, may be because nouns have fewer segmental differences, as explained by Söderström et al., (2012). This is despite the fact that nouns contain more morphological information (i.e., about gender, number or definiteness) than verbs. Interestingly, in the perception task, participants showed that they perceived verbs just as accurately. However, there are different neural networks involved in perception (ventral stream) and production tasks (dorsal stream), adding more complexity to finding an association between the two of them (Schremm et al., 2017). Thus, although it may be complicated for L2 learners, it might be possible that L2 learners of Swedish may eventually produce different tonal patterns for verbs as their language mastery and exposure increases. As Schremm et al., (2016) suggest, after prolonged exposure to an L2, learners may focus more on acquiring L2 features that are not present in their L1. In light of this, they may focus more on producing Swedish word accents.

In connection with the findings of Hed (2016), Hed et al., (2019) and Schremm et al., (2017), the low to intermediate participants generally produced the Central Swedish patterns, which they were exposed to during their training. Interestingly, she also found three participants who produced tonal patterns identical to the Southern Swedish variety. Nonetheless, word accent 1 was produced most accurately in their study. With regards to this study, similar results were shown for the advanced L2 learners, who produced more instances with accent 1 (n=33) than with accent 2 (n=11), with their respective tonal alignments out of 102 utterances (51 for accent 1; 51 for accent 2) within the real noun condition.

A reason why participants show a tendency towards Central Swedish could be due to exposure to this variety. That is, even though participants live in an area where Southern Swedish is spoken, they could be exposed to this variety by other means, such as their social surroundings and how they learn their L2. Lund is a student city with people from all over Sweden; therefore, they could be exposed to the CS variety as well, as (Hed, 2016) mentions. Regarding the means to learn their L2, participants could be using multimedia content to improve their L2 skills. In fact, most

participants reported studying Swedish through listening to the radio or news in Swedish. Although, depending on their target dialect, if any, they could be listening to programmes from Skåne Län, rather often than not, the language variety used in the news or radio is Central Swedish; especially in programmes [7] or material driven towards teaching Swedish (Riad, 2014). Nevertheless, the possibility that they have Central Swedish as their target dialect could not be excluded from this argument. For this reason, information about their target dialect and the dialect of their teacher, if native, was requested. Within the advanced group (n=17), 7 participants had Central Swedish as their target dialect, while 4 had South Swedish (the remaining ones did not have any target dialect (n=4) or had others other than the ones mentioned (n=2)). In regards to the Swedish accent they were exposed to in their L2 classes, 6 participants had native teachers with a Central Swedish accent at the moment of their participation, and 8 with a South Swedish accent, while the remaining ones either did not know where their teachers were from (n=1) or were exposed to other dialects (n=2). It is worth mentioning as well that out of those 4 participants who had South Swedish as their target dialect, 2 were exposed to it while the other 2 were exposed to the Central Swedish dialect.

Another form of exposure could be through their Swedish teachers, as previously mentioned. Considering that Central Swedish is regarded as the closest variety to be a "national standard" of the language (Riad, 2014), L2 Swedish teachers might lean towards instructing this variety. And what is more, tonal patterns of the Central Swedish variety are shared with other regional varieties of Swedish. Therefore, there could be a potential reason for instructing this variety with regards to avoiding risks of interference in communication with native speakers of Swedish, as suggested by Schremm et al., (2017), who explains that the difficulty of L2 learners in producing word accents may cause misunderstanding with native speakers. Nevertheless, L2 teachers who come from Skåne often instruct on the Souther Swedish dialect, as information collected during this study has also suggested. In line with this argument, it would be interesting to mention that even though the perception task was in Central Swedish, and performed after the production task, participants still

[7] One of these programmes is Radio Sweden på lätt svenska hosted by Forsberg (2021).

produce tonal patterns related to Central Swedish overall. And, what is far more interesting is that among the first four participants who performed the perception test before the recordings, there was one who exhibited Southern Swedish patterns. This was the case of an advanced participant who reported to be focusing on this variety at the moment of her participation, even though the dialect she was exposed to in her L2 classes was Central Swedish.

Southern Swedish accent-1 pattern has also been observed in other participants of the advanced group and other groups, even though the results were not significant. A total of other 5 advanced participants showed to frequently use this pattern through their tonal alignment within accent-1 words (5 from the beginner group and 4 from the intermediate group). Exposure could explain why they produced Southern Swedish patterns. Even though most advanced speakers were exposed to CS in their classes, they were living in Skåne and 2 of them had SS as their target dialect. For the Intermediate group, only one was exposed to SS in their classes whereas, for the Beginner group, the majority was exposed to SS. Therefore, exposure either to their surroundings or within their classes could play a major role in their production of Swedish word accents.

Given that a difference in the production of word accents was exhibited by advanced learners, the timing (in terms of F0 onset, peak and fall latencies) of their utterances within the real noun conditions for each accent was measured. If we are to compare them with Bruce (1977)'s results from native speakers, a focus accent should have a rise duration of 115.55ms for accent 1 and 150. 33ms for accent 2. The advanced participants in this study exhibited double the average duration for the rise in both accents (A1: 228ms, A2: 271ms). In the case of fall duration, Bruce (1977) provides an average length of 68.5 ms for accent 1 and 80.6 ms for accent 2. In this study, the average L duration for accent 1 occurs at 87ms and for accent 2, at 121ms. Both the duration of the rises and the duration of the falls are far longer than that of native speakers. A possible explanation for having longer durations for both rises and falls could be that participants are perhaps more focused on producing the word accent accurately, especially on the stressed syllable, than are aware of their duration. For this reason, it could even be considered an overproduced word accent. In addition, participants are likely to be unaware of the timing difference of word accents,

considering that they possibly did not receive any formal instruction on Swedish word accents. Therefore, it is likely that they were more focused on producing a similar pattern to that of L1 Swedish speakers. Nevertheless, the participants' accounts of accent 1 and accent 2 latencies seem fairly similar to that of native speakers in the sense that the timings of accent 2 are longer than that of accent 1. As mentioned in the background section, one of the main differences between accent 1 and accent 2 is located in the timing of their fall, having the latter a longer duration (Bruce, 1977).

As regards the correlations performed between the time living in Sweden and the conditions of validity, invalidity, present and past tenses, they showed to be similar to the results in Schremm et al. (2016). Nevertheless, they indicated no significance in neither study, possibly due to a lack of statistical power.

5.3 Limitations

There are many limitations to this study regarding language level assessment, number of participants and the analysis and coding of the production material. Firstly, the online language test used for the classification of the study only considered Swedish grammar. Therefore, the participants could have been classified into other levels if other language skills such as speaking, or writing would have been evaluated. However, considering that the participants' score was used in the new classification system and that there were not any considerable differences as to the level at which the participants were classified, I believe these options were matched fairly to their results in the tasks performed and the groups were distributed in a fairly equal way. Other types of evaluations, like it could be a more complete language test or with the aid of a professional, could have extended their participation time considerably longer than it was already, exhausting their abilities and risking their performances in the latest tasks. Additionally, the language questionnaire contained self-assessment questions regarding their language proficiency, which could also have been used as an additional way of classifying the participants.

Secondly, results suggest that the study could have benefited from a larger number of participants to reach even more significance, especially in the advanced group. And finally, but not least important is the interrater reliability for the analysis and classification of the recording material, which could also have benefited from another rater's point of view. Nevertheless, the approach of examining the rise vs. the fall could be regarded as more objective given that disagreements could occur in the case of having another rater.

6. Concluding remarks

6.1 Summary

To sum up the findings, the perception results indicated that L2 learners of Swedish from a beginner, intermediate and advanced levels seemed to have had a word accent-suffix association to identify word accents in Swedish (of the kind in the Central Swedish variety) regardless of their proficiency level and that they can use word accents to predict upcoming suffix in the same manner as native speakers, which was exhibited through a comparison with the results of native speakers reported in Schremm et al., (2016). Results for the invalid condition showed that the intermediate and advanced speakers take more time to process the mismatching tone-suffix of accent 2 than that of accent 1; just like it has been shown to happen in the case of native speakers (Roll et al., 2010; Schremm et al., 2016; Söderström et al., 2012). It is also the case for intermediate L2 learners in the valid condition. Beginner participants exhibited opposite results by having faster response times for the past tense suffix -*te* for validity and invalidity, possibly because they regard the past tense in Swedish as a simpler form as compared to the present tense, which contains both the simple and progressive forms together. To conclude the perception task H1 was not corroborated given that there were no significant differences among the proficiency groups in the perception tasks. Along with the first hypothesis, there were some predictions for this task which were met, in the sense that intermediate learners were slower than the advanced ones, and the beginner group was the slowest of them all. Nevertheless, there were individual differences within the groups which are worth considering.

Concerning the production task, advanced L2 learners of Swedish with a non-tonal L1 produced word accents similar to the focal accents from the Central Swedish dialect for real nouns. That is, for real nouns with a word accent-1 suffix, they produced a low-pitched tone followed by a high-pitched one (L*H), and for real nouns with a word accent-2 suffix, they produced a high-pitched tone followed by a low-pitched and a high-pitched one (H*LH). Possibly due to learning full-form

words together with their word accent could explain why these differences were only found in the real noun condition. Therefore, H2 was only met to a certain point, considering advanced speakers produced a difference of word accents within one of the two word-class conditions and no difference in timing. Additionally, an unexpected reverse word accent effect was found for accent-1 pseudo nouns, which was produced with an accent 2 falling contour in the stressed syllable. With regards to a timing difference between the production of word accents for cases where they made a difference, L2 learners did not produce similar timing differences between the fall of accent 1 and accent 2 to that of native speakers. However, they produced the fall of accent 2 longer than accent 1, which is the case of native speakers, too. Lastly, even though it proved not to be significant in both studies, a similar correlation between the time living in Sweden and the conditions of the perception test were fairly similar to those of Schremm et al. (2016)'s study with advanced speakers. Possibly if a bigger group of advanced L2 learners of Swedish with non-tonal L1 were tested, results would show some significance.

Considering that the aim of this study was to examine when L2 learners of Swedish with a non-tonal L1 started to perceive and produce word accents in Swedish, the RQs formulated at the beginning of this study seem to have found some potential answers: from what the results in production have shown: a more significant production of word accents has its initial stage at a more advanced level whereas all L2 level-groups in the present study have been observed to perceive and use word accents as predictors regardless of their proficiency level (RQ1 and RQ3). Hence, regarding RQ2, a difference was found for the perception and production tasks.

In conclusion, this study's contribution has been that of examining different proficiency levels in an L2 Swedish context, which in comparison with previous studies, has led to the suggestion that word accents should be included in the syllabus of L2 classes.

6.2 Future studies

The results of the current project point to potential future studies. It would be interesting to replicate this study by focusing on one, and a larger, group of proficient L2 learners of Swedish with a non-tonal L2. As results have shown in both this and previous studies (Schremm et al., 2016), a lack of statistical power could be the reason for not reaching significance in the relation between the time of exposure to the Swedish language and the performance in these tasks. In case of replication of this exact study, it would be beneficial to find another method of assessing language proficiency that takes into account other language skills. It would also be interesting to conduct a replication study of Hed et al., (2019)'s project and this one by using a control group who is instructed in word accents and another who is not, possibly by also having three proficiency groups. A final remark would be to consider participants with a larger exposure to the language or the environment in which it is spoken, and perhaps considering having participants with other L1 backgrounds (i.e., other tonal languages or tone-accented languages).

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Appendix 1 – List of participants

Participant number	*L1*	*Level of Swedish*	*Studied Swedish before coming?*	*Exposure to Swedish (months)*	*Time living in Sweden (months)*
1	German	Adv	Yes	2	2
2	Spanish	Adv	Yes	58	30
3	Spanish	Int	No	24	48
4	Telugu	Beg	No	42	42
5	Persian	Int	No	15	15
6	Spanish	Beg	Yes	36	18
7	English	Beg	No	6	180
8	Telugu	Int	No	144	144
9	Arabic	Adv	No	10	10
10	Telugu	Beg	Yes	15	1
11	Telugu	Beg	No	12	2
12	Portuguese	Int	No	28	28
13	Russian	Adv	No	5	4
14	Dutch	Int	Yes	72	4
15	Italian	Adv	No	23	68
16	Italian	Adv	No	12	11
17	Bengali	Beg	No	13	16
18	English	Adv	No	16	16
19	Greek	Int	Yes	29	28
20	Bengali	Adv	No	12	28
21	Arabic	Beg	No	12	12
22	English	Int	No	12	12
23	Czech	Adv	No	36	36
24	Arabic	Int	No	48	72
25	French	Adv	Yes	12	5
26	Telugu	Int	No	36	60
27	Portuguese	Int	No	5	5
28	Spanish	Beg	No	5	18
29	English	Adv	Yes	2	1.5
30	Russian	Adv	No	25	30
31	Russian	Adv	no	52	52
32	English	Beg	yes	10	7
33	Indonesian	Beg	yes	5	2

34	Hindi	Beg	no	18	18
35	Greek	Adv	yes	84	8
36	Tamil	Int	Yes	24	18
37	Arabic	Beg	no	24	2
38	Dutch	Int	no	11	11
39	Arabic	Int	no	6	6
40	Greek	Beg	no	7	7
41	Arabic	Adv	yes	19	7
42	Spanish	Beg	yes	9	9
43	Polish	Adv	yes	42	8
44	German	Int	no	7	7
45	German	Beg	yes	30	30
46	Hindi	Beg	yes	10	8
Mean (*S.D*)				24,46 *(25.76)*	25,44 *(34.97)*

Appendix 2 – Production list 1

1.	*Vad gör hon?* Hon drömmer *(drömm-er)*
2.	*Vad gjorde hon?* Hon rymde.
3.	*Vilka är de?* De är mommar *(momm-ar)*
4.	*Vilken är den?* Det är en drömman *(dröm-man)*
5.	*Vilken är den?* Det är domen *(dom-en)*
6.	*Vilken är den?* Det är munnen *(mumm-en)*
7.	*Vilket är det?* Det är ett billån (bil-lån)
8.	*Vad gör hon?* Hon nunner.
9.	*Vilken är den?* Det är en barnamun *(barn-mun)*
10.	*Vad gör hon?* Hon glömmer.
11.	*Vilken är den?* Det är brunnen *(brunn-en)*
12.	*Vad gjorde hon?* Hon nunde.
13.	*Vad gör hon?* Hon ninner.
14.	*Vad gjorde hon?* Hon drömde.
15.	*Vilka är de?* De är brunnar *(brunn-ar)*
16.	*Vilken är den?* Det är en julgran *(jul-gran)*
17.	*Vilken är den?* Det är nummen *(numm-en)*
18.	*Vilka är de?* De är domar *(dom-ar)*
19.	*Vilken är den?* Det är nymmen *(nymm-en)*
20.	*Vad gjorde hon?* Hon glömde.
21.	*Vad gjorde hon?* Hon ninde.
22.	*Vilka är de?* De är nummar *(numm-ar)*
23.	*Vilken är den?* Det är mommen *(momm-en)*
24.	*Vad gör hon?* Hon rymmer.
25.	*Vad gjorde hon?* Hon lande.
26.	*Vad gör hon?* Hon lanner.
27.	*Vilka är de?* De är nymmar *(nymm-ar)*
28.	*Vilka är de?* De är mummar *(mumm-ar)*

Appendix 3 – Production list 2

1.	*Vilken är den?* Det är nymmen (*nymm-en*)
2.	*Vad gör hon?* Hon glömmer.
3.	*Vilken är den?* Det är nummen (*numm-en*)
4.	*Vilken är den?* Det är mommen (*momm-en*)
5.	*Vad gjorde hon?* Hon rymde.
6.	*Vilken är den?* Det är en drömman (*dröm-man)*
7.	*Vilka är de?* De är nymmar (*nymm-ar*)
8.	*Vilken är den?* Det är en julgran (*jul-gran*)
9.	*Vad gör hon?* Hon rymmer.
10.	*Vad gör hon?* Hon nunner.
11.	*Vilka är de?* De är nummar (*numm-ar*)
12.	*Vilka är de?* De är mommar (*momm-ar*)
13.	*Vad gjorde hon?* Hon nunde.
14.	*Vad gjorde hon?* Hon glömde.
15.	*Vad gjorde hon?* Hon ninde.
16.	*Vad gör hon?* Hon ninner.
17.	*Vilken är den?* Det är domen (dom-en)
18.	*Vilken är den?* Det är munnar (munn-ar)
19.	*Vad gjorde hon?* Hon lande.
20.	*Vad gjorde hon?* Hon drömde.
21.	*Vad gör hon?* Hon lanner.
22.	*Vilka är de?* De är brunnar (*brunn-ar*)
23.	*Vilken är den?* Det är munnen (*munn-en*)
24.	*Vilken är den?* Det är brunnen (*brunn-en*)
25.	*Vilket är det?* Det är ett billån (*bil-lån*)
26.	*Vilka är de?* De är domar (*dom-ar)*
27.	*Vad gör hon?* Hon drömmer.
28.	*Vilken är den?* Det är en barnamun (*barn-mun*)

Appendix 4 – Language background questionnaire

Language background questionnaire

Name:

Date:

1. Indicate your native language(s) and any other languages you have studied or learned, the age at which you started using each language in terms of listening, speaking, reading, and writing, and the total number of years you have spent using each language.

Language	**Listening**	**Speaking**	**Reading**	**Writing**	**Years of use[a]**	**Last used[b]**

a. You may have learned a language, stopped using it, and then started using it again. Please give the total number of years.
b. In case you no longer use the language

2. In which language do you communicate best or feel most comfortable in terms of listening, speaking, reading, and writing in each of the following environments?

	Listening	**Speaking**	**Reading**	**Writing**
At home				
With friends				
At school				
At work				

3. Your country of residence (name of country and name of state/region):

4. Where did you grow up (name of country and name of state/region)? If you have lived at several places during your childhood, list all of them and indicate the age when you lived there (e.g. 0-5):

5. If you have lived or travelled in countries other than your country of residence or country of origin for three or more months, then indicate the name of the country, your length of stay, the language you used, and the frequency of your use of the language for each country. If you have stayed in Sweden, indicate also the region/city where you were.

Country	**Length of stay[a](months)**	**Language**	**Frequency of use[b]**

a. You may have been to the country on multiple occasions, each for a different length of time. Add all the trips together.
b. Please rate with a number between 1 and 7, according to the following scale (enter the number in the table)

Never	Rarely	Sometimes	Regularly	Often	Usually	Always
1	2	3	4	5	6	7

6. Have you been in contact with any other languages than those that you have already listed above, for extended periods of time? Think of all possibilities of contact, not just intentionally studying them (e.g. having a baby-sitter/nanny who spoke a different language with you).

Language	**Nature of contact**	**When and how long?**

7. Indicate the language used by your teachers for instruction at each educational level. If the instructional language switched during any educational level, then also indicate the "Switched to" language.

	Language	**Switched to**
Elementary school		
Middle school		
High school		
College/university		

8. Rate your current ability in terms of listening, speaking, reading, and writing in each of the languages you have studied or learned. Please rate according to the following scale (enter the number in the table):

Very poor	Poor	Limited	Functional	Good	Very good	Native-like
1	2	3	4	5	6	7

Language	**Listening**	**Speaking**	**Reading**	**Writing**

9. Rate the strength of your foreign accent for each of the languages you have studied or learned. Please rate the strength of your accent according to the following scale (enter the number in the table):

None	Very weak	Weak	Moderate	Strong	Very strong	Extreme
1	2	3	4	5	6	7

Language	**Strength of accent**

10. Are you studying Swedish this semester?: YES NO

11. If yes, which course are you taking?:

12. When did you begin your Swedish course?:

13. List all the Swedish language courses you have taken previously, if any: In the following chart all the questions are compulsory (*)

When? (*)	Level/name of the course[a] (*)	Swedish native speaker teacher?[b] (*) (Y/N)	Focus of the course (*)	Accent of your teacher (*) (e.g: Skånska,central svenska or any other)	Accent you aim to have (*) (e.g: Skånska, central svenska, or any other)

a. If you took the course in Sweden, you can write the name of the course, e.g. SFI, otherwise indicate the level of the course as precisely as you can (e.g. A1-A2, or beginner)
b. Answer yes if you had a native Swedish speaker teacher, and if you know, indicate where in Sweden your teacher was from
c. E.g. general/conversational/crash course/focused on grammar etc.

14. Have you studied Swedish before coming to Sweden?

15. Why do you study Swedish/have studied Swedish? You can also describe how your motivation for learning the language has changed over time:

16. Estimate how many hours per week you spend engaged in the following activities in Swedish:

Activity	**Hours/week**
Listening to radio	
Watching television	
Reading for fun	
Reading for school/work	
Writing for school/work	
Writing email to friends	
Talking to co-workers/teachers	
Talking to classmates	
Talking to friends	
Talking to significant others/family members	

17. Rate your language learning skill in general, as you see it. In other words, how good do you feel you are at learning new languages, relative to your friends or other people you know? (underline or make bold one number)

Very poor	Poor	Limited	Average	Good	Very good	Excellent
1	2	3	4	5	6	7

18. Rate your skills in terms of listening, speaking, reading, and writing and pronouncing new languages that you learn. Use the scale above from 1 to 7 (enter the numbers in the table). Think about how easy you tend to find attaining these skills relative to each other and relative to other people you know.

Listening	**Speaking**	**Reading**	**Writing**	**Pronunciation**

19. For how long have you lived in Sweden?

20. For how long have you been in contact with the Swedish language?