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Tonal accents realization in Norwegian speakers' English production:
Do Norwegians transfer their tonal accents?

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Abstract

This study investigates whether Urban East Norwegian (hence force Norwegian) speakers realize their tonal accents on their English. One difference between these two languages is that Norwegian uses pitches to differentiate lexical items, whereas English uses pitch to indicate post-lexical contrast, i.e., to convey different pragmatic meaning. For both languages, there are only two tones, the L tone and the H tone. In Norwegian, both the L tone and H tone can be associated with the primary stressed syllable, resulting in different accents that can indicate different lexical items. This is to say that syllables with primary stress in Norwegian can have only two ways of accentuation, Accent 1 and Accent 2. Tonality in Norwegian is independent of sentence intonation. In contrast, in English, tonality is affected by the sentence intonation. For instance, if a word bares no sentence intonation, only an H tone can be associated with the primary stressed syllable; however, if a word carries sentence intonation, depending on the pragmatic meaning it conveys, its primary stressed syllable can bear either an H tone or an L tone. Therefore, in this thesis, based on these dissimilarities, we would like to explore whether Norwegian speakers transfer their tonal accents onto their English. If they do, which of the two accents do they transfer? Or are both the Accent 1 and Accent 2 transferred?

A simple read-speech experiment was designed to explore the questions. In total, 7 young Norwegian speakers with similar backgrounds were recruited for the experiment. The experiment contained 7 test words (see appendix 1), each were inserted into 5 carrier sentences based on two parameters, utterance positions and contexts. The participants were sound recorded while reading the 35 stimulus sentences. In total, 245 recorded sentences were obtained from the Norwegian participants. At the same time, two native American English speakers were also included in the experiment, as the L1 template group. They read the same set of sentences as the Norwegian participants did. Thus, 70 sentences were read in total by English speaker. Therefore, a sum of 315 recorded sentences formed the analysis material of this study. These audio materials were analyzed with the help of the computer program Praat (Paul & David, 2019).

The main findings of this study are: (1) all of the Norwegian participants were affected by their L1 Norwegian prosody; (2) the Accent 1 (L*H), not the Accent 2 (H*LH), is the accent transferred; (3) most of the participants have problems with the tonal pattern of the test words when the words were placed at the utterance-initial and utterance-middle positions, but not for the utterance-final position; (4) with respect to the degree of tonal accent transfer, there were individual differences among the participants (some of them were deeply affect by their Norwegian prosodic system, while others illustrate better control); (5) it seems that the carried-over tonal accent affected the participants' English intonation also. One additional finding of this study is that some of the participants did not fully acquire the English interrogatives' intonation.

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Chapter 1 Introduction

The research question of this study is whether the tonal accent patterns of a learner's first language (LI) can affect their second language's (L2) production. More specifically, this thesis seeks to answer the question of whether Norwegians transfer their tonal accents when they speak English. Our study provides statistics which show that the Norwegian participants do transfer their tonal accents to English. In most cases, Accent 1, rather than Accent 2, is more prominently realized onto English. This study was conducted due to the following motivations:

1.1 Motivation

Language transfer has been a well-observed linguistic phenomenon. On one hand, many linguists have claimed that, language transfer is a kind of crosslinguistic influence, which results from similarities and differences between any former acquired or half-acquired language and the target language. Language transfer plays an important role in the acquisition of a new language (Odlin, 1989; Schwartz & Sprouse, 1996; Gass & Selinker, 1983). Odlin (1989) also stated that, there are two possible outcomes of transfer: positive transfer, which is facilitative to the learners, and negative transfer, which is non-facilitative.

When it comes to Norwegian and English, despite sharing a wealth of similarities, such as belonging to the same Germanic language group, they have notable differences. One of the most noticeable differences is that Norwegian has two tonal accents, whereas English does not. This is correlated with the use of pitch. Norwegian is a partially tonal language, which uses pitch to signal the lexical differences, for example, *bønder* [ˈbøn:əɾ] with Accent 1 (L*H), means 'farmers'; while *bønner* [ˈbøn:əɾ] with Accent 2 (H*LH), means 'beans'. These two words share the same set of phonetic segments, thus, without context, the only way to distinguish them is their accents (Nicholson & Teig, 2003). English uses pitch to indicate pragmatic contrast. For instance, a general question typically gives a rising pitch. In addition, English is also a so-called stress language: the stress shift within a word can change the meaning or grammatical category of the word (e.g. *object* [ˈɑːb.dʒekt] versus *object* [əbˈ.dʒekt]). Because language similarities and dissimilarities can lead to language transfer, we are then curious about whether Norwegians also transfer their tonal accents when they speak English. And if they do, which one of the two accents influence them most?

Secondly, the acquisition of the prosodic system is vital in L2 Acquisition. Even though 'intelligibility' has replaced 'the eradication of foreign accents' (Levis, 2005) became the goal of L2 learners' (Abercrombie, 1949), and even though accented speech can also be intelligible (Derwing & Munro, 1997), to produce the target language as native-

like as possible is still an important issue in language acquisition. This is due to the fact that speaking a language with a foreign accent can have many negative results. For instance, a foreign accent can cause poor communication between the speaker and the listener, as the listener may have difficulties in understanding speaker's narratives (James, 1998). Apart from that, a foreign accent can also contribute to social discriminations and negative evaluations. People speaking with an obvious accent are often considered as 'non-native' and 'poorly-educated' (Beebe, 1988; Munro, 2003).

Thirdly, despite the L1 prosody transfer happens and influences learners' L2 speech, and despite the fact that the acquisition of the prosodic system is important in the acquisition of a second language, little research has focused on the phonological influences from the L1. Furthermore, in terms of the amount of research and literature focused on the cross-linguistic influences, there are few that compare the prosodic systems of Norwegian and English in comparison to the voluminous literature on the subject of Asian languages and English (Liu, F. 2009; Ueyama, M. 1997; Ingram, J. 2005; Lu & Kim, 2016; Saito & Saito, 2017; McGory 1997). With respect to previous studies on Norwegian tonal accents, the existing literature was mostly either on thorough introductions (Wetterlin 2010; Kristoffersen 2006) or on foreign-accented Norwegian (Kelly, 2015; Holm, 2008; Steien & van Dommelen, 2018; Nielsen, 2012). Recent studies related to both Norwegian and English are primarily concerned with sociolinguistic factors. For example, some discussed the social status of American and British varieties of English among Norwegian learners (Siikanen, 2009; Rindal, 2010; Asgautsen, 2017), other's investigated different peoples' attitudes towards the Norwegian-accented English (Andresen, 2016), and yet even others looked at the communication problems of Norwegian-accented English (Fossen, 2018). In other words, to the best of our knowledge, there were not many studies that focused on the prosodic transfer issues of Norwegian. Therefore, the goal of this study is to draw attention to this domain.

1.2 Questions and hypotheses

Questions

The goal of this thesis is to see if Norwegian speakers' tonal accents influence their L2 English pronunciation. To achieve the goal, we asked several questions. Firstly, do Norwegian speakers transfer their tonal accents to their L2 English? Secondly, if they do transfer the accents, how does this look? Do they transfer the whole tonal accent system and then realize both accents in the respective environments? Do they only transfer one of the two accents? Or, instead, do they develop a third pattern that belongs neither to Norwegian nor to English? Thirdly, with respect to the prosody transfer, are there any individual differences among the participants? Based on these questions and previous research, we propose the following hypothesis:

Hypotheses

There will be tonal accents transfer.

Even though not 'absolute', different languages use pitch differently. For example, some languages mainly use pitches to indicate lexical differences, like Mandarin Chinese, Thai, and Vietnamese, while some other languages apply pitch to signal pragmatic contrast. English belongs to this latter kind. Language differences and similarities can cause crosslinguistic influences; the greater the differences between the two languages, the more problems can be expected (Lennon, 2008). Language transfer is a well-researched and identified phenomenon. Much previous studies illustrates that language learners, whose L1 language uses pitch to differentiate lexical items, are often affected by their L1's prosodic system during their English acquisition process (Lu & Kim, 2016; Saito & Ueda, 2007; Ingram, 2005; Liu, F. 2009; Ueyama, 1997; Toivanen, 2003). With respect to the function of the pitch, Norwegian differs fundamentally from English as Norwegian uses pitches to distinguish lexical items and English does not. Therefore, we hypothesize that, similarly to Asian language speakers, Norwegian speakers will also be influenced by their native language's prosody.

Accent 1 will transferred.

Norwegian has two tonal accents, Accent 1(L*H) and Accent 2 (H*LH). Between these two accents, Accent 1 is believed to be the marked member and Accent 2 is the default accent (Lahiri et al. 2005a, b; Wetterlin 2006, 2010; Kristoffersen 2006). Accent 1 is the accent of the foreign categories, marking the foreignness of the lexical items. In Scandinavian languages, most of the foreign words and loanwords get Accent 1 because of their foreignness (Lahiri et al. 2005a, b; Kristoffersen 2006). Therefore, we assume that when Norwegian speakers encounter unfamiliar or problematic English words, they will assign the L*H accent to the words because the Accent 1 is the accent for words that do not follow rules.

There will be individual differences.

Ueyama (1997) looked at the Japanese learners. He found out that L1 Tokyo Japanese learners transfer their pitch accent to their English. Moreover, these Japanese learners acquire the L2 English intonation by two steps. They first acquire the category patterns (the phonological characteristics) and then learn how to produce native-like acoustic streams (the phonetical characteristics) later. Ueyama's study also found out that it takes language proficiency from step one to step two, as, even though all the participants were affected by their Japanese prosody, the advanced learners and the intermediate learners had much less pitch accent transfer than the beginning learners. Ueyama's finding support the Two-Module Intonation Models of Pierrehumbert (1980), which says that the speech cognitive system contains two parts, the phonological component and the phonetic component. In terms of the pitch accent, though Tokyo Japanese has only one pitch accent (H*L) in comparison to Norwegian's two, Norwegian is quite similar to Japanese in that both languages use pitch to contrast lexical meanings. Therefore, we hypothesize that the Norwegian participants also transfer their tonal accents to their English and there will be individual differences among them.

1.3 Structure of the thesis

In this introduction chapter, we have talked about the motivation for conducting the study, asked the research questions, and proposed the hypotheses based on theories and previous research. In the following chapter, background information of Norwegian tonal accents and English intonation will be provided. Subsequently, claims of language transfer and second language acquisition will also be highlighted. Chapter 3 gives a comprehensive introduction of the methodologies used in conducting the experiment and analyzing the data. In chapter 4, the results of the experiment will be presented in detail. Chapter 5 discusses the results, along with the proposed hypotheses and the different accounts in earlier literatures; thereafter, the attention will be directed the contributions and limitations of the study. Chapter 6 briefly summarizes the whole study.

2 Background information

2.1 Norwegian

Norwegian is the language spoken mainly in Norway. It belongs to the Scandinavian languages, a sub-family of the North Germanic language family. Scandinavian languages have three group members: Danish, Norwegian, and Swedish. Generally speaking, the people that speak these three languages can understand each other due to both phonological/lexical similarities and historical reasons. Among these three languages, Norwegian and Swedish are more phonologically similar, both languages use pitches to distinguish lexical and morphological meaning. Meanwhile Danish uses Stød, a glottal stop, for this purpose.

Although Norwegian has no official spoken norms, people living in Norway can understand each other by their own dialects. Norwegian has two official written norms, called Bokmål ('book language') and Nynorsk ('new Norwegian'). The former is closely related to Danish orthography and the latter is a reflex of different dialects. The dialect spoken in Central Eastern Norway, including the capital city of Oslo and its surrounding area, is usually called as Urban East Norwegian (UEN) or East Norwegian. UEN is widely used in theatre and TV; it is also the dialect taught to foreigners (Kristoffersen, 2000). Due to this reason, UEN was chosen as the research object of this study.

2.2 Norwegian tonal accents

The contrastive tonal opposition is one of the most researched phenomena of Scandinavian languages (Vanvik 1957; Jasanoff 1966; Haugen 1963, 1967; Fintoft 1970; Withgott & Halvorsen 1988; Kristoffersen 1993a, 1993b, 2000, 2006; Riad 1998a, 1998b, 2003, 2006; Lahiri et.al 2005a, b; 2006, 2007; Wetterlin 2010). In these studies, the Norwegian tonal opposition is also well studied and it is often compared with its counterparts, Swedish and Danish. The Norwegian dialects can be divided into three types. The first type is no tonal contrast, as is common in areas around Bergen and Brønnøy as well as many dialects of the Troms and Finnmark counties (Kristoffersen, 2000). Except these dialects, most of the other Norwegian varieties have two contrastive tonal accents, usually referred to as Accent 1 and Accent 2. The difference between these two accents is located on the primary stressed syllables. In the so-called low tone dialects, for example, the UEN dialect, Accent 1 is phonologically represented as an L*H and phonetically realized as a low tone (L) associated with the primary stressed syllable. An example of this is the accent on the word *bønder* [ˈbøn:ər] (farmers). Accent 2, in contrast, is phonologically represented as an H*LH and phonetically realized as a high tone (H) on the primary stressed syllable. An example

of this is the accent on the word *bønner* [ˈbøn:əɾ] (beans). The corresponding high tone dialects show an upside down picture. In these dialects, the Accent 1 has a high tone (H) on the primary stressed syllable, phonologically represented as an H*L, and the Accent 2 has a low tone (L) on the primary stressed syllable, phonologically represented as an L*HL.

2.3 Previous accounts of Scandinavian tonal accents

The linguistic interests of Scandinavian tonal accents can be traced back to 18th century. Most linguists focused mainly on the differences between the two accents and the discussion of the marked/default member. With respect to the properties of tonal accents, both agreements and disputes can be found in previous literature. In the following sections, the representative agreed traits and controversial approaches of the Scandinavian tonal accents will be presented.

2.3.1 Agreed traits of Scandinavian tonal accents.

With respect to the numerous accounts of the Scandinavian tonal accents, what is generally accepted? Wetterlin (2010) offered a summary in her work. Firstly, the lexical tone is limited to the main stressed syllable. That is to say that the realization of the tonal opposition is triggered by the primary stress. Secondly, in most dialects, this tonal opposition can only be found on polysyllabic words. This is due to the realization of Accent 2, which normally needs a minimal domain that consists of a primary stress plus a non-stressed syllable, i.e., a disyllabic trochee. Without such a disyllabic construction, the realization of Accent 2 is not possible. Therefore, monosyllabic words cannot have the accentual contrast because they lack the needed syllabic structures.

Thirdly, some morphemes have inherent accents. Rischel (1963), Haugen (1967) and Kristoffersen (2000) argued that, tonal accents could be governed by affixes. The argument was based on the observation that some suffixes can influence the realization of tonal accent. For example, in Norwegian, the suffix marking the indefinite plural form, {-er}, always induces Accent 2 (Kristoffersen, 2000). Wetterlin (2010) provided a more comprehensive morphophonological study looking at the UEN. She analyzed the accent assignments of the inflectional morphologies and the derivational morphologies and came to the conclusion that Accent 1 is the inherent accent of some morphemes, rather than Accent 2. Even if linguists agreed that some morphemes can carry an inherent accent, they contradicted on which accent is the carried one. This divergence brought about two different approaches, the A1 approach and the A2 approach, which will be presented in next section.

2.3.2 Controversial accounts of Scandinavian tonal accents

Three widely accepted characteristics of the Scandinavian tonal accents were introduced in the last section. In this section, two argumentative issues will be presented: what is the nature of the tonal opposition and which one is the marked member of the two accents.

The nature of the tonal opposition.

In terms of the nature of the tonal opposition, there are two different approaches, the privative approach and the equipollent approach. The privative approach holds that the tonal opposition is privative, that is, only one of the two contrastive melodies is lexically specified while the other one lacks such a property. Lorentz (1981,1995), Haugen (1963), Kristoffersen (1993a, b, 2000) and Wetterlin (2010) supported this approach. These linguists agreed that 'lexically specified' is the fundamental quality that distinguish the two accents, meaning that one accent has the quality and another one has not.

The equipollent approach argues that Accent 1 (L*H) and Accent 2 (H*LH) have identical melody and the difference lies only in the timing of the tones, i.e., which tone is attached to the main stressed syllable. This approach has been adopted in many studies, for instance, in Haugen & Joos (1952), Fintoft (1970), Gussenhoven & Bruce (1999) and Gussenhoven (2004). As an illustration, Fintoft (1970) looked at the Trondheim dialect. He studied the contours of the homophones *faret* [fa:re] 'the track', Accent 1, and *fare*[fa:re] 'danger', Accent 2. He characterized that Accent 1 has a subtle falling and rising contour, while accent 2 has a normal falling and rising contour. He then concluded that the two contours were identical, and the main difference lies in the 'timing', the F0 minimum of Accent 2 comes always 50 to 100 ms later than the F0 minimum of Accent 1. Another basis for people to argue for the equipollent approach is that Accent 1 (L*H) has a low tone (L) at the initial position. Logically, if there is a low tone (L), there must be a higher tone (H) stand right before the low tone(L). Therefore, the real structure of Accent 1 is also HL*H, same as Accent 2. In this way, Accent 1 and Accent 2 have the identical melodies, but different on the timing of the low tone (L). In Accent 1, the low tone (L) comes early and falls on the stressed syllable. However, in Accent 2, the low tone (L) comes after the initial high tone (H) has taken the stressed syllable, thus the low tone (L) can only fall on the post-stress syllable.

Which one is lexically specified?

The privative approach declares that only one of the two contrastive tonal accents is lexically specified while the other one is the default accent. However, there are different views on this issue. There are two contradictory approaches, the A2 approach and the A1 approach.

A2 approach

The A2 approach claims that Accent 2 is the lexically specified accent and Accent 1 is

the unmarked one (Lorentz 1995, Kristoffersen 1993a, 1993b, 2000; Myrberg & Riad 2015; Riad 2003, 2006, 2012, 2014, 2018). This privative approach is based on two grounds. Firstly, Accent 2 has a more complicated structure, that is, it contains an initial high tone (H) that is absent in Accent 1. This structural complexity makes Accent 2 more special, thus becoming the marked member of the opposition. Secondly, when compared with Accent 1, Accent 2 has a more limited distribution, as it can only be found on polysyllabic words and not on monosyllabic words (Haugen 1963, 1967; Basbøll 2014).

Kristoffersen (2000) offers one of the most representative A2 approach analysis. By looking at the UEN dialects within the framework of generative grammar, he argues that the tonal accent assignment in UEN is partly lexically specified and partly the result of the interaction of morphology and phonology. More specifically, words and morphemes can be lexically marked, but they can only be marked for bearing an initial floating high tone (H), which is the trigger of the Accent 2. This initial high tone (H) is part of the lexicon, as it can be predicted by words' morphological structure. For example, words with certain suffixes always get the Accent 2. Therefore, this initial high tone (H) is the lexical tone, its presence and absence decides the accent of the words. Kristoffersen (2000) also provides a constraints-oriented account for his A2 approach, in which he captures most of the generalizations of the accent distribution in UEN by only a handful of constraints.

Riad (2003, 2006, 2012, 2014, 2018) also claims that most dialects of Swedish and Norwegian have a tonal contrast, which is realized on the primary stressed syllables. This tonal opposition is privative, Accent 2 (H*LH) is the marked member and Accent 1(L*H) is the unmarked. Riad came to this conclusion by first defining the prosodic hierarchy of Swedish and then decomposing the contour of the tonal accent into two different tonal prominence levels. The higher level was delineated as the Big Accent and the lower level as the Small Accent. He then looked at the Big Accent level and determined that the differentiating factor between Accent 1 and Accent 2 of this level, is that only the Accent 2 has an initial high tone (H). Except this initial (H), the rest of the Accent 2 is the LH, which is identical to Accent 1. Furthermore, the LH is only intonational tones, i.e., the prominence tones. Therefore, only initial high tone (H) is actually specified.

A1 approach

Kristoffersen (2006) looked at UEN again, this time using the Optimality Theory. (McCarthy 2002, Prince & Smolensky 2004). He argues here that the tonal opposition is the result of the conflict of a marked constraint that promotes high tones on prosodic heads (Accent 2) and a faithfulness constraint that protects pre-linked low tones (Accent 1). In disagreement with his claims in Kristoffersen (2000), Kristoffersen (2006) claimed that Accent 1 is the specified member of the tonal contrast. With universal tendency, the high tone is attracted to metrical head and, if a low tone is associated to the metrical head, it should then be taken as a special case and be marked. This is

exactly the case of Accent 1. Accent 1 has a low tone on the main stressed syllable, the metrical head. Furthermore, another argument mentioned in Kristoffersen (2006) is that the distribution of Accent 2 is not limited. In fact, it is the most common tonal pattern, if one takes only the complex words into consideration.

Lahiri et al. and Wetterlin also argue that Accent 1 is the marked member of the tonal opposition, the special accent that does not follow rules (Lahiri et al. 2005a, 2005b, 2006, 2007; Wetterlin 2010). One of their arguments states that most of the loanwords in Scandinavian languages have Accent 1. These loanwords came from a different system, as they could not fit in the native phonological pattern, they are then specified. To put in other words, these loanwords are assigned the Accent 1 because they are not local enough. Another argument by Wetterlin (2010) is that in the A2 approach, the lexically specified member in Norwegian, Swedish, and Danish, shows an asymmetric distribution. Instead of tonal opposition, Danish has different contrast on words, i.e., a Danish word either has or does not have a stød, a glottal constriction (Basbøll 2005). It is well observed that Danish støded words correspond with Norwegian/Swedish Accent 1 words. It is also generally accepted that, in Danish, stød is the lexically specified term (Grønnum/Basbøll 2001). Therefore, if the A2 approach is correct, the Accent 2 is the marked one and the words in Danish and Norwegian/ Swedish then do not correspond. Based on these arguments, Wetterlin then claims that, words and morphemes can only be lexically specified for Accent 1. Wetterlin (2010) referred to these claims as accent assignment rules for Scandinavian non-compounds, meaning that Accent 1 is the marked one and it is always realized. Moreover, if there is no lexical specification, all words containing at least one disyllabic trochee receive the default Accent 2, otherwise they receive Accent 1.

2.4 The role of pitch in English intonation

Prosody is those prosodic features of speech, including intonation, tone, stress, and rhythm, the properties of syllables and larger units of speech. Prosody can reveal the status of the speakers and reflect their utterance. For instance, it can show if the speaker is energetic or listless. It can also indicate if the utterance is declarative or interrogative. In this section, the related prosodic features of English, i.e., the application of pitch in English and the intonation of declaratives and interrogatives, will be presented.

In contrast with tonal languages like Mandarin Chinese, English is a so-called intonational language. Instead of using pitch to contrast the lexical meaning, English uses pitch to contrast the meaning of an utterance, i.e., to convey pragmatic/intonational meaning (Pierrehumbert 2000). From the opposite view, in Mandarin Chinese, if one changes the pitch of a word, the meaning of the word changes; in English, words do not have fixed pitches, thus the change of pitch does not change the meaning of the word. For example, for the English word *coffee* [ˈkɑː.fi], regardless of whether one reads it with a rising or falling pitch, the meaning of the word remains the same, 'a dark brown,

slightly bitter hot drink'. However, if a word is placed in a sentence, then the pitch on the word can be manipulated to indicate different meaning of the sentence. To put it more clearly, with a sentence, the alternation of certain words' pitch can change the meaning of the sentence.

English uses pitch to signal post-lexical contrast, i.e., to distinguish sentence types. In general, English has two basic types of intonation. The first is a falling intonation/pitch, which is phonologically represented as H* L, phonetically realized as a fall on the final stressed syllable of the sentence, and followed by a boundary L% tone. The second is a rising intonation/pitch, which is phonologically represented as L* H, phonetically realized as a rise on the final stressed syllable of the sentence, and followed by a boundary H% tone.

In English, the falling intonation is the most common type of intonation. It is widely used in declarative sentences, special questions, imperative sentences, exclamatory sentences, among others. Here, we would like to briefly introduce the declarative sentences and special questions since they are included in the experiment. Declarative sentences (also known as statements) are sentences that give information, state the facts, or convey the opinion; declarative sentences ask no questions, make no commands, carry no emotion. For example, *This is coffee.* is a declarative sentence and it gets a falling intonation. Special questions (also known as open questions or wh-questions) are questions that begin with *who, what, where, when, why,* and *how*. For illustration, *What is coffee?* is a special question and it receives a falling intonation as well. In some special cases, a special question can get a rising intonation, take for example when it is used to ask for repetition or clarification of previously known information. Rising intonation can also be used to indicate general questions. General questions, also known as yes–no questions or polar questions, are questions expecting either a "yes" or a "no" as the answer. For example, *Do you like coffee?* is a general question and it normally receives a rising intonation.

2.5 Second Language Acquisition and Cross Linguistic Influence

L1 transfer vs L2 acquisition.

Second language (L2) acquisition is the process by which people learn a second language. The acquisition of a second language is a complex process that can be shaped by a variety of factors. Among these factors, the influence of a learner’s first language (L1) is a hotly contested issue in applied linguistics, L2 acquisition research, and language teaching (Odlin 1989; Rod 1994). Odlin (1989) defined the notion of 'language transfer' as a kind of influence, resulting from the similarities and dissimilarities between any former acquired or half- acquired language and the target language. Language transfer is bidirectional, the carried over properties from one's first language (L1) is particularly undeniable. This is because, by the time a learner starts a new language, there already exists a language in his mind, which serves as a

knowledge-base that they turn to either consciously or subconsciously (Shormani 2014 a, b).

L1 transfer is an undeniable phenomenon in L2 acquisition, but its influence is complicated. Odlin (1989) claims that there are two kinds of L1 transfer; if the transferred properties facilitate the learners, then it is a positive transfer, but if the transferred properties interfere/hinder the learners' acquisition, then it is a negative transfer. Other linguists, for example, Flynn et al. (2004) proposed The Cumulative-Enhancement Model. This model holds that the effects coming from any formerly acquired language can only be facilitative. In this case, transfer only happens if the properties of L1 are beneficial to the L2 acquisition, otherwise, they stay neutral and do nothing. Meanwhile, within the generative grammatical framework, Dulay & Burt (1974, 1975, 1977) looked at child L2 acquisition and proposed the Creative Construction Hypothesis, which holds that the L2 acquisition process is similar to the L1 acquisition process, i.e., L2 = L1. In this hypothesis, the influence of the first language is completely denied.

In addition, Schwartz & Sprouse (1994, 1996) proposed the Full Transfer/ Full Access Hypothesis, which claims that second language learners are affected by both the knowledge of one's L1 and the knowledge of universal grammar (UG). In other words, a learner's initial state of his L2 is the final state of his L1 acquisition (full transfer); a learner also always has access to the universal syntactic principles during the acquisition process (full access). Similarly, Lardiere (2009 a, b) proposed The Feature Reassembly Hypothesis, which argues that, at the initial phase of one's L2 acquisition, a learner transfers the whole established system of his native language, thus the learning task for an L2 leaner is to reassemble this transferred system into new configurations, so to make it L2-identical. Flynn (1996), however, proposed the Partial Access Hypothesis, which argues that L2 learners can partially access the UG, but the L1 also plays an vital role in the acquisition process because L1 impedes the power of UG.

Prosody transfer.

With respect to language transfer, whether the carried over L1 properties are beneficial or non-beneficial to the acquisition of L2, and whether the learners transfer the whole entrenched L1 system or just a few properties, what is clear is that L1 transfer is a widely acknowledged and identified phenomena in L2 acquisition. Generally speaking, language transfer can happen at any linguistic domain, including syntactic, phonological, morphological, semantic, and pragmatic. Within the phonological and morphological domains, many studies have focused on first language transfer (Singh 2013). This focus occurs because, normally, those who learn an L2 as an adult speak with an accent, and thus the influence of a learner's L1 cannot be ignored. According to Zsiga (2013), an L2 learner's foreign accent comprises the transfer of phonetic and phonological patterns from the L1, a foreign accent signals language transfer.

With respect to the acquisition of L2 phonology, the influence coming from the L1 sound system plays a large role in most theoretical models. The Speech Learning Model (SLM) (Flege 1995) emphasizes the differences between the L1 and L2 and underlines the learner's perception of these differences. For instance, if the sounds in the second language (L2) are very different from the sounds in the first language (L1), then such differences can be perceived by the L2 learners easily. In this case, the acquisition can be more efficient. In contrast, if the L2 sounds are similar to the L1 sounds, then the subtle differences are relatively harder for the learners to perceive. If the learners cannot perceive the differences between the sound, they may equate the L2 sounds with the L1 categories and thus unconsciously substitute the L2 sounds with the L1 sounds in their speech. At the same time as the SLM was being developed, the Perceptual Assimilation Model (PAM) was being developed by Best (Best 1995, Best & Tyler (2007). Similarly to SLM, the PAM also focuses on the similarities and dissimilarities between native and non-native sounds. The PAM model claims that listeners can discriminate the differences between a foreign sound and a native sound, and the degree of the difficulty of this discriminating job is predictable. If the contrast between the native categories and foreign categories is closely related, then such features can be recognized and acquired easily. However, if the contrast between the native categories and the foreign categories is not related, then the discriminating job is predicted to be difficult, and thus the acquisition will be difficult.

To summarize, within the Second language (L2) acquisition domain, L1 transfer is a well-observed phenomenon, and the influence coming from one's first language is unquestionable. With respect to the L2 speech, most former studies and models highlight the similarities and differences between the first language and the second language, as well as the transferred L1 properties.

Chapter 3 Methodologies

The aim of this thesis is to see whether L1 Norwegian speakers' tonal accents influence their L2 English pronunciation. More specifically, when Norwegians speak English, do they realize the tonal accents onto their English production. If they do, how? To achieve this goal, we organized an audio experiment where we recorded 7 Norwegians and 2 native English speakers reading identical sets of English sentences. The obtained audio materials were analyzed acoustically and phonologically, with the help of the computer program Praat (Paul & David, 2019). This project has been approved by the Norsk Senter for Forskningsdata (NSD)/Norwegian Centre of Research Data. (See appendix 5 for the NSD's assessment).

3.1 Participant and Materials

Though Norwegian learners of English are presented with both British English (BrE) and American English (AmE) (Rindal, 2010), American English is believed to be the dominant pronunciation in Norway, due to the increasing American global cultural power (Rindal, 2010; Crystal 2012). Therefore, in this thesis, we looked at the American English variation. We recruited 7 Urban East Norwegian speakers, all of whom come from Oslo and are bachelor's or master's students at NTNU in Trondheim. All the participants are approximately 20 years old and possess the same amount of English schooling, i.e., all are formally educated in Norway with none having overseas education. All participants speak only American English as a second language. We also included 2 native AmE speakers as the control group, the L1 template, both of whom are students at NTNU as well.

The audio recordings of all participants were used as the primary analytical material. There were three main reasons for using planned sentences to test the participants. (1) Despite some literature stating that read speech and spontaneous speech may differ acoustically (Holm, 2003; Caldognetto, 1997), research also shows that the foreign language pronunciation is basically the same, regardless of whether speech is read or spontaneous (Munro, 1995). In fact, in determining whether Norwegians transfer their tonal accents onto their English, read speech was determined to be a better metric. This is because, by using read speech, we can decide which words appear in the test sentences, thus giving us control over the relevant linguistic parameters. Finally, by using the same set of planned sentences, we can compare and contrast the same linguistic contents and features produced by different language groups, i.e., English L2 speakers and English native speakers.

3.2 Target words and test sentences

As we mentioned earlier, there is little literature focused on the issue of whether Norwegian speakers transfer their tonal accents onto their English speech. Therefore, we foresee that, if tonal accents transfer does happen, there are five possible scenarios:

1. Norwegian speakers transfer the whole tonal accents system and realize both accents in the respective environments.
2. Norwegians speakers realize the Accent 1 (L*H) onto the English test words.
3. Norwegians speakers realize the Accent 2 (H*LH) onto the English test words.
4. Norwegians speakers are affected by their L1 tonal accents, but, with respect to the accent assignment on the test words, they develop a third pattern that is identical to neither Norwegian nor English.
5. Norwegians speakers do not do any tonal accents transfer at all, i.e., Norwegians' tonal accents do not affect their English production.

Among these five possibilities, we propose that the second possibility is the most probable, based on existing literature. This is to say that we speculate that Norwegian participants will apply their Accent 1(L*H) on some or all of the test words. In order to find out which of these scenario is most accurate, we must employ the right stimuli.

3.2.1 Finding the target words

We filtered target words carefully, using two main considerations. Firstly, the target words must have the possibility to trigger both Accent 1 and Accent 2. In terms of the distribution of Norwegian tonal accents, it is widely known that monosyllabic words and words with final stress can only have Accent 1. In contrast, words with stress on a non-final syllable have the contrast of Accent 1 and Accent 2 (Wetterlin, 2010). Based on this, we chose seven English words as the stimuli. Among which, four of them are common nouns: two are disyllabic words with stress on the initial syllable, *lava* [ˈlɑː.və] and *tremor* [ˈtrem.ɚ], two are trisyllabic words with penultimate stress, *veranda* [vəˈræn.də] and *accounting* [ə.ˈkaʊn.ʈɪŋ]. The other three words are disyllabic agent nouns, i.e., a noun that is derived from another noun denoting an action, *skier* [ˈskiː.ɚ], *runner* [ˈrʌn.ɚ] *and singer* [ˈsɪŋ.ɚ], all of these words have stress on the initial syllables.

In general, based on their syllabic construction, these words can have either Accent 1 or Accent 2, however, which accent they will be assigned by the participants is unknown. For instance, six out of these seven words end in a schwa, the most common vocalic endings in Norwegian (Wetterlin 2010). As we mentioned in section 2, most of the A2 approaches argue that, in Norwegian, all nouns that end in a schwa get lexical Accent 2 (Rischel 1963; Haugen 1967; Bruce 1977; Kristoffersen 2000). Therefore, we might assume that if the Norwegian participants transfer their tonal accents, then they

may assign these six target words Accent 2. In the case of the word *veranda* [vəˈræn.də], with its written form ending with <a>, Norwegian participants may take this <a> as a segment which should be pronounced as /a/ because the corresponding Norwegian word does end in /a/. Words in Norwegian ending in /a/ normally get the Accent 1, thus, we may assume that it is also possible that the word *veranda* [vəˈræn.də] would receive Accent 1. The word *accounting [ə.ˈkaʊn.ʈɪŋ]*, since it has the primary stress on the second syllable and is a word that does not end in a schwa, is assumed to primarily receive Accent 1 (Kristoffersen 2000).

From another point of view, four of these are not simplex words, i.e., *accounting* [ə.ˈkaʊn.ʈɪŋ], *skier* [ˈskiː.ɚ], *runner* [ˈrʌn.ɚ] *and singer* [ˈsɪŋ.ɚ]. These words are all constructed by a stem and a suffix. These two suffixes, {-er} and {-ing}, are derivational suffixes. According to Wetterlin (2010), {-er} and {-ing} are unspecified derivational suffixes. Generally speaking, these kind of suffixes attach to monosyllabic stems and form a disyllabic environment for the accent assignment, thus getting Accent 2. Therefore, our Norwegian participants may assign these words Accent 2 as they do with similar Norwegian words, i.e., *lære* plus{-er}, becomes *lærer* (Accent 2), and *fisk* plus{-er}, becomes *fisker* (Accent 2). However, there are always exceptions, so not all Norwegian words that end with <er> get Accent 2. For example, words like *glitter, gitter* and *åker,* have Accent 1 because the schwa is inserted after the accent assignment. Another reason the word *accounting [ə.ˈkaʊn.ʈɪŋ]* may receive Accent 1 is that, in Standard East Norwegian, most verb stems are monosyllabic. If a verb stem has two syllables, it is a loan and it gets specified, consequently receiving Accent 1 (Wetterlin 2010). Altogether, these seven test words have the basic construction for both accents. Moreover, some contain certain morphemes that can trigger certain accents. That is to say, the participants have the possibility of assigning either of the two accents to the test words.

Finally, these seven words were chosen also because they contain many voiced and sonorous segments. These traits are important in considering that the audio recordings will be acoustically analyzed by Praat, and voiced and sonorous segments give the best pitch contours, which are better for presentation.

3.2.2 Preparing the test sentences

After we had all target words in place, we then embedded these words in carrier sentences, so that they cannot be assigned a boundary tone or the sentence stress. So as to make the sentence as natural as possible, we also included other various lexical items in the sentences, which did not impact the test words. In order to see how Norwegians' L1 prosody affects their English, we had two experimental parameters. We first inserted the target words at different utterance positions, and we second put the same set of words into different contexts. In detail, this means that every target word was placed in declarative sentences and at three different positions, utterance-initial, utterance-middle and utterance-final. In addition to the declarative sentences, all words were also placed

in two contexts, special questions and general questions. For clarity, please see the below illustration with the test word *lava* [ˈlɑː.və.] (The list with all the test sentences is attached as appendix 2).

Lava is made up of crystals.
I think that lava is very dangerous.
This is called lava.
What is lava?
Do you know anything about lava?

In total, there are 7 test words and each word is tested 5 times. Thus, each participant reads 35 sentences. We did not include more possible words out of the consideration that too many sentences might lead to participants' fatigue, resulting in list intonation. All test sentences were randomly ordered and inserted into PowerPoint slides.

3.3 Experiment procedures

Because the audio recordings were to be acoustically analyzed by Praat, each needed to be high quality. To ensure this, all recordings took place in a NTNU research laboratory with only the participant and the examiner. In order to have the read speech as natural as possible, the environment was informal, with neither a recorder nor an external microphone used. The PowerPoint slides containing the test sentences were displayed by a computer screen (Apple MacBook Air), and the recording job was done by Praat. Another benefit of using Praat to record is the distance between the participants and the computer can minimize the participants' breathing airflow, which can be easily captured by a high sensitivity microphone.

Before the test, the recording environment was thoroughly examined by the examiner to ensure that it was quiet enough. The examiner chatted leisurely with the participants, in both Norwegian and English, to ease participants' nerves. After participants signed the consent form (see appendix 4), necessary test instruction was given in order to make sure the participants understood what they needed to do and also to avoid unnecessary noises during the recording. The participants were told that they would be reading 35 individual English sentences shown on the screen. After finishing one sentence, they needed to press the down arrow key gently to get the next sentence. They would then repeat this procedure until all sentences were read. The participants were also told to read loudly and clearly, not to communicate with the examiner in any case, even if they encounter an unfamiliar word, rather they should guess the pronunciation as normal and continue reading. The planned testing time was approximately 15 minutes, with the 35 sentences taking around 3 minutes to read depending on the reading speed of each participants. After the test, the participants were paid for their participation.

Chapter 4. Presentation of the experiment results

As we mentioned in the last section, in order to make the read speech as natural as possible, the program Praat was used to record the participants rather than using a recorder and external microphone. Praat was also used to cut the full audio recordings into single sentences and individual words. Praat was also applied for basic acoustic analysis, as it is capable of visualizing speech files by digitizing the speech into different representations, for instance, waveforms, spectrograms and pitch contours. All of these are vital for our analysis. Acoustically, pitch is the vibration of the vocal folds. The faster the vocal folds vibrate, the higher the pitch becomes. Auditorily, pitch is the human ear's perception of the vibration's frequency. Thus, if we want to discuss the pitches we hear, we need a measurement of the sound. Traditionally, pitch is measured by fundamental frequency (F0), which is an objective measurement and is measured in Hertz (Hz), which indicates how many times the vocal folds vibrate per second. For instance, if a pitch's F0 is 180 Hz, this means the person's vocal folds are vibrating 180 times per second at that point. In a word, by using Praat as a data processor, we can extract specific data and images that can then help us more clearly describe what we have heard.

The audio materials obtained are of a reasonable quality. We went through each Norwegian participant’s English production, as well as the two American speakers’ production, with the latter’s English being used as the L1 template. We divided the recordings into individual sentences in Praat. We identified and classified all target words based on our perception and with the help of the pitch contours shown by Praat. The target word was judged by whether it had a native-like accent or nonnative-like accent. If it was nonnative-like, did it sound like an L*H accent, an H*LH accent, or something else? (See appendix 3 for the results of the experiment).

In the preceding chapters, we gave detailed descriptions of the Norwegian tonal accents as well as the pitch realization in English language. In this section, we will present the results of the experiment. This is to say that the participants' English production of both the Norwegian speakers and the English speakers will be both described and contrasted carefully. To begin, the tonal accent realization of target words at different utterance positions will be presented. Next, the two different target contexts will be considered, i.e., we will discuss how the participants produce the target words while the words were inserted in different interrogative sentences. And lastly, a short summary of the whole data will be provided at the end of the section. We use mostly numbers and ratios in our descriptions, along with necessary figures and images for illustration. Not all the obtained sentences, but only the most typical and representative sentences will be presented, due to the thesis length.

4.1 Finding the L*H in English sentences

Based on the widely accepted “Trondheim Model of Intonation” (e.g. Fretheim, T., & Nilsen, R. 1989), Norwegian tones are assigned within the Accent Phrase (AP). An AP begins with the primary stressed syllable of a word and typically ends on the last syllable before the next primary stressed syllable. Therefore, ideally, in order to identify the possible Norwegian tonal patterns, we should first divide the test sentences into APs and then analyze. However, during our analysis, we found that for most cases, the AP analysis does not work, as it is only applicable for Norwegian intonation. In reality, most of our participants had the native-like English pronunciation for most constituents of the test sentences, but they attached a wrong low tone (L) on the primary syllables, thus forming an L*H accent, within certain words.

This phenomenon can be seen as an influence of their L1 Norwegian. Both Norwegian and English have only two tones, a low tone (L) and a high tone (H). The difference is that, in English, the tonal variation depends on pragmatic factors, while, in Norwegian, it depends on lexical and phonotactic properties. To be more specific, in English, if a given word bears no sentence intonation, a high tone is associated with the most prominent syllable, i.e., the primary stressed syllable. All the other syllables, those at the left or right side of the primary stressed syllable, are assigned low tones. For example, for the word *runner* [ˈrʌn.ɚ], the tone assignment should be H*L. On the other hand, in Norwegian, both high tone and low tone can be assigned to the primary stressed syllable, resulting in two different accents, L*H and H*LH. Therefore, if the Norwegian participants have a lower pitch on the first primary stressed syllable L, and a higher pitch on the second syllable, then this word will be deemed as holding an L*H accent.

4.2 Results of the parameter 'Positions'

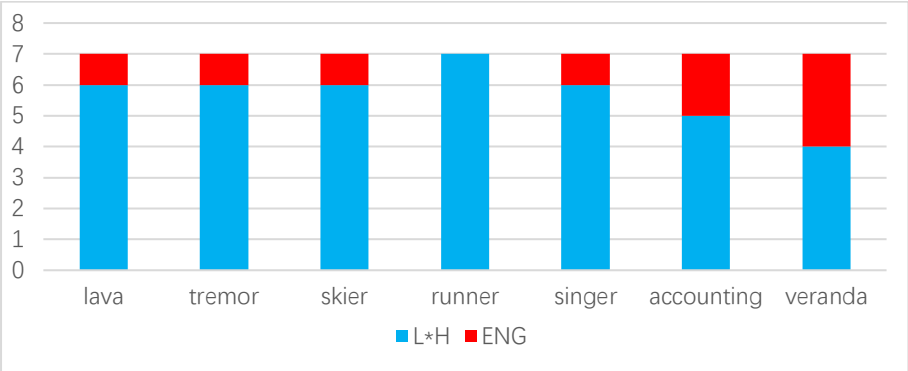
In this section, we present how Norwegian speakers alternate their pronunciation in different positions. Each of the 7 target words were inserted into the beginning, middle and end positions of three different declarative sentences, respectively. Each of the declarative sentences were produced by 7 individual participants once. In total, for each position, utterance-initial, utterance-medial and utterance-final, we have 7*1*7=49 samples. The accent distributions of each position are illustrated individually.

4.2.1 Utterance-initial position

Target words that were placed at the beginning of the sentences were produced with an L* H accent by most of the participants. The following bar chart illustrates the accent

patterns of certain target words when placed in the initial position of declarative sentences.

Figure (1): Accent distributions of target words inserted at the initial position of declarative sentences.

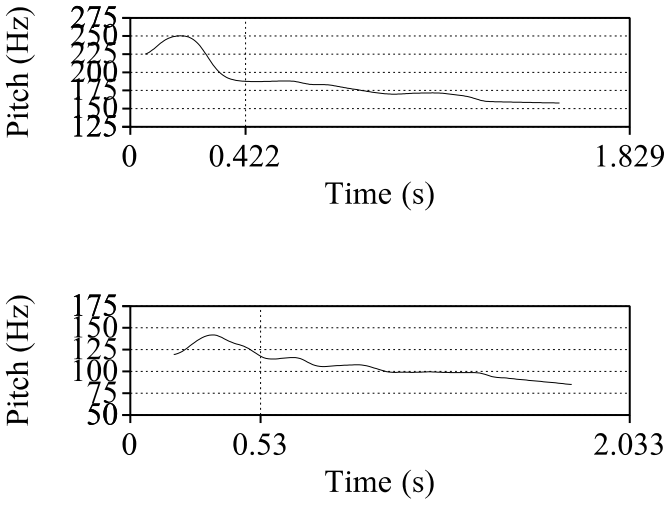


In this simple bar chart, the Y- axis indicates the individual test words, while the X-axis shows how many of the participants had the corresponding accent patterns. The blue colored bar indicates that the word had L*H accent, and the red colored bar represents ENG, the native-like English pronunciation, i.e., a high tone (H) was assigned to the main stressed syllable of the word. One can see that the blue color is overwhelming. To be more specific, when placed at the beginning of declarative sentence, the target word *lava* was pronounced as having an L*H accent by 6 of the 7 participants. The same statistical pattern was seen for the target words *tremor, skier, singer.* The L*H accent was seen in 5 of 7 participants for the word *accounting*, 4 of 7 for *veranda*, and 7 of 7 for the word *runner*. In total, 40 out of 49 samples were judged as having an L*H accent, that is 81.6%. The rest 9 samples (18.4%) were deemed as having a native-like pronunciation, i.e., a high tone (H) associated to the main stressed syllable.

To concretize the above numbers, pitch contours of the native English participants and the Norwegian participants will be presented and contrasted. All of the pitch contours were interpolated. This interpolation was due to most participants being young males with relatively lower pitch ranges. Therefore, when their pitch is lower than the pitch range in Praat, especially when they had a creaky voice, the F0 of the pitch could not be detected. Moreover, the pitch contours in Praat are discontinuous because the test sentences contain some unvoiced segments which have no F0. While these discontinuous pitch contours may imply the participants speaks intermittently, we disagree based on our perception. We heard the participants produce the test sentences primarily as 'whole sentences', rather than as several sentence constituents. Therefore, we applied the 'interpolate' function in Praat, so that the pitch contours can reflect the test sentences better.

To start with, the following figure (2) shows the pitch contour of the test sentence *Runner is the word I want you to say.*, as pronounced by the native English speakers, participant No.8 (the upper one) and participant No.9 (the lower one), respectively.

Figure(2): by participant No. 8 and No.9

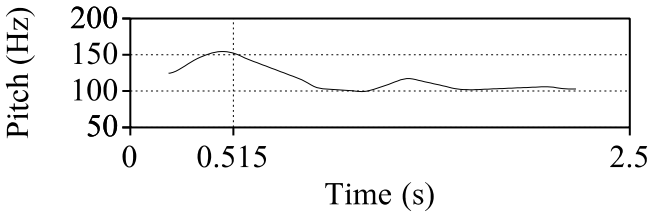


Runner is the word I want you to say.

The test sentence is *Runner is the word I want you to say.*, and the target word is *runner* [ˈrʌn.ɚ]. The vertical dotted line marks the boundary of the target word. As we heard and as pitch contours show, the two native English speakers have similar pitch patterns. In terms of the pitches on the test word *runner*, they had a high tone (H) on the initial syllable, a lower tone for the second syllable, which is followed by a gradual declination lasts until the end of the sentence.

Contrarily, all of the 7 Norwegian participants, had relatively lower pitch on the first syllable of the test word *runner.* This trend is demonstrated in the following figures, (3) and (4).

Figure (3) : by participant No. 1

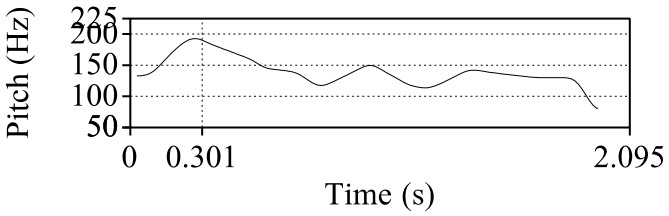


Runner is the word I want you to say.

Figure (3) shows the pitch contour of the same sentence produced by the Norwegian participant No. 1. At first glance, we might say that this contour is very similar to the native participants' above. All had an accentual peak at the beginning of the sentence, and then a downward trend to the end. However, if we look at the vertical dotted line, we could see the differences. Participant No. 1 had an L*H accent for the word *runner*

[ˈrʌn.ɚ]. Within the word, a low tone is left-aligned with the stressed syllable, and a high tone is right-aligned with the end of the word.

Figure (4): by participant No. 5



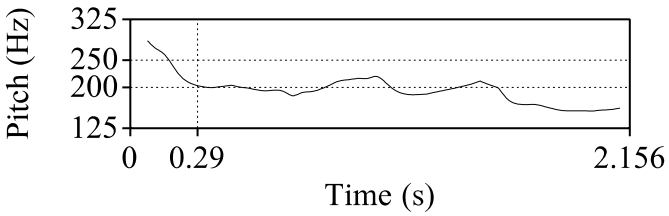
Runner is the word I want you to say.

As can be seen from the figure (4), participant No.5 had the same pitch pattern as participant No. 1. For test word *runner* [ˈrʌn.ɚ], participant No.5 also had a relatively lower pitch for the stressed syllable and a higher pitch for the post-stressed syllable, which makes the word hold an L*H accent.

Therefore, with respect to the pitches on the test word *runner* [ˈrʌn.ɚ], the two Norwegian speakers show a contrary pattern to the two native English speakers. The Norwegians had a low tone (L) on the stressed syllable, while the native speaker had a high tone (H). Furthermore, the two native speakers always display the same pattern, not only for the test word *runner,* but for all the other test words. Therefore, in the following comparisons, the pitch contours of the participant No.8 will be presented as the L1 template, so to keep the conciseness of the thesis.

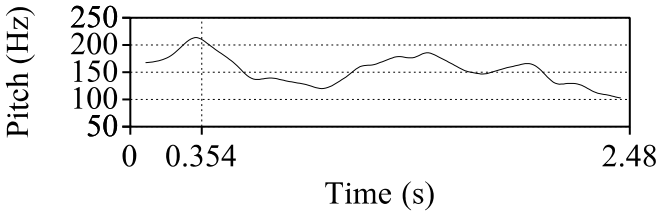
For the test word *runner* at the utterance-initial place, 7 out of 7 Norwegian participants had similar L*H accent patterns. Therefore, we cannot provide any examples for 'the Norwegian participants with native-like H*L accent'. However, as we mentioned above, 9 samples (18.4%) were deemed as having a high tone (H) on the main stressed syllable. Such sentences will be presented and compared in the following part of this section.

Figure (5): by participant No. 8



Tremor is an involuntary shaking movement.

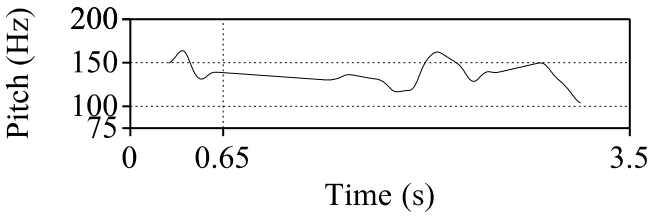
Figure (6): by participant No. 2



Tremor is an involuntary shaking movement.

Figure (5) and (6) illustrate the pitch contour of the same test sentence, *Tremor is an involuntary shaking movement.* The former figure is produced by the native English speaker No. 8 and the latter figure by the Norwegian participant No. 2. Each figure is divided into two halves by a vertical dotted line. As is visible from the figures, the two pitch contours are very dissimilar in the first half, but quite similar in the second half. The vertical dotted line marks the end of the test word *tremor* [ˈtrem.ɚ]. The native English participant had an higher pitch on the initial stressed syllable and a lower pitch on the second syllable, thus forming an H*L accent on the word *tremor*. The Norwegian participant, however obviously started with a lower pitch and then raised the pitch to the peak on the second unstressed syllable, thus resulting in an L*H accent on the word *tremor.*

Figure (7): by participant No. 5



Tremor is an involuntary shaking movement.

With respect to the pitch contour of the target word *tremor* [ˈtrem.ɚ], figure (7) shows a pattern that similar to that seen in the figure (5). It is given an H tone on the first stressed syllable, followed by a lower tone on the second syllable, and therefore, it was determined as holding an H*L accent.

So far, we have seen pitch contours of two group of disyllabic words with initial stress. Examples of trisyllabic words with penultimate stress will now be presented.

Figure (8): by participant No. 8

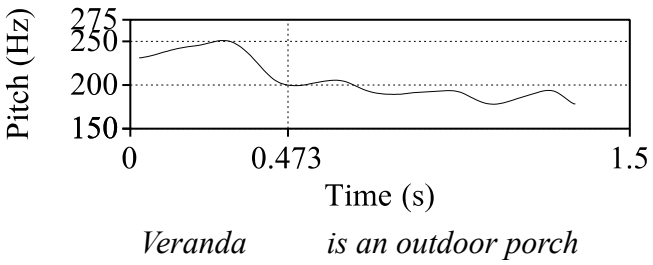
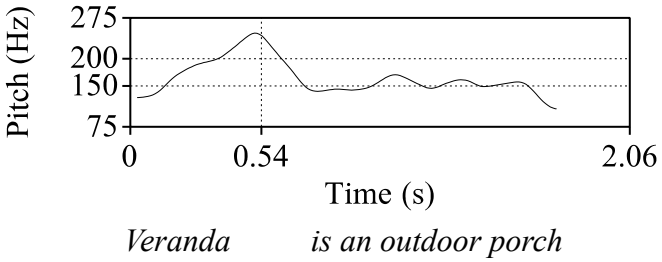
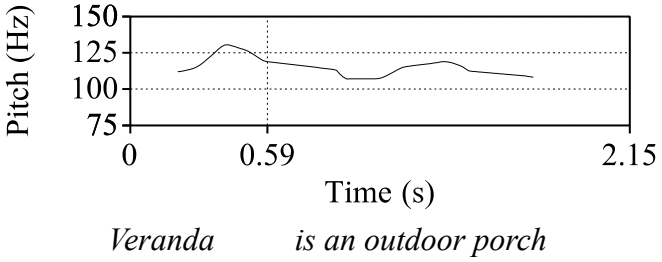


Figure (9): by participant No. 2



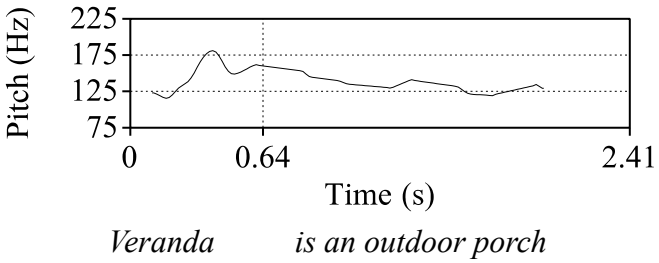
The sentence illustrated by figure (8) and (9) is *Veranda is an outdoor porch.*, produced by participant No. 8 and participant No. 2, respectively. V*eranda* [vəˈræn.də] has three syllables and its primary stress falls on the second syllable [ˈræn]. Again, similar patterns were observed as above. The vertical dotted line represents the watershed, before it, the pitch contours are distinguished, after it, the overall trend of the pitch contours are downstepped. For participant No. 8, she reached the accentual peak on the stressed syllable [ˈræn], and then lowered the pitch. For Norwegian participant No. 2, he started with a lower level pitch, then climbed on the stressed syllable [ˈræn] and reached the pitch ceiling at the final syllable [də]. Therefore, we judged that the participant No. 2 had an L*H accent for the test word *veranda*, with a high tone (H) right-aligned with the end of the word. Two more examples will be displayed in order to show that some of the Norwegian participants assigned a high tone (H) on the stressed syllable [ˈræn] as the native English speakers did.

Figure (10): by participant No.1



As the figure (10) shows, for the test word *veranda* [vəˈræn.də], the participant No.1 started with a low pitch on the initial syllable, reached the peak on the second syllable and lowered the pitch again afterwards. Thus, he had a high tone (H) on the stressed syllable.

Figure (11): by participant No. 5



Identically to participant No.1, participant No.5 also assigned the right tone (H) to the stressed syllable [ˈræn], which can be easily understood from figure (11).

To preliminarily summarize, as the figures listed above show, when the target words were placed at the initial place of declarative sentences, most of them (81.6%) were pronounced with an L* H accent, regardless of whether they were normal noun or agent nouns. With respect to the syllabic structures numbers, when the test word was disyllabic, a low tone (L) was left-aligned with the stressed syllable and a high tone (H) was right-aligned with the end of the word. Within the trisyllabic words, a high tone (H) was right-aligned with last syllable, while the other syllables, including the stressed syllable, all were assigned a lower tone. In contrast, 9 out of our 49 samples, 18.4%, were pronounced with a native-like accent. That is to say, for these 9 test words, the participants had a high tone (H) on the main stressed syllable. The reason or motivation behind this, i.e., alternation between the Norwegian and English prosody system, is not yet clear.

4.2.2 Utterance-middle position

In the last section, we have presented figures to show that, when the test words were placed at the utterance-initial positions, Norwegian participants produced a large number of L* H accents on the test words. In this section, we will show that when the test words were inserted in the middle position of the sentences, half of them get the same tonal patterns as when they were inserted in the utterance-initial positions. In the same structure as the preceding section, whole pictures and ratios will be provided first. Following that, pitch contours of specific sentences will be presented and compared.

Figure (12): Accent distributions of target words inserted at the middle position of declarative sentences.

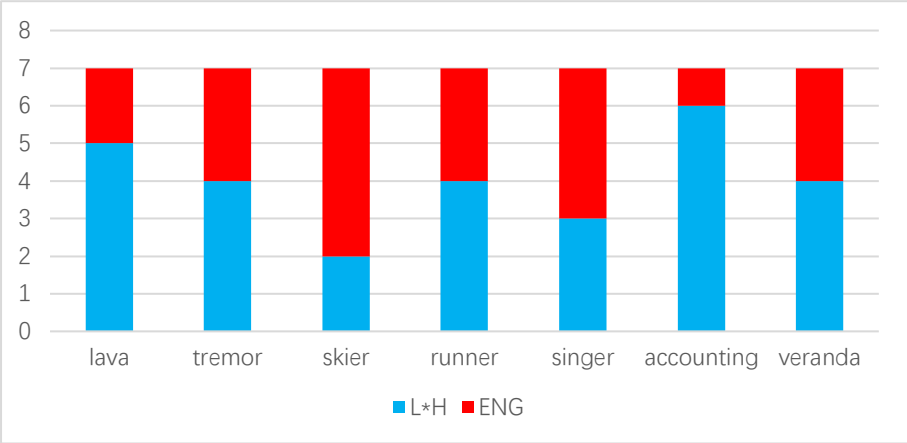
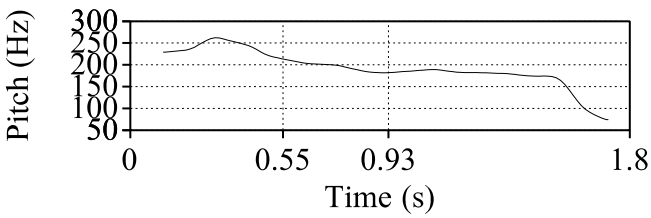


Figure (12) shows which accents the Norwegian participants assigned to the test words. Compared with the figure (1), we can see that, the blue-colored bars in this bar chart are generally shorter. This means that the Norwegians had fewer L*H accents when the words were embedded in the middle position of the sentences. To be more concrete, figure (12) reveals that 28 out of total 49, or 57.1%, sample words were assigned an L* H accent. The remaining 21 samples, or 42.9%, were judged as native-like. In further detail, when embedded in declarative sentences, the target word *lava* was assigned an L*H accent by 5 out of 7 Norwegian participants. The numbers for *tremor, runner and* veranda are 4/7, for skier, 2/7, for *singer, 3*/7 and for *accounting*, 6/7.

In the following portion, typical pitch contours of the relevant sentences will be displayed to show that when the test words were embedded in the middle of sentences, approximately half of them received a low tone (L) on the main stressed syllables. This kind of accent assignment, L tone on the primary stressed syllable, is generally not allowed in English, but it is permitted in Norwegian, as it corresponds to the Norwegian tonal Accent 1. On the other half of the sample words, the high tone (H) was attached to the primary stressed syllables. Therefore, it is suspected that the participants were influenced by their mother language's prosodic system, interchanging unconsciously between English and Norwegian tonal patterns.

Figure (13): by participant No. 8

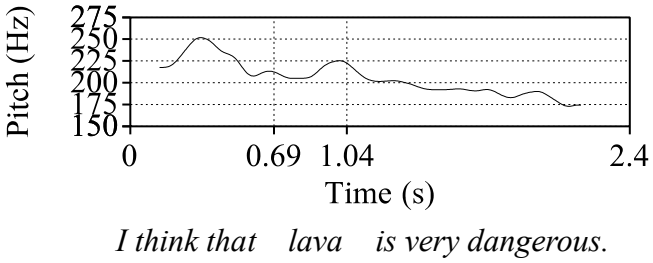


I think that lava is very dangerous.

Again, we start with the pitch contours of the native English speakers. Figure (13) shows the pitch contour of the sentence *I think that lava is very dangerous.*, pronounced

by participant No.8. The target word is *lava* ['lɑː.və], and the vertical dotted lines mark the word boundaries. As we can see from the graph, the target word *lava* has a slightly H*L contour, with a higher pitch on the first stressed syllable and a lower pitch on the subsequent syllable. Next, two examples will be cited to show how the Norwegian participants produce the same sentences.

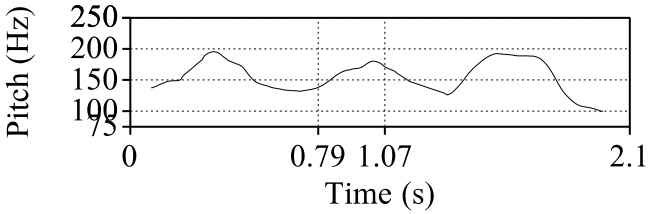
Figure (14): by participant No. 4



I think that lava is very dangerous.

Figure (14) shows the pitch contour of participant No. 4, a female speaker, the same gender as participant No. 8. As the graph shows, there is a clear low-high contour between the two vertical dotted lines. That is, the participant assigned a low tone (L) on the first stressed syllable ['lɑ] of the target word and assigned a high tone (H) to the following unstressed syllable [və]. Except of this part, the overall pitch forms displayed by figure (13) and (14) are quite alike.

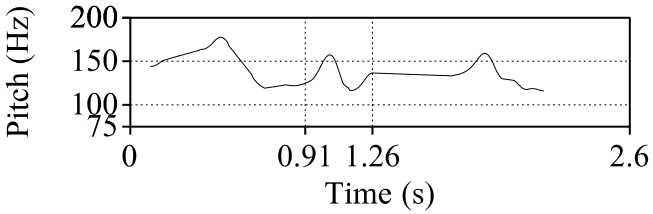
Figure (15): by participant No. 2



I think that lava is very dangerous.

Figure (15) denotes the pitch contour of the same test sentence, which was produced by speaker No. 2, a Norwegian male participant. As we can see from the figure, this participant had more ups and downs. However, if we only look at the target word *lava,* it is not difficult to say that the word has an low-high contour, a low tone (L) was left-aligned with the stressed syllable ['lɑ] and a high tone (H) was right-aligned with the unstressed syllable [və].

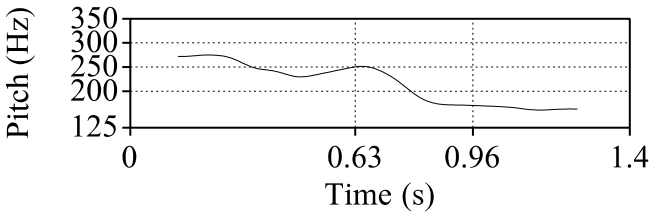
Figure (16): by participant No. 5



I think that lava is very dangerous.

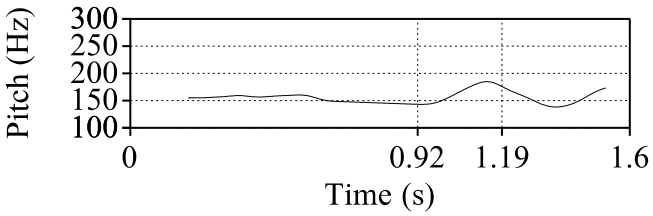
We have compared the pitch contours of a native English-speaking American (figure 13) and a Norwegian (figure 14 and 15). The Norwegian had an L*H accent for the target word. Figure (16) illustrates the pitch contour of the same sentence, produced by Norwegian participant No. 5. As the figure illustrates, the participant No. 5 had a visible high tone (H) on the initial stressed syllable of the word *lava* and a lower tone (L) attached on the unstressed [və]. Therefore, the tonal pattern on the word *lava* was judged as a native-like H*L.

Figure (17): by participant No. 8



Say the word singer again.

Figure (18): by participant No. 2



Say the word singer again.

Figure (17) and figure (18) show the pitch contours of the sentence, *Say the word singer again.*, produced by the American participant No.8 and the Norwegian participant No.2, respectively. In comparing the two graphs, it can be seen that the two contours are divergent in the middle phase. The first graph illustrates a clear high-low contour, whereas the second graph illustrates a low-high contour. This divergence is located on the target word *singer* [ˈsɪŋ.ɚ], which is indicated by the vertical dotted lines. In the

next portion, three more figures will be presented, in which the pitch contours of the target word are more similar to the native pattern.

Figure (19): by participant No. 3

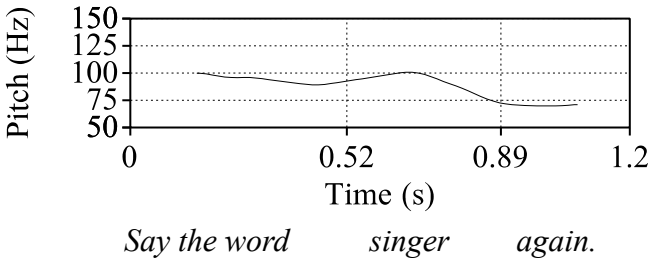


Figure (20): by participant No. 5

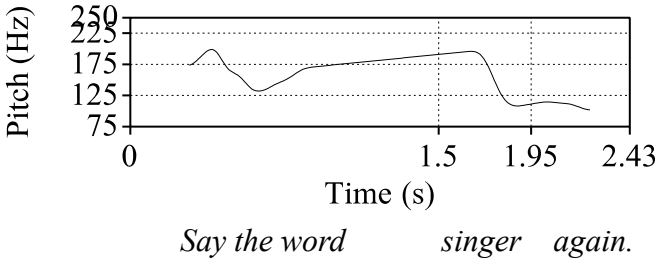


Figure (21): by participant No. 6

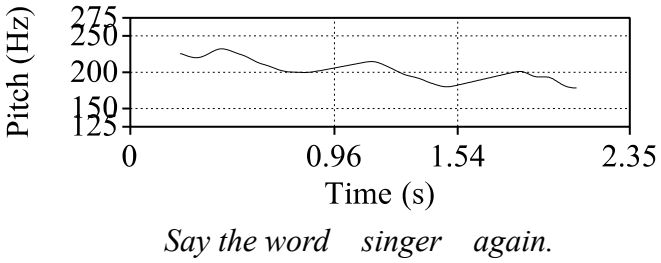
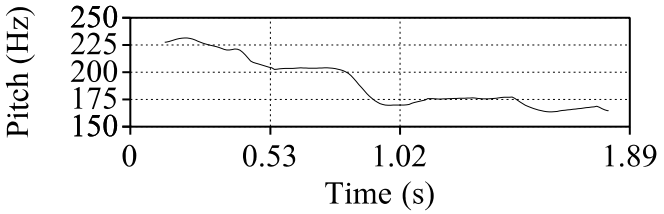


Figure (19), (20), and (21) display the pitch contours of the same sentence, produced by Norwegian participants No.3, No.5 and No.6, respectively. As the figures show, even though the three contours are not exactly the same, they share striking commonalities. For the target word *singer* [ˈsɪŋ.ɚ], a high tone (H) was attached to the first syllable, while a lower tone was assigned to the second syllable. Thus, the accent on the word *singer* is clearly an H*L accent.

Thus far, we have compared two groups of disyllabic words. In the subsequent part of this section, the results of two trisyllabic words, *veranda* [vəˈræn.də] and *accounting* [ə.ˈkaʊn.t̪ɪŋ], will be presented.

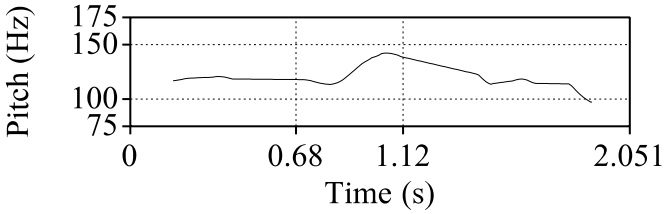
Figure (22): by participant No. 8



I know that veranda is a popular thing.

Figure (22) demonstrates an overall downward trend pitch contour. It represents the test sentence *I know that veranda is a popular thing.*, produced by the American participant No.8. The vertical dotted lines mark the boundaries of the target word *veranda* [vəˈræn.də]. The contour pattern indicates that the pitch distinction between the pre-stressed syllable [və] and the stressed syllable [ˈræn] is subtle. However, by manual perception, it is clear that pitches on the word *veranda* follow an LH*L pattern. That is to say that, within the word domain, the most prominent syllable [ˈræn] received the highest pitch, while the other two syllables received relatively lower pitches.

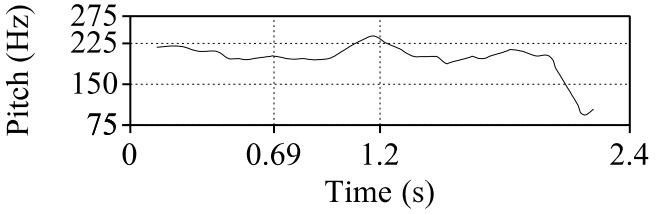
Figure (23): by participant No. 1



I know that veranda is a popular thing.

Compared with the native-English-speaking American participant, participant No.1 had a different pitch contour on the target word. As is shown clearly in Figure (23), the target word *veranda* starts with a relatively low pitch on syllable [və], which rises as it moves to the syllable [ˈræn]. The pitch reaches its ceiling on the final syllable [də]. Therefore, the word *veranda* is said with an L*H accent.

Figure (24): by participant No. 4

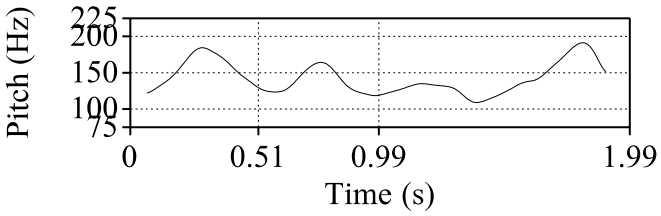


I know that veranda is a popular thing.

Figure (24) reveals a similar pitch contour as Figure (23); thus, participant No. 4 also has an L*H accent for the word *veranda* [vəˈræn.də], with a high tone (H) falling on the final unstressed syllable [də], right-aligned with the end of the word.

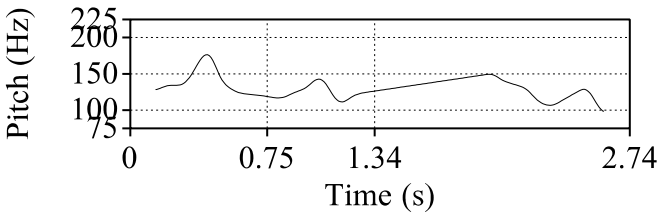
It is important to mention that, with respect to the actual realization of the (L) and (H) tones, the Norwegian participants exhibited some minor variations. This is more obvious and more easily noted on trisyllabic words. For instance, in considering figure (9), we can see that, for trisyllabic word *veranda*, the pitch contour illustrated has a steeper rise. Simply put, the pitch begins to rise from the second stressed syllable, and gets even higher towards the final syllable. Meanwhile, the pitch contours shown in figure (23) and (24) illustrate a different pattern, i.e., they remain relatively low and flat on both the initial syllable and second stressed syllable before finally rising on the final syllable.

Figure (25): by participant No. 2



I know that veranda is a popular thing.

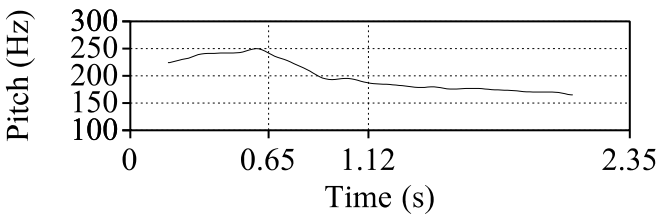
Figure (26): by participant No. 5



I know that veranda is a popular thing.

The pitch contours in figure (25) and (26) represent the same test sentence *I know that veranda is a popular thing.*, produced by Norwegian participants No. 2 and No. 5, respectively. As shown in both above figures, the two contours are very similar except when nearing the end of the sentence. For the target word *veranda* [vəˈræn.də], a high tone (H) is assigned on the stressed syllable [ˈræn], and a lower tone to the nearby syllables. Therefore, the accents on the target word were judged as native-like.

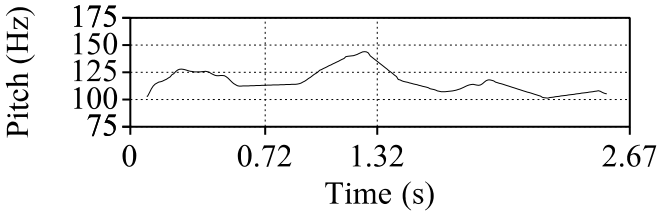
Figure (27): by participant No. 8



I believe that accounting is the language of business.

Figure (27) denotes the pitch contour of the sentence *I believe that accounting is the language of business.*, pronounced by the American participant No.8. The graph gives the impression of that the target word *accounting* [ə.ˈkaʊn.t̬ɪŋ] has a higher tone on the initial unstressed syllable [ə]. However, manual validation proves otherwise. In fact, the speaker connects the word *that* with the first coming syllable [ə], forming a [ðætə]. Therefore, the syllable [ə] was assessed by the Praat program as having a higher pitch, the result of the influences coming from the former syllable [ðæt]. Furthermore, for the remaining part of the word, the stressed syllable [ˈkaʊn] has a relatively higher pitch than the post-stress syllable [t̬ɪŋ]. Rephrasing this, the word [ə.ˈkaʊn.t̬ɪŋ] has a high tone (H) on the stressed syllable, which obeys the pitch regularities of English. The following examples, however, will present another picture.

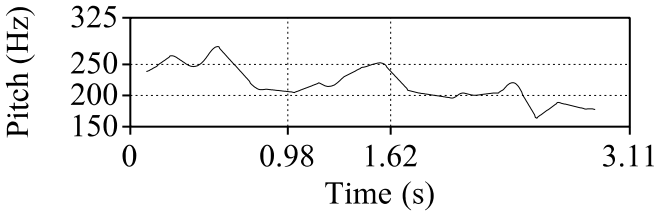
Figure (28): by participant No. 1



I believe that accounting is the language of business.

In comparing the pitch contour in figure (28) with the one in figure (27), the two are not strongly dissimilar. Both display a peak at the initial part of the sentence and a descending trend towards the end. The difference appears at the middle phase, i.e., the contours of the target word *accounting* [ə.ˈkaʊn.t̬ɪŋ]. Figure (28) shows that the word has an L*H accent, as a high tone (H) is assigned to the final unstressed syllable [t̬ɪŋ].

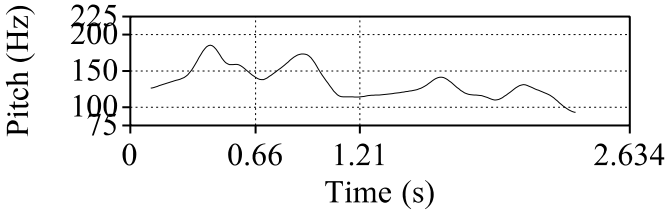
Figure (29): by participant No. 4



I believe that accounting is the language of business.

Even though the pitch graph of figure (29) has more curvature, the pitch contours share the same characteristics as figure (28). As seen between the two vertical lines in the graph, the target word *accounting* has a low-high contour indicating an L*H accent, with the highest tone falling on the final unstressed syllable [t̪ɪŋ].

Figure (30): by participant No. 2



I believe that accounting is the language of business.

Participant No. 2 had a high tone (H) on the second stressed syllable of the word *accounting* [əˈkaʊn.t̪ɪŋ], as seen in figure (30). Different from the native-English-speaking participant No.8 (figure 27), the participant No. 2 did not bind the first syllable of the test word [ə], with the prior word [ðæt]. In fact, participant No. 2 actually paused after the word *that*, and then started again with a low pitch on the syllable [ə]. He then raised the pitch on the stressed syllable [ˈkaʊn], before making a fall on the final syllable [t̪ɪŋ]. Therefore, the accent pattern on the word *accounting* [əˈkaʊn.t̪ɪŋ] was native-like.

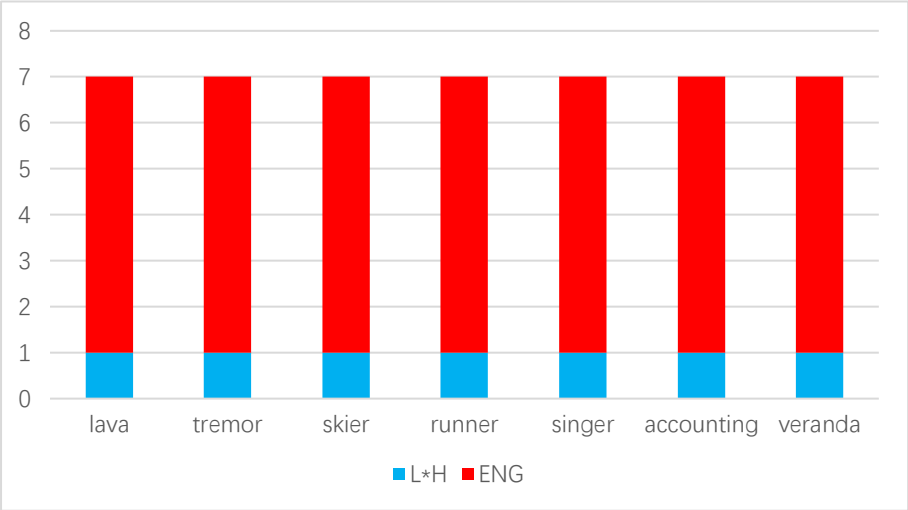
In summary, in this section we have exemplified 4 groups of test words with 18 pitch contours. We demonstrate that, when the target words were inserted at the middle place of a sentence, more than half of them (57.1%) were assigned an L* H accent. The other half of them (42.9%) were judged as having a native-like accent pattern, that is, a high tone (H) was assigned to the main stressed syllables. In general, the L*H accent occurred less frequently at the middle position than at the initial position. In addition, when it comes to syllable structure, the test words in these two positions show the same pattern. Namely, within a disyllabic word, a low tone (L) is left-aligned with the stressed syllable and a high tone (H) is right-aligned with unstressed syllable. Conversely, within

a trisyllabic word, a high tone (H) is right-aligned with ending syllable, while all the other syllables receive lower tones. In the next section, the results of the utterance-final position will be discussed.

4.2.3 Utterance-final position

In the previous two sections, we have presented how the participants assign tones to the target words at the utterance-initial and utterance-middle position. In this section, the accent assignments of the target words at the utterance-final position will be discussed.

Figure (31): Accent distributions of target words inserted at the final position of declarative sentences.



As figure (31) shows, the accent distribution of the target words at the utterance-final position is more regular in comparison to the former two positions. For every target word, only one participant had the L* H accent (indicated by the blue-colored bar), numerically thus 7 out of 49 samples or 14.3%. On the other hand, for every target word, there were 6 participants which had the native-like accent (indicated by the red-colored bar), i.e., a high tone (H) was attached to the stressed syllable, or 85.7%. It is important to note that only a single participant, No. 7, had the L*H accent, and this accounted for all 7 of the accented target words. The other 6 participants produced all the words correctly. This may suggest that these 6 participants were aware of the correct pronunciation of the target words. In the following results presentation, the pitch contours of the test sentences produced by both the participant No.7 and the other six Norwegian participants will be presented and contrasted, so as to illustrate the divergences.

Figure (32): by participant No. 7

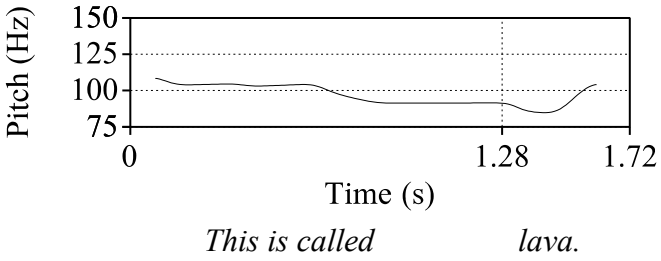


Figure (32) shows the pitch contour of the sentence *This is called lava.*, produced by participant No.7. As the graph shows, the target word *lava*, divided by the vertical dotted line, has an L*H accent, with a low tone (L) assigned to the stressed syllable [ˈlɑː] and a high tone (H) right aligned on the unstressed syllable [və].

Figure (33): by participant No. 4

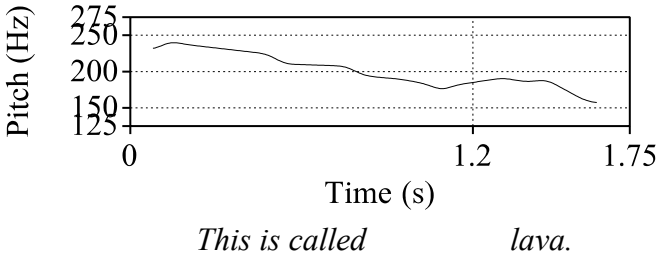
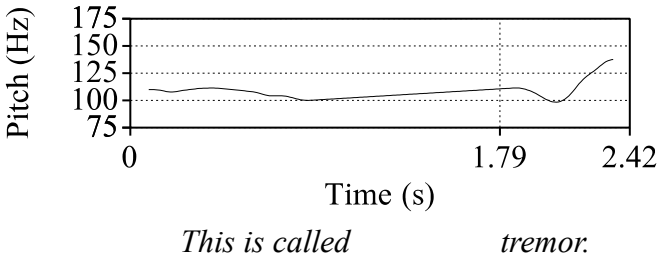


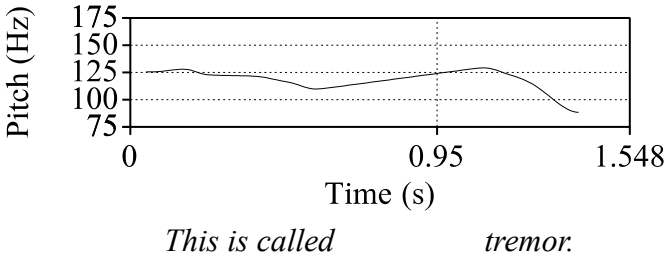
Figure (33) shows the pitch contour of the corresponding sentence produced by participant No. 4. Clearly, this participant has an H*L accent for the word *lava,* with a high tone (H) left-aligned on the stressed syllable [ˈlɑː].

Figure (34): by participant No. 7



The pitch contour shown in figure (34) demonstrates a similar pattern as the one shown in figure (32), with a gradual downward trend for the portion *This is called,* followed by a low high contour of the target word *tremor.*

Figure (35): by participant No. 1



As displayed in figure (35), in contrast with the participant No.7, participant No.1 has an H*L accent for the test word *tremor,* with a high tone (H) assigned to the stressed syllable [ˈtre].

Figure (36): by participant No. 7

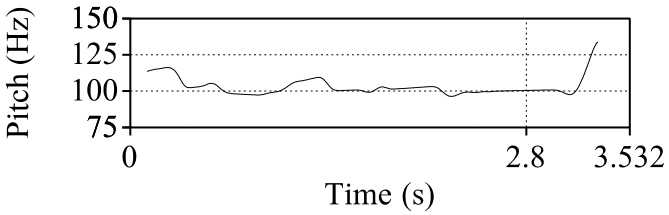


Figure (37): by participant No. 2

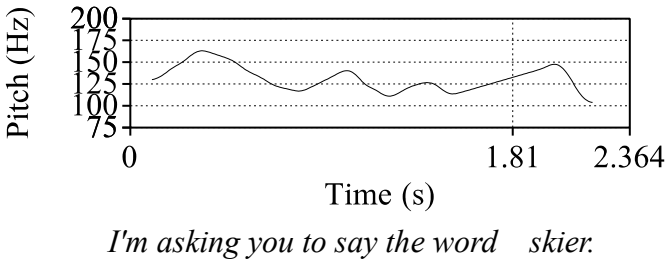
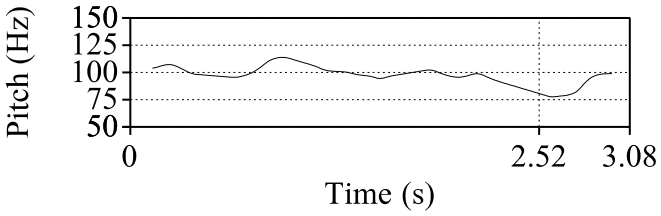


Figure (36) and figure (37) illustrate the pitch contours of the same sentence *I'm asking you to say the word skier.*, produced by participant No.7 and participant No. 2, separately. As can be seen from the figures, the two participants have similar patterns for most constituent parts of the sentence, but they clearly diverge in the accent of the word *skier.* To be more specific, participant No.7 has a noticeable L*H accent, while the participant No. 2 had a noticeable H*L accent.

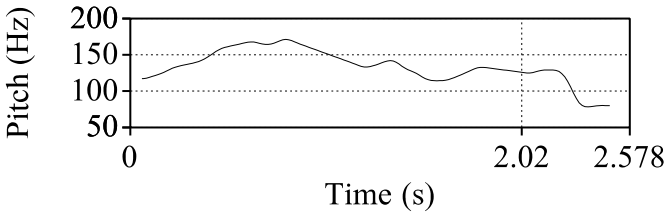
Figure (38): by participant No. 7



I'm asking you to say the word runner.

As figure (38) shows, participant No. 7 has an L*H accent for the test word *runner.* The participant has a low level pitch on the first stressed syllable and a higher pitch on the second coming syllable.

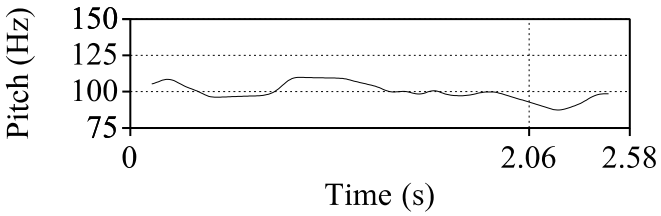
Figure (39): by participant No. 5



I'm asking you to say the word runner.

In juxtaposing the last phase of the pitch contours shown in figure (39) and figure (38), one can see that they are opposite. For the target word *runner*, participant No.5 has a high low pitch contour, with a high tone (H) on the initial stressed syllable.

Figure (40): by participant No. 7



I'm asking you to say the word singer.

Figure (40) illustrates that participant No. 7 assigns an L*H accent to the target word *singer*, when the word is placed at the end of the test sentence *I'm asking you to say the word singer.*.

Figure (41): by participant No. 6

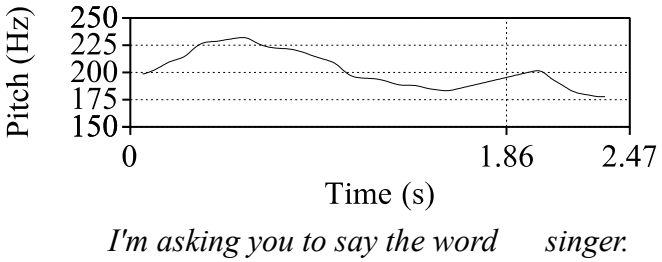
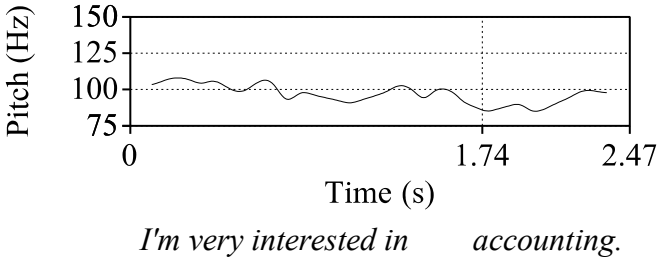


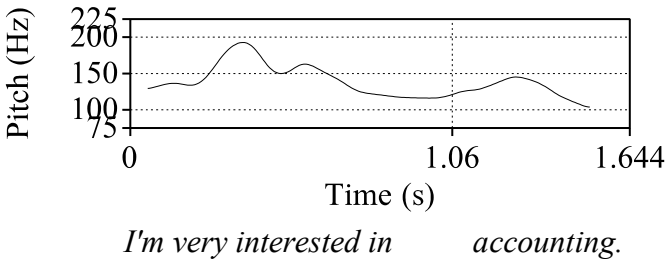
Figure (41) indicates that the participant No. 6 has an H*L accent to the word *singer,* with a high tone (H) assigned to the initial syllable [ˈsɪŋ].

Figure (42): by participant No. 7



As evidenced by figure (42), participant No.7 has an L*H accent for the test word *accounting.* This is because the highest pitch is on the final syllable [t̪ɪŋ], right aligned with the end of the word, with lower tones on both the stressed syllable [ˈkaʊn] and the initial syllable [ə].

Figure (43): by participant No. 2



The participant No. 2 demonstrates a native-like pronunciation for the test word *accounting.* Within the word *accounting,* the highest pitch is placed on the stressed syllable [ˈkaʊn], and lower pitches placed on the other two syllables.

Figure (44): by participant No. 7

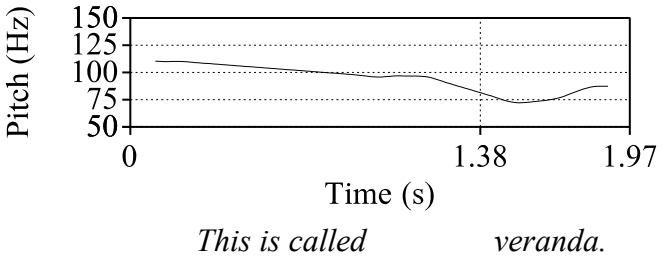
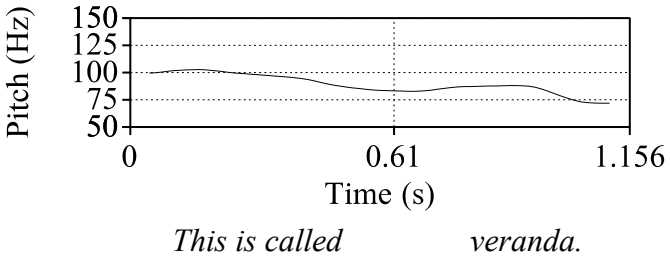


Figure (45): by participant No. 3



In comparing figure (44) and figure (45), one can see that the two pitch contours are only different in their second half. Participant No.7 has an L*H accent for the target word *veranda,* with the highest pitch located on the last unstressed syllable [də]; participant No. 3, in contrast, has the highest pitch falls on the stressed syllable [ˈræn].

In an overview of this section, the pitch contours of the participant No. 7 have been compared with the corresponding contours of the other 6 participants. As evidenced by the figures presented above, it can be said that when the target words were inserted at the end of the sentences, most of the Norwegian participants had a high tone (H) on the stressed syllable of the words. Participant No. 7 was the only one, who assigned the L*H accent to the test words, and performed this consistently. In fact, the participant No. 7 illustrates the L*H accent for all target words, irrespective of where in the sentence the words were inserted. The results of participant No. 7 are interesting and will be discussed further in the successive sections.

4.3 Results of the parameter 'Contexts'

In Norwegian, pitch is used to indicate the lexical contrast, i.e., to signal different lexical items. Generally speaking, this is not possible in English. Instead, English uses pitch to indicate post-lexical contrast, i.e., to convey different pragmatic meanings. For

instance, English pitch may be used to tell if a sentence is declarative or interrogative. In English, declarative sentences and special questions (wh-qustions) tend to have a falling intonation, which is phonologically represented as H* L, and phonetically realized as a fall on the final stressed syllable ending with an utterance boundary low tone (L%). For some special purposes, a special question can also have a rising intonation, which is phonologically represented as L* H and phonetically realized as a rise on the final stressed syllable then ending with an utterance level boundary high tone (H%). This can happen during the use of special questions such as when asking for repetition or clarification of previously known information. In the experiment, the two native American English speakers had both falling intonation or rising intonation for the special questions. Follow the same outline of the former sections, the pitch contours of the participant No.8 will be used for illustration. Figures (46) and (47) are examples of falling intonation; figure (48) is used as an example of rising intonation. As opposed to special questions, general questions in English typically acquire a rising intonation (see figure 49 and figure 50 for illustration), which is phonetically realized as a rise on the final stressed syllable ending with an utterance boundary high tone (H%). General questions with a falling pitch normally convey rudeness and impatience. Neither of our two native participants demonstrated such a pattern for the test sentences.

Figure (46): by participant No. 8

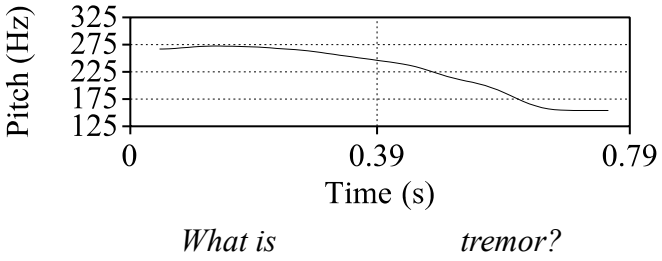


Figure (46) illustrates that, for the special question *What is tremor?*, the native participant No.8 has a falling intonation, which is realized as a high tone (H) linked to the stressed syllable [ˈtre], and a low tone (L) linked to the following syllable [mə˞]. Moreover, the utterance level boundary tone for this special question is L%, which cannot be seen as a separate tone in the pitch contour.

Figure (47): by participant No. 8

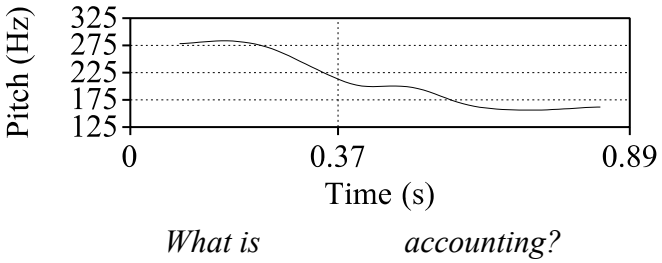
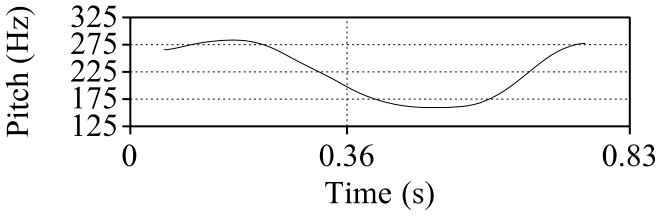


Figure (47) shares the same pattern with figure (46). The sentence, *What is accounting?,* has a falling pitch, with a high tone (H) aligned with the stressed syllable [ˈkaʊn], a low tone (L) attached to the following unstressed syllable [ʈɪŋ], and a boundary tone L% that is inseperatable and thus unobservable.

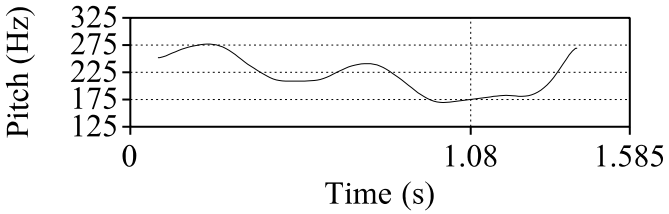
Figure (48): by participant No. 8



What is lava?

As figure (48) demonstrates, the participant No.8 has a rising pitch for a special question, with a low tone (L) on the final stressed syllable [ˈlɑː] and a high tone (H) on the syllable [və]. Here, the utterance level boundary tone is H%, so it, similarly to previous figures, can also not be observed. In contrasting figure (46) with (48), it is clear that despite two interrogative sentences having identical structures, they receive opposite utterance intonations.

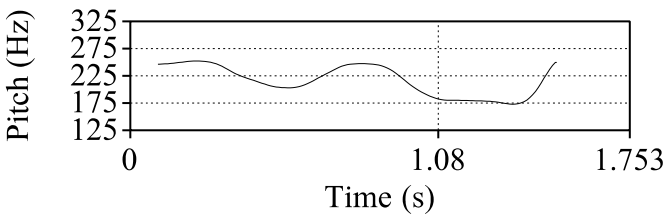
Figure (49): by participant No. 8



Do you know anything about tremor?

Figure (49) displays the pitch contour of the general question, *Do you know anything about tremor?*. The participant clearly demonstrates a rising intonation for the question. Compared with the same target word in figure (46), the word *tremor* in this figure (49) shows a low-high contour. This is seen as a low tone (L) being assigned to the stressed syllable [ˈtre], and high tone (H) to the post stressed syllable [mə˞], followed by an invisible utterance boundary H%.

Figure (50): by participant No. 8



Do you know anything about accounting?

The general question, *Do you know anything about accounting?,* also has a rising intonation, which was phonetically realized as a low tone (L) attached to the final stressed syllable[ˈkaʊn], a high tone (H) to the post stressed syllable [ŧɪŋ], and an ending of an unobservable boundary H%.

As previously stated, to achieve the goal of the thesis, i.e., to see whether Norwegians' L1 tonal accents influence their English pronunciation, we have chosen 7 target words with construction that can trigger both Accent 1 (L*H) and Accent 2 (H*LH). We have then placed these words into various utterance positions and different contexts. For the parameter 'contexts', we have chosen the utterance-final positions of general questions and special questions. Based on what we have mentioned above, in these two positions, each test word has the possibility of being produced with a rising intonation (L*H) and a falling intonation (H*L), which, are very similar to the Norwegian Accent 1 (L*H) and Accent 2 (H*LH), respectively. Therefore, the results of the participants reading these interrogatives might reveal details regarding whether the participants are affected by their L1 tonal accents.

In the following section, pitch contours of the interrogative questions produced by the Norwegian participants will be illustrated. All 7 target words were inserted in the final position of one special question and one general question, totally 14 sentences for each word. The sentences were read by 7 Norwegian participants, producing then 98 samples in total. To begin, the pitch contours of interrogative questions produced by participant No.7, No.5 and No.6 will be displayed because they are clearly demonstrative of regular patterns. After that, noteworthy sentences produced by the other participants will be presented. Finally, a short summary will be provided.

4.3.1 Interrogative sentences produced by participant No. 7

In this section, pitch contours of the special questions and the general questions produced by participant No.7 will be presented. Briefly, participant No.7 applied only a rising intonation for all the 14 interrogative sentences.

Figure (51)

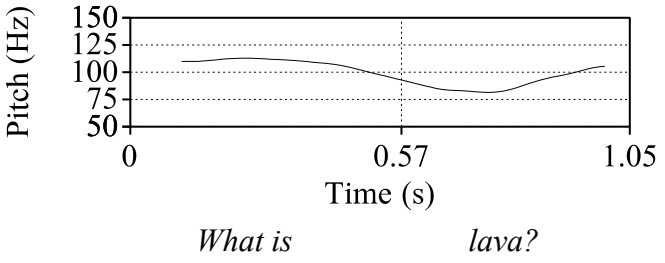


Figure (52)

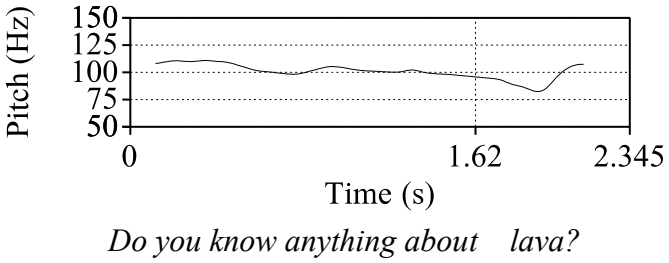


Figure (51) and figure (52) show the pitch contours of two interrogative sentences, *What is lava?* and *Do you know anything about lava?*. As evidenced here, the pitch contours share the same pattern. The target word *lava*, in both sentences, receives a rising pitch, with a low tone (L) assigned to the syllable [ˈlɑː] and a high tone (H) on the syllable [və].

Figure (53)

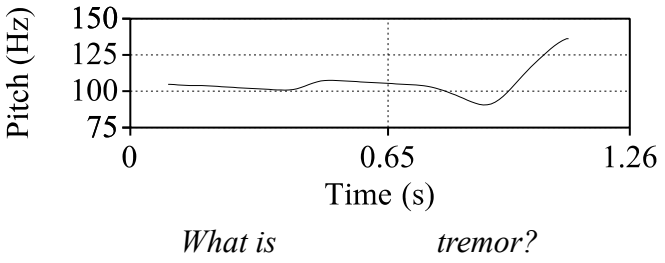
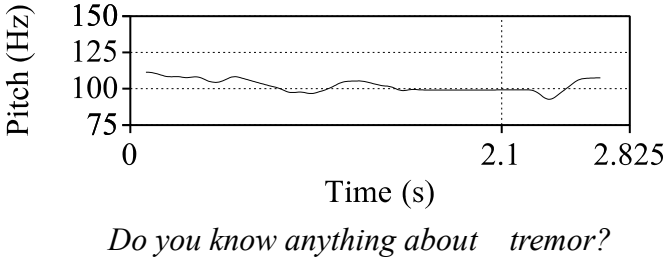


Figure (54)



The pitch contours in figures (53) and (54) display the same pattern as figures (51) and (52). In these two interrogative sentences, the target word *tremor* illustrates a rising pitch, with a low tone (L) attached to the syllable [ˈtre] and a high tone (H) on the syllable [mɚ].

Figure (55)

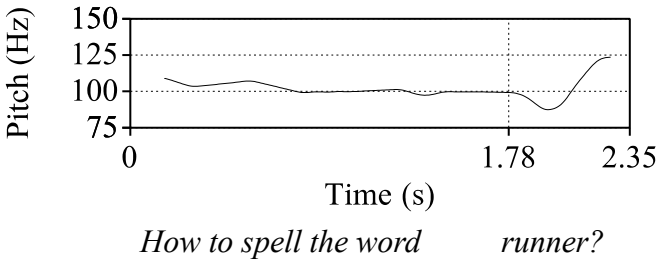
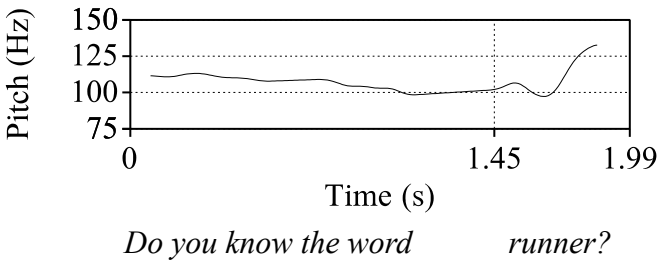


Figure (56)



As figures (55) and (56) shows, in both the special question and the general question, the test word *runner* received a rising intonation, which can be interpreted as an L*H accent. This is realized as a low tone (L) left aligned with the initial stressed syllable [ˈrʌn] and a high tone (H) right aligned with the post stressed syllable [ɚ].

Figure (57)

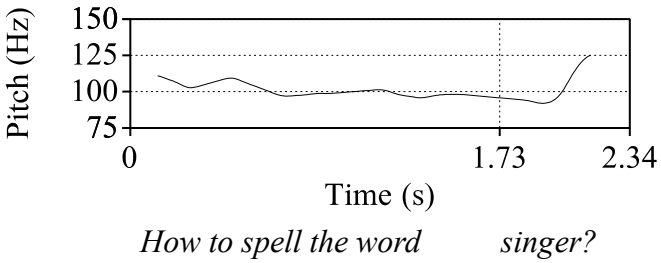
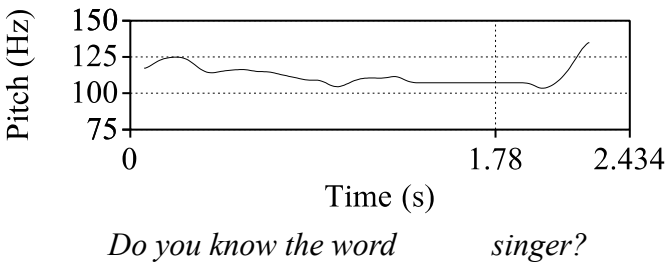


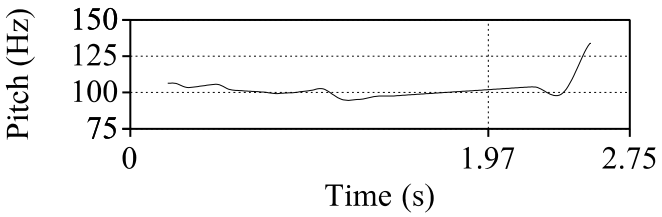
Figure (58)



Do you know the word singer?

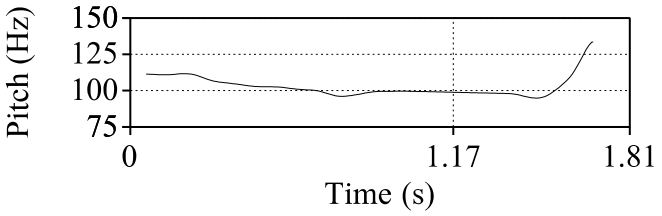
The target word embedded in the interrogative sentences shown in figure (57) and (58) is *singer.* It also has a rising pitch, realized as a low tone (L) to the stressed syllable [sɪŋ] and a high tone (H) to the second syllable [ɚ].

Figure (59)



How to spell the word skier?

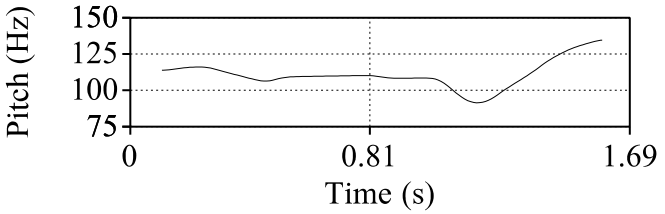
Figure (60)



Do you know the word skier?

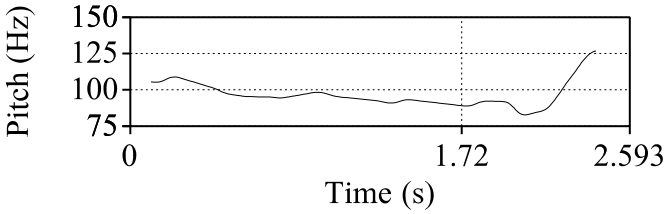
Figures (59) and (60) reveal that, in both the special question and the general question, the target word *skier* is produced with a rising pitch, with a low tone (L) assigned to the stressed syllable [ˈski] and a high tone (H) to the final syllable [ɚ].

Figure (61)



What is accounting?

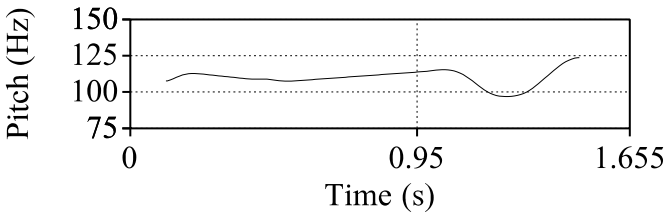
Figure (62)



Do you know anything about accounting?

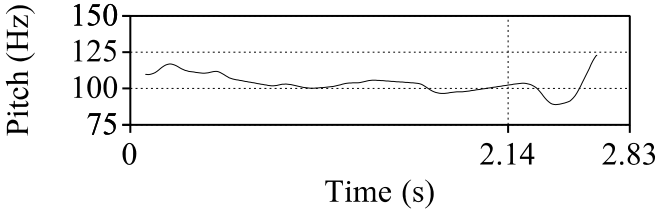
The target word in the questions shown in figures (61) and (62) is the trisyllabic word *accounting.* The word *accounting* in these two sentences receives very similar low-high rising pitches, with a low tone (L) on the stressed syllable [ˈkaʊn] and a high tone (H) on the final unstressed syllable [ɪŋ].

Figure (63)



What is veranda?

Figure (64)



Do you know anything about veranda?

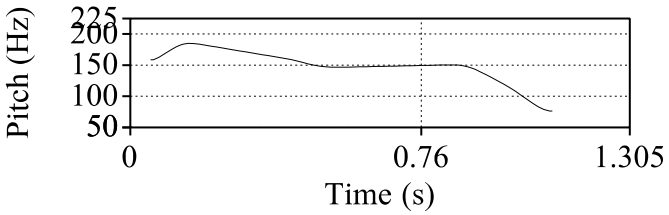
Following the same pattern as the word *accounting,* the other trisyllabic, *veranda,* also received a rising pitch, as it shown in figures (63) and (64). Within the word *veranda,* an obvious low tone (L) was attached to the stressed syllable [ˈræn] and a high tone (H) is easily viewed on the final unstressed syllable [də].

In summation, in this section, we have seen all pitch contours of the 14 interrogative sentences pronounced by the Norwegian participant No.7. A rising intonation for all the sentences is clear, which is realized as an L*H accent on the utterance-final word, with a low tone (L) on the final stressed syllable, followed by a relatively higher tone. The participant consistently pronounced the test sentences with a rising pitch. This trend was seen regardless of whether the question was special or general, of whether the embedded target word was a normal or agent noun, and of how many syllables the target word had. In the next section, the pitch contours of participant No. 5 and No. 6 will be presented; these will exhibit a striking contrast to No. 7.

4.3.2 Interrogative sentences produced by participant No. 5 and No. 6

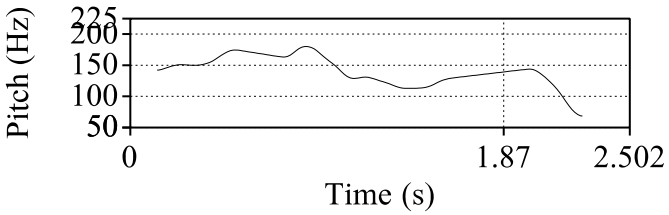
In this section, the characteristics of how participant No. 5 and No. 6 pronounce the special questions and general questions will be displayed. Contrary to participant No. 7, these two participants both employ a falling pitch for all sentences. For the sake of conciseness, only representative pitch contours from these two participants will be presented. 7 test words with 2 different examples for each word, in total 14 interrogative sentences, will be shown.

Figure (65): by participant No.5



What is tremor?

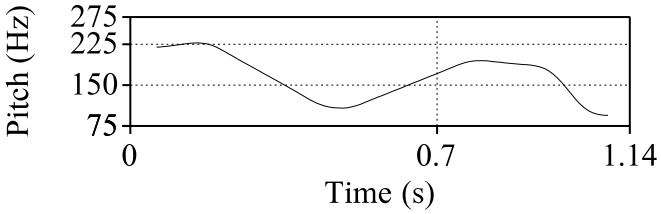
Figure (66): by participant No. 5



Do you know anything about tremor?

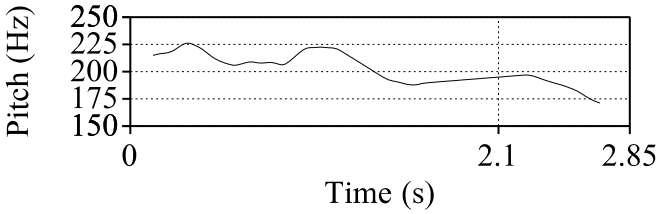
Figures (65) and (66) present how participant No. 5 produced the two interrogative questions. As the pitch contours show, the participant has a falling intonation for both sentences, which is realized as a fall on the stressed syllable of the utterance-final word. The vertical dotted lines mark the test word, *tremor,* which was assigned a high tone (H) on the stressed syllable [ˈtre] and a low tone (L) on the following syllable [mɚ].

Figure (67): by participant No. 6



What is lava?

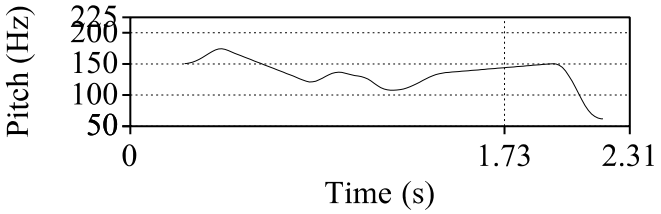
Figure (68): by participant No. 6



Do you know anything about lava?

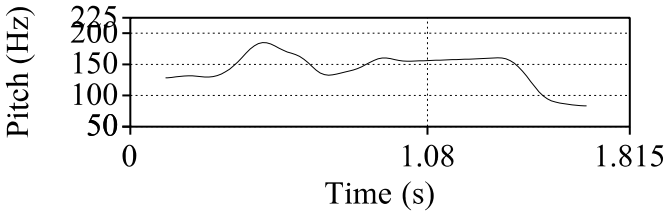
Figures (67) and (68) show the pitch contours of sentences produced by participant No. 6. These two sentences have falling intonation, which is perceived as an H*L accent on the utterance-final word, *lava.* This accent is noted as a high tone (H) left aligned with the stressed syllable [ˈtre] and a low tone (L) right aligned with the end of the word.

Figure (69): by participant No. 5



How to spell the word skier?

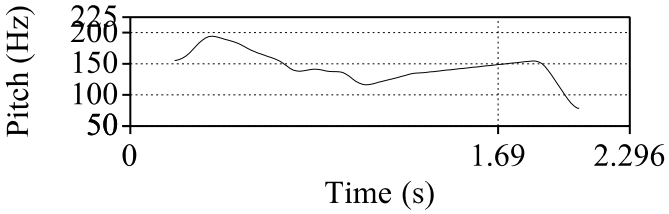
Figure (70): by participant No. 5



Do you know the word skier?

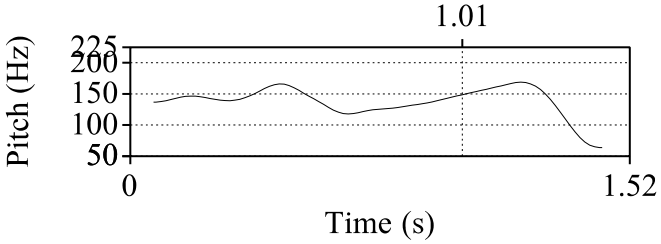
Figures (69) and (70) illustrate the pitches of two questions pronounced by participant No. 5. In both sentences, the target word was *skier*. The test word is clearly endowed an H*L accent, with a high tone (H) on the syllable [ˈski] and a low tone (L) on the syllable [ɚ]. Furthermore, the H*L accent of the word *skier* signaled the falling intonation of the sentences.

Figure (71): by participant No. 5



How to spell the word singer?

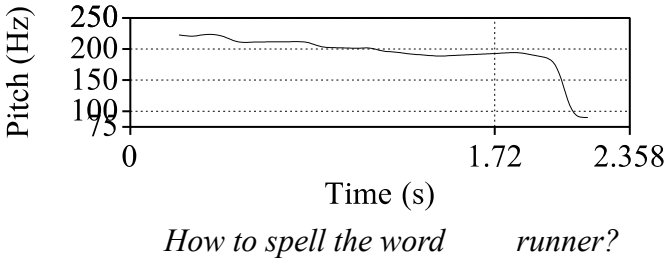
Figure (72): by participant No. 5



Do you know the word singer?

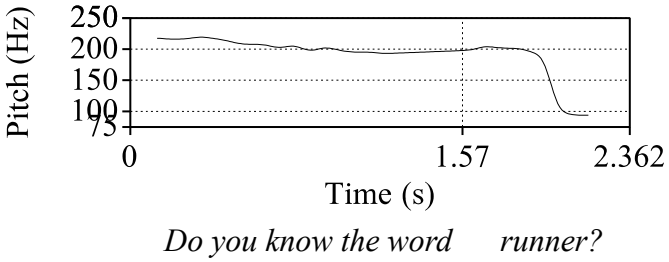
In parallel to the preceding examples, the sentences shown in figures (71) and (72) also have a falling intonation. This is phonetically realized as an H*L accent on the target word *singer,* with a high tone (H) attached to the stressed syllable [ˈsɪŋ] and a low tone (L) right aligned with the end of the word.

Figure (73): by participant No. 6



How to spell the word runner?

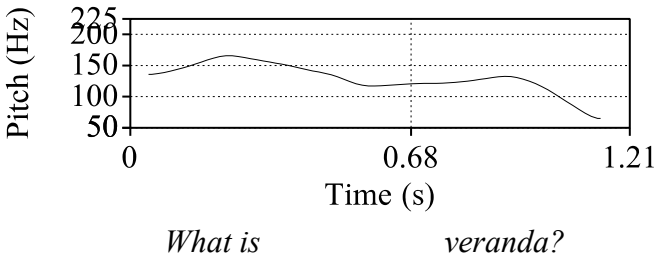
Figure (74): by participant No. 6



Do you know the word runner?

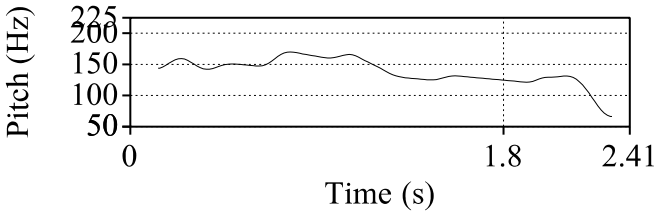
Figures (73) and (74) exhibit another group of interrogative sentences produced by participant No. 6. These graphs show that the participant has a very uniform pattern for the saying the two questions: a flat pitch contour for the first part of the sentence and a falling pitch for the second part. The target word *runner* received a high tone (H) on the initial syllable [ˈrʌn] and a low tone (L) on the second syllable [ɚ].

Figure (75): by participant No. 5



What is veranda?

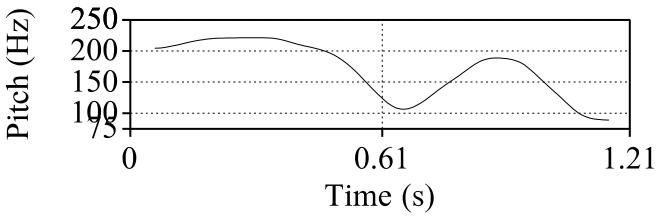
Figure (76): by participant No. 5



Do you know anything about veranda?

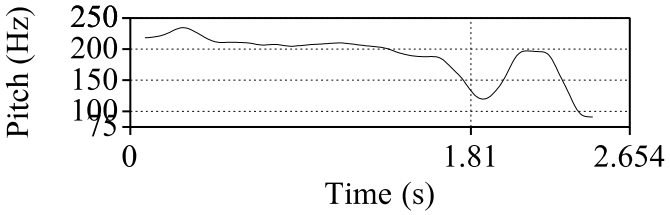
Figures (75) and (76) display the pitch contours of two interrogative questions produced by participant No. 5. As the contours illustrate, the participant has a falling pitch for both sentences, which is realized as a high tone (H) attached to the final stressed syllable [ˈræn] and a low tone (L) on the syllable [də].

Figure (77): by participant No. 6



What is accounting?

Figure (78): by participant No. 6



Do you know anything about accounting?

The interrogative questions pitch contours presented in figures (77) and (78) follow the same pattern as previous figures of this section, both of them have a falling intonation. The pitch contour clearly present that, within the test word *accounting,* the stressed syllable [ˈkaʊn] has a higher pitch, while both the pre-stressed syllable [ə] and post-stressed syllable [t̬ɪŋ] have a relatively lower pitch.

In this section, we have presented 14 pitch contours of interrogative sentences, of which, 7 were special questions and 7 were general questions. These sentences and their pitch contours were identical between participant No. 5 and No. 6, using only falling

intonation for all the interrogative sentences. In these pitch contours, they assign a high tone (H) to the stressed syllable of the word in the utterance-final position. In the coming section, how the other four participants produced these two interrogative sentences will be addressed.

4.3.3 Interrogative sentences produced by the other four participants

In the former two sections, we have shown how the participant No. 7, No. 5, and No. 6. produced the interrogative sentences. In terms of sentence intonation, these three participants demonstrate regular, but distinct patterns. In this section, the performances of the other four participants will be discussed. As a brief summary, participant No. 4 used only a falling intonation for special questions and rising intonation for general questions. The other three participants, No. 1, No. 2 and No. 3, generally followed the same pattern, but provided a few notable exceptions.

Figure (79): by participant No. 1

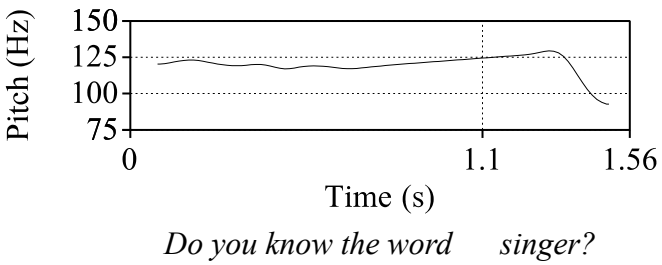
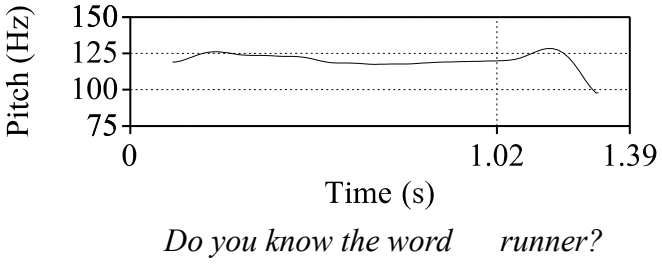


Figure (80): by participant No. 1



These two figures, (79) and (80), show the pitch contours for two general questions, produced by participant No. 1. As the figures demonstrate, the participant has a falling intonation for these two sentences, with a high tone (H) on the stressed syllable of the last word and a low tone (L) on the following syllable.

Figure (81): by participant No. 2

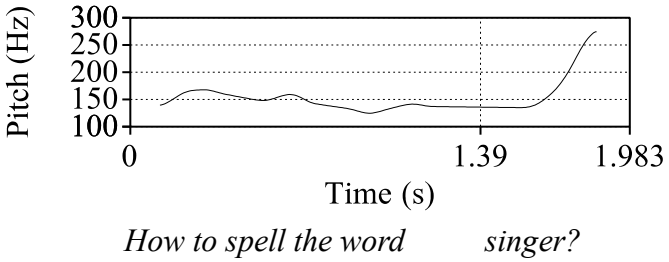
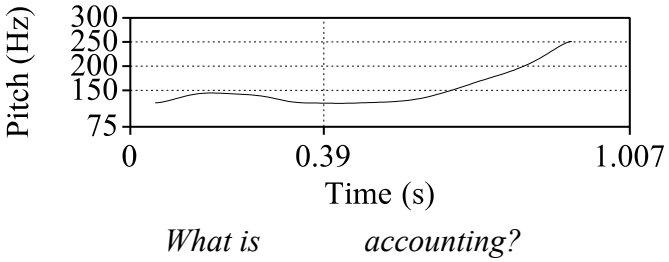


Figure (82): by participant No. 2



Figures (81) and (82) display the pitch contours of two special questions, pronounced by participant No. 2. The participant places a rising pitch on these sentences, with a low tone (L) on the stressed syllable of the final word followed by a syllable with a high tone (H).

Figure (83): by participant No. 3

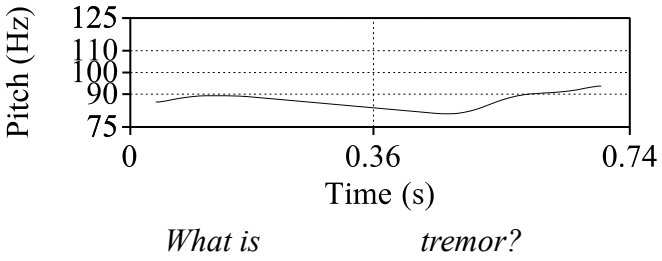


Figure (83) shows the pitch contour of the question *What is tremor?*, as produced by participant No. 3. The graph illustrates that the sentence has a rising intonation, with a low tone (L) on the final stressed syllable [ˈtre] and a high tone (H) on the last syllable[mɚ].

Briefly, with respect to the interrogative sentences, participant No. 1, No. 2, No. 3, and No. 4 use mostly a falling intonation for special questions and a rising intonation for general questions, with the notable exception of the five sentences shown above. Here, participant No. 1 had falling intonation for two general questions, participant No. 2 had

rising intonation for two special questions, and participant No. 3 had rising intonation for one special question

4.4 Summary of the results

Thus far, the test data has been thoroughly presented and reviewed, and the pitch contours of the Norwegian participants and the native-English-speaking participants have been compared. In the following section, an overview of the entirety of the experiment results will be provided.

As previously mentioned, our experiment included 7 target words, with each was placed in the initial, the middle and the final position of separate utterances, and then pronounced by 7 Norwegian participants. Therefore, with respect to the parameter 'position', a total of 7*3*7=147 sample words were collected.

Figure(84)

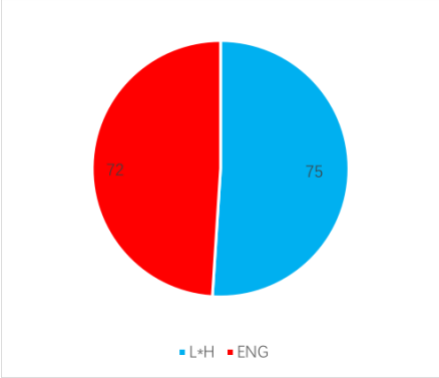


Figure (84) summarizes the accent distribution of the sample words. As illustrated by the pie chart, 75 out of 147 sample words were produced with an L*H accent, the accent which corresponds to Norwegian tonal Accent 1. The other 72 sample words, represented by the red colored sector in the pie chart, were judged as having a native-like English pronunciation. That is to say, these words were produced with a high tone (H) attached to the stressed syllable and lower tones attached to all the other unstressed syllables.

Figure(85)

	Utterance-initial	Utterance-middle	Utterance-final
L*H	40	28	7
ENG	9	21	42

In further detail, figure (85) shows how the Norwegian participants alter their strategies of accent assignments on the target words when they are embedded in different utterance positions. Each of the 7 words was placed in three different utterance position,

and thus, with the 7 Norwegian participants, 49 samples were obtained for each position. As the table shows, when the target word was placed at the utterance-initial position, 40 samples demonstrated an L*H accent, whereas 9 samples were considered as native-like. When placed at the utterance-middle position, 28 target word samples had an L*H accent, whereas 21 samples were deemed native-like. When target words were placed at the utterance-final position, 7 samples showed an L*H accent, whereas 42 samples were judged as native-like. It is important to keep in mind that, of the utterance-final position samples, the L* H accent pattern was limited to a single participant, No. 7, while all the other 6 participants employed the correct, or native-like pronunciation of the target words.

As also mentioned previously, to test the participants, we also placed the target words into two different contexts. Therefore, every Norwegian participant also read 7 special questions and 7 general questions on top of the declarative sentences above. The following figure, (86), provides a summary of how the Norwegian participants produce these interrogative sentences.

Figure (86)
(S=special question; G= general question; f= falling pitch; r=rising pitch.)

	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7
7S	7f	5f/2r	6f/1r	7f	7f	7f	7r
7G	5r/2f	7r	7r	7r	7f	7f	7r

In this table, the special questions are represented by the capital letter 'S' and the general questions are represented by the letter 'G'. The letter 'f' means that the sentence was produced with a falling intonation and the letter 'r' stands for a rising intonation. As the table illustrates, half of the participants applied a regular pattern of intonation to the interrogative sentences. That is, No. 7 had rising intonation for all the 14 questions, No. 5 and No. 6 used only falling intonation, and No. 4 had falling intonation for the 7 special questions and rising intonation for the 7 general questions. However, the other half of the participants demonstrated inconsistent intonation. Of this second cohort, participant No. 1 had falling intonation for two general questions, participant No. 2 had rising intonation for two special question, and participant No. 3 had rising intonation for one special question.

In conclusion, the results of the experiment can be summarized as follows:
1. Participants employed primarily L*H accents on the target words; these L*H accents correspond to Norwegian Accent 1;
2. Participants No. 1 - 6 had L*H accents for some of the target words when the words were placed in the utterance-initial and utterance-middle position, but not when the words were placed in the utterance-final position;
3. Participant No. 7 had L*H accent for all target words in all utterance positions;
4. For all interrogative sentences, Participant No. 5 and No. 6 demonstrated only a falling intonation, the pattern that corresponds to the English declarative pattern;

5. Participant No. 7 had only rising intonation for all the interrogative sentences;
6. Participant No. 4 illustrated falling intonation for special questions and rising intonation for general questions; this was also seen in participants No. 1- 3, with a couple of exceptions.

Chapter 5 Discussion

5.1 Discussion of the experiment results

In the last chapter, the results of the experiment were presented in detail. In this chapter, the results will be discussed with respect to our hypotheses and different accounts in previous literature, so to ascertain whether the hypothesis was fulfilled and thus the Norwegian participants realized their tonal accents onto their English production.

Firstly, figure (84) gives an overall perspective of how Norwegians produced the target words when inserted in declarative sentences. In short, 75 out of 147 sample words, or 51%, were judged as having the L*H accent, with a low tone (L) attached to the main stressed syllable of the word. Moreover, figure (85) shows that most of the L*H accents occur when the test word is placed in the initial or the middle of the utterance; only 7 L*H accents (all produced by participant No. 7) occurred when the test word was inserted in the final position. If only the initial and middle position are taken into consideration, then 68 (40 plus 20) out of 98 sample words (49 for each position) had L*H accent, or 69.4%. Assuming that the majority of our judgements, which tone was assigned to the stressed syllable of the test words, are correct, it can then be said that the L*H accent does occur in the Norwegian participants' English production. The L*H accent pattern has not been seen in the production of the American participants.

We have hypothesized that Norwegians are affected by their L1 tonal accents when they speak English. Previous studies, showing that Asian language speakers transfer their lexical tones/L1 prosodic features to English, support such a hypothesis as it cannot expected that Norwegians are an exception of the power of L1. This is to say that it is unlikely that Norwegians are completely insulated from the influence of their mother language, even though they are known for being widely proficient in, or ‘very good at’ English. The frequent occurrence (51%; 69.4%) of the L*H accent validates our hypothesis to an extent. Based on (1) theories that language similarities and dissimilarities lead to language transfer (Odlin, 1989; Schwartz and Sprouse, 1996) and language interaction (Flege 1995, Best 1995, Best & Tyler (2007), and (2) the fact that Norwegian participants of this study do not speak a third language, it is not unreasonable for us to suspect that these L*H accents come from the participants' L1 prosodic system. As only the Norwegian language allows such pitch pattern (a low tone on the primary stressed syllable); English does not allow this. In addition, because only L*H accent (Accent 1) and no H*LH accent (Accent 2) was found, our second hypothesis, that Norwegians assign an Accent 1 to the target word, even when the word's construction is possible for both Accent 1 and Accent 2, is validated.

Figure (85) also demonstrated that, with respect to the different positions the target words were placed at, Norwegian participants had different accent assignment

strategies. For words at the utterance-initial position and the utterance-middle position, the participants assigned either L* H accent or English-like accent (a high tone on the stressed syllable). For words at the final position, only participant No. 7 had the L* H accent pattern, while the other 6 participants had the correct pronunciation for all the target words.

Based on this phenomenon, it can be reasonably deduced that these 6 participants are aware of the correct way to produce the target words. These participants could have produced all the test words with a high tone (H) on its stressed syllable, just as was done when the words were placed at utterance-final position, however, they did not. This means that, with respect to the tone on the stressed syllable, they altered between a low tone (L) and a high tone (H). In addition, the frequency of the L*H accent suggests that the Norwegian participants produce it regularly. Moreover, because the L*H accent is only found at certain places, this indicates that the Norwegian participants produce it also systematically. The alternation of the tone on the stressed syllable is only permitted in Norwegian, not in English; thus, when this is evident in the Norwegian participants' English production, we can assume it to be a manifestation of the influence of the Norwegian prosodic system.

With regard to participant No. 7, who consistently produced the test words with L* H accent regardless of the position of the target words in the utterance, and, additionally, who was determined to have a strong Norwegian accent when speaking English, we claim that his English prosodic system is deeply affected by his Norwegian prosodic system. The obvious divergence of participant No. 7 from the other 6 participants verifies our hypothesis; that is, the participants are affected in varying degrees by their L1 language. This may be a result of differential exposure to English and differing proficiencies in the English language, in spite of similar backgrounds in terms of area (Oslo) and education.

This divergence was well found in literature, specifically by the results of Ueyama (1997). The 6 participants obviously know the phonological characteristics of the English words, i.e., a high tone (H) on the stressed syllable, as they produced such a pattern for some of the target words in the utterance-initial/middle positions and for all the words in the utterance-final position. However, their L1 phonological regularities were still applied occasionally; such performance corresponds to the performances of the advanced/intermediate learners in Ueyama (1997). This phenomenon (applying the L1 phonological regularities while knowing the L2 phonological characteristics) was interpreted by Ueyama (1997) as the learners mastered the L2 phonological characteristics of English words, but not acquired the L2 phonetical characteristics fully. Meanwhile, the performance of participant No. 7, who uses the L1 categorical pattern everywhere, corresponds to the performance of the beginner learners in Ueyama (1997). The beginner learners performance was interpreted as they not yet having acquired the L2 phonological characteristics.

Other than 'position', we also included 'context' as a parameter to test our participants. The overall results of how Norwegian participants produce the two interrogative sentences were outlined in figure (86). What kind of conclusions can be drawn from a thorough examination of the table? Firstly, the former conclusion can again be drawn, namely that participant No. 7 does indeed realize the Norwegian tonal accent onto his English speech, and thus he is strongly influenced by the Norwegian prosodic system. This judgment is based on the data obtained from No. 7. The participant assigned the L*H accent not only to all of the encountered target, but also to other random words that have a structure able to trigger both Accent 1 and Accent 2. Also, he applied the rising intonation excessively, i.e., on all of the declarative sentences ending with a target word, and on all special and general questions. Moreover, during our manual analysis, his Norwegian accent was easily perceptible. This Norwegian accent can be interpreted as a manifestation of L1 prosody transfer because a foreign accent marks transfer of phonetic and phonological patterns from the first language to the target language (Zsiga, 2013).

Furthermore, even though participant No. 9 also used only a rising intonation for all the special questions, we argue that there is a difference between the performances of these two participants. We believe that the reason for participant No. 9 applying the rising intonation for special questions is that he treated these special questions as sentences conveying the information to 'ask for repetition or clarification of previously known information'. While, we believe the reason for participant No. 7's intonation was his lack of knowledge of English intonation, as he had only rising pitch, and no other intonation varieties, for all the test sentences.

Secondly, participants No. 5 and No. 6 used only falling pitch for both the special questions and the general questions. Recalling figures (31), they also assigned all the target words in the final position a correct H*L pattern. Based on these two facts, it can be deduced that these two participants know the correct tonal pattern of the test words, i.e., a high tone (H) on the stressed syllable. However, both of them still produced occasional L*H accents when the words were placed at the utterance-initial and utterance-final positions. Considering that this L*H accent corresponds with the Accent 1 in Norwegian, and that the participants do not speak a third language, it is logical that this L*H accent was carried from their L1 Norwegian. These results are concert with the results of Ueyama (1997) because participants No. 5 and No. 6 acquired the pitch pattern of the English words, but still applied their L1 knowledge sometimes, likely unconsciously. In addition, the application of falling intonation on all the interrogative questions reveals at least that these two participants have not yet fully acquired the English intonation of interrogative sentences.

Thirdly, participants No. 1, No. 2, No. 3 and No. 4 demonstrated relatively stable patterns for the 14 interrogative sentences. In the majority of instances, they presented a falling intonation for the special questions and a rising intonation for the general questions. Inferring from this, these four participants are likely aware of the

phonological characteristics of the English interrogatives, i.e., they know that the pitch pattern of the utterance-final word should be changed as it emerges in different type of interrogative sentences. Additionally, for the test words placed at the utterance-final position, all four of the participants produced them correctly. From this evidence, it can be concluded that these participants also know the correct pronunciation of the target words. Nevertheless, they still assigned L*H accent to a large number of the sample words inserted at the utterance-initial and utterance-final positions. As this L*H pattern is not allowed on English words, but is a common Norwegian tonal pattern that corresponds to the Accent 1, it can then be argued that the pattern was brought from the L1 Norwegian prosodic system to English by each participant, either consciously or unconsciously.

In the case of participant No. 1, who displayed a falling intonation for 2 general questions, a possible explanation for this performance may be either that the mistakes were made unconsciously or he did not fully acquire the English intonation of interrogatives. For participants No. 2 and No. 3, who had rising intonation for some of the special questions, it is suspected that either these two participants were fully aware that both a rising intonation and a falling intonation can be used for special questions or that they transferred either the L*H accent on the test words, or even that they simply produced these sentences with the Norwegian intonation, where a question always end with a rising pitch. Unfortunately, the answer cannot be realized via the current audio material.

In conclusion, based on the experiment results, we claim that the L*H accents found in the English production of the participants were actually the representation of the Accent 1, as it is transferred from the L1 Norwegian. The next part of this chapter is dedicated to the contributions and limitations of this study.

5.2 Contributions of the study

This current study was primarily motivated by the assumption that L2 learners can suffer from their L1 prosodic system. L1 prosody transfer plays an important role in the acquisition of a second language, as it can contribute to an overt 'foreign accent' with low intelligibility, leading to social discrimination and negative evaluation. Despite the significance of L1 prosody transfer, there is little established research focused on the phenomenon, and the existing research primarily concerns Asian languages. To our best knowledge, there were few, if any, studies that have investigated whether Norwegians are affected by their tonal accents. Therefore, this thesis can service as a pioneer case study on this issue, providing a large number of pitch contour samples with detailed descriptions on how Norwegians speak English. Hopefully, this will inspire further research interests within this domain.

In addition, based on the results of this study, there is little doubt that Norwegians transfer their tonal accent (L*H) to English. Moreover, accent transfer can assumed to

be common as the rate of accent transfer is not so low as to be considered unsubstantial. Also, based on manual perception, this transferred L*H accent does weaken the intelligibility of their English speech. For speakers with production akin to that of participant No. 7, their speech may be difficult for listeners to understand . These experimental findings serve as a reminder that tonal accent transfer has a great influence on L2 production, i.e., it causes accentedness and thus costs comprehensibility. Moreover, L1 prosody transfer does not only occur in Asian languages, but can also happen in European languages. Therefore, it may be beneficial for English teachers and English learners in these countries to be aware of and even attend to the prosodic similarities and dissimilarities between the native and target language, so as to minimize the possible crosslinguistic influence.

Furthermore, the results of our study show that, with respect to the L1 tonal accent transfer, the overall performance of our participants followed the same trajectory as the Japanese speakers in the Ueyama (1997) study. That is, with respect to the acquisition of the L2 speech system, the learners always resort to their L1 before they fully acquire the target language's system. Finally, this study also reveals that some of the Norwegian participants have problems with the intonation of the English interrogative sentences. This is an interesting topic for further study and deserves extra attention in relevant pedagogy.

5.3 Limitations of the study

This study has several limitations. One limitation is that the size of the experiment was relatively small, with only had 9 participants in total, 7 of which are Norwegian speakers and 2 of which are native American-English speakers. Recruitment for this study was difficult for several reasons. Firstly, the author of the study lives in Trondheim, but the research object was Urban East Norwegian, a dialect spoken in the Oslo area. Secondly, despite the recruiting advertisement being posted on social media, few subjects were willing to take the job without compensation. Therefore, the number of participants was limited due to financial reasons. Size was also limited for target word samples. In order to avoid experimental fatigue and list intonation, only 35 sentences could be included in the reading test. Due to the small sample size, the results of this study can only be considered preliminary. Future studies should endeavor to include more participants, so that the results are more accurate and reliable.

A second limitation arises in the reliability of the study as knowledge of participants' educational background information and English proficiency was limited. A formal English proficiency test and a background survey was not included, but rather information on these parameters was obtained via casual communication with the participants before the read-speech test. Thus, this limitation may decrease the reliability of the information.

A third limitation is that, the results of the experiment could suffer from subjective factors. For instance, despite the author attempting to placate participants' nervousness or stress before the test, some of the participants were still uncomfortable with the experimental environment. As a result, they became extra careful in their pronunciation of each sentence. Additionally, the judgements of which tones were attached on the test words were done manually and by the author alone, as it was a personal thesis study. Although the author is a native Mandarin Chinese speaker, with a strong grasp of tones and tonality, it cannot be guaranteed that the judgements were error-free. Future studies should include a focus on more interactive and less repetitive experiments, so as to ensure a more natural L2 speech. This is in accordance with the previous recommendation that, in order to further probe the tonal accent transfer of the Norwegian language, a bigger project with a larger data set and more evaluators are recommended.

A fourth limitation is that the contingency/coincidence of the research results cannot be ruled out. That is, it cannot be proved unambiguously that all of the participants produced the Norwegian Accent 1. Even though the results show that all of the participants had L*H accent on the test words, and these L*H accents corresponded to the Norwegian Accent 1, it is also possible that these L*H accents only resemble the Norwegian Accent 1. While this is unlikely, the possibility cannot be eliminated.

Finally, the study is incomplete, i.e., unanswered questions remain and even others have arisen. For instance, most of the participants had L*H accent on the test words only when the words were inserted in the initial/middle positions of an utterance. Why was L*H accent not found on the words in the utterance-final position? Our study cannot answer this question. It was also noted that several mistakes were made by participants No. 1, No. 2, and No. 3 in the intonation of the interrogative sentences. It could not be answered from the data whether the mistakes were triggered by L1 transfer or occurred because participants lack the related L2 intonation knowledge. Neither of these questions can be answered by the data we obtained; they therefore require further study.

Chapter 6 Summary

This study investigated L1 prosodic transfer in L2 acquisition. More specifically, the research question was whether Norwegians tonal accent patterns can influence their L2 English production. The research interests were originated from previous claims and research which suggests that language similarities and dissimilarities give rise to crosslinguistic influence, and the transferred linguistic patterns from the first language play a great role in the second language (Rod 1994, Odlin 1989). The two research languages, Norwegian and English, differ in the way they apply the pitch, the former using pitch to indicate lexical contrast and the latter utilizing it to covey pragmatic differences. Therefore, it was of interest to check whether this dissimilarity causes any prosodic transfer.

To answer the research question, 7 Norwegians (as the research object) and 2 Americans (as the control group) were recruited for a designed reading experiment, which included 35 English sentences. Their reading speech was recorded for later analysis. The speech material was mainly processed by a combination of Praat and manual analysis. The main results of the experiment answered the research questions and verified the research hypotheses, that is, the Norwegians participants were affected by their L1 prosodic system, as they brought the Accent 1 (L*H) into their English speech. These participants were influenced by their L1 in different degrees, as they showed individual differences.

This study contributes to our understanding of crosslinguistic influence (CLI), confirming that, even in countries with high English proficiency, certain prosodic features can be carried from leaners' first language to their English, thus causing non-native-like speech. Therefore, during one's second language acquisition process, extra attention should be paid to the L1 prosody transfer.

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Appendix

Appendix 1 The list of test words

lava	[ˈlɑː.və]
tremor	[ˈtrem.ɚ]
skier	[ˈskiː.ɚ]
runner	[ˈrʌn.ɚ]
singer	[ˈsɪŋ.ɚ]
accounting	[ə.ˈkaʊn.t̚ɪŋ]
veranda	[vəˈræn.də]

Appendix 2 The list of test sentences

Lava is made up of crystals.
I think that lava is very dangerous.
This is called lava.
What is lava?
Do you know anything about lava?

Tremor is an involuntary shaking movement.
I believe that tremor is not life threatening.
This is called tremor.
What is tremor?
Do you know anything about tremor?

Skier is the word I want you to say.
Say the word skier again.
I'm asking you to say the word skier.
How to spell the word skier?
Do you know the word skier?

Runner is the word I want you to say.
Say the word runner again.
I'm asking you to say the word runner?
How to spell the word runner?
Do you know the word runner?

Singer is the word I want you to say.
Say the word singer again.
I’m asking you to say the word singer?
How to spell the word singer?
Do you know the word singer?

Accounting is a control system.
I believe that accounting is the language of business.
I'm very interested in accounting.
What is accounting?
Do you know anything about accounting?

Veranda is an outdoor porch.
I know that veranda is a popular thing.
This is called veranda.
what is veranda?
Do you know anything about veranda?

Appendix 3 The results of the experiment

(I=Utterance-initial; M=Utterance-middle; F=Utterance-final; S=special question; G= general question; f= falling intonation; r=rising intonation.)

Words	No. 1	No.2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9
lava-I	ENG	L*H	L*H	L*H	L*H	L*H	L*H	ENG	ENG
lava-M	ENG	L*H	L*H	L*H	ENG	L*H	L*H	ENG	ENG
lava-F	ENG	ENG	ENG	ENG	ENG	ENG	L*H	ENG	ENG
lava-S	f	f	f	f	f	f	r	r	r
lava-G	r	r	r	r	f	f	r	r	r
tremor-I	L*H	L*H	L*H	L*H	ENG	L*H	L*H	ENG	ENG
tremor-M	L*H	ENG	ENG	L*H	ENG	L*H	L*H	ENG	ENG
tremor-F	ENG	ENG	ENG	ENG	ENG	ENG	L*H	ENG	ENG
tremor-S	f	f	r	f	f	f	r	f	r
tremor-G	r	r	r	r	f	f	r	r	r
skier-I	L*H	ENG	L*H	L*H	L*H	L*H	L*H	ENG	ENG
skier-M	L*H	ENG	ENG	ENG	ENG	ENG	L*H	ENG	ENG
skier-F	ENG	ENG	ENG	ENG	ENG	ENG	L*H	ENG	ENG
skier-S	f	f	f	f	f	f	r	r	r
skier-G	r	r	r	r	f	f	r	r	r
runner-I	L*H	L*H	L*H	L*H	L*H	L*H	L*H	ENG	ENG
runner-M	L*H	ENG	ENG	L*H	ENG	L*H	L*H	ENG	ENG
runner-F	ENG	ENG	ENG	ENG	ENG	ENG	L*H	ENG	ENG
runner-S	f	f	f	f	f	f	r	r	r
runner-G	f	r	r	r	f	f	r	r	r
singer-I	L*H	ENG	L*H	L*H	L*H	L*H	L*H	ENG	ENG
singer-M	L*H	L*H	ENG	ENG	ENG	ENG	L*H	ENG	ENG
singer-F	ENG	ENG	ENG	ENG	ENG	ENG	L*H	ENG	ENG
singer-S	f	r	f	f	f	f	r	f	r
singer-G	f	r	r	r	f	f	r	r	r
accounting-I	L*H	ENG	L*H	L*H	ENG	L*H	L*H	ENG	ENG
accounting-M	L*H	ENG	L*H	L*H	L*H	L*H	L*H	ENG	ENG
accounting-F	ENG	ENG	ENG	ENG	ENG	ENG	L*H	ENG	ENG
accounting-S	f	r	f	f	f	f	r	f	r
accounting-G	r	r	r	r	f	f	r	r	r
veranda-I	ENG	L*H	ENG	L*H	ENG	L*H	L*H	ENG	ENG
veranda-M	L*H	ENG	ENG	L*H	ENG	L*H	L*H	ENG	ENG
veranda-F	ENG	ENG	ENG	ENG	ENG	ENG	L*H	ENG	ENG
veranda-S	f	f	f	f	f	f	r	f	r
veranda-G	r	r	r	r	f	f	r	r	r

Appendix 4 The consent form

Inquiry for participation in a research project

This is an inquiry about participation in a research project where the main purpose is to be able to say something about Norwegian's English. In this letter we will give you information about the purpose of the project and what your participation will involve.

Purpose of the project
This project is one part of a master's thesis, the main purpose is to be able to say something about Norwegian's English.

Who is responsible for the research project?
UiT Norges arktiske universitet / Institutt for språk og kultur is the institution responsible for the project.

Why are you being asked to participate?
You being asked to participate because you fulfill the test requirements:
You are Norwegian adult.
You can speak English.

What does participation involve for you?
If you chose to take part in the project, this will involve that you read 35 short English sentences, while been sound recorded. The task takes around 15-30 mins, and you will get 200 kr as payment. The recording will be used for acoustic and phonological analyses.

Participation is voluntary
Participation in the project is voluntary. If you chose to participate, you can withdraw your consent at any time, on the condition that you return the payment. All information about you will then be made anonymous. There will be no negative consequences for you if you chose not to participate or later decide to withdraw.

Your personal privacy – how we will store and use your personal data
We will only use your personal data for the purpose(s) specified in this information letter. We will process your personal data confidentially and in accordance with data protection legislation (the General Data Protection Regulation and Personal Data Act).
• No personal data will be collected, apart from the voice recordings.
• The recordings will only be used for acoustic and phonological analyses of speech melodies in the thesis. It will not be possible to use these analyses to identify individuals.
• The consent form cannot be linked to individual recordings, as your name will be replaced with a code.

What will happen to your personal data at the end of the research project?
• Your personal data (the recordings) will be deleted when the project has been finished. The project is scheduled to end [15.09.2020].

Your rights
So long as you can be identified in the collected data, you have the right to:
- access the personal data that is being processed about you
- request that your personal data is deleted
- receive a copy of your personal data (data portability), and

Appendix 5 NSD's assessment

NSD NORSK SENTER FOR FORSKNINGSDATA

NSD's assessment

Project title

Pitch accent realization in English production of Norwegian speakers

Reference number

537741

Registered

28.02.2020 av tianjiao huang - zoe070406039@163.com

Data controller (institution responsible for the project)

UIT – Norges Arktiske Universitet / Fakultet for humaniora, samfunnsvitenskap og lærerutdanning / Institutt for språk og kultur

Project leader (academic employee/supervisor or PhD candidate)

Martin Krämer, martin.kramer@uit.no, tlf: 77646501

Type of project

Student project, Master's thesis

Contact information, student

TIANJIAO HUANG, thu034@uit.no, tlf: 94096568

Project period

30.03.2020 - 15.09.2020

Status

25.03.2020 - Assessed

Assessment (1)

25.03.2020 - Assessed

Our assessment is that the processing of personal data in this project will comply with data protection legislation, so long as it is carried out in accordance with what is documented in the Notification Form

and attachments, dated 25.03.2020. Everything is in place for the processing to begin.

NOTIFY CHANGES
If you intend to make changes to the processing of personal data in this project it may be necessary to notify NSD. This is done by updating the information registered in the Notification Form. On our website we explain which changes must be notified. Wait until you receive an answer from us before you carry out the changes.

TYPE OF DATA AND DURATION
The project will be processing general categories of personal data until 15.09.2020.

LEGAL BASIS
The project will gain consent from data subjects to process their personal data. We find that consent will meet the necessary requirements under art. 4 (11) and 7, in that it will be a freely given, specific, informed and unambiguous statement or action, which will be documented and can be withdrawn. The legal basis for processing personal data is therefore consent given by the data subject, cf. the General Data Protection Regulation art. 6.1 a).

PRINCIPLES RELATING TO PROCESSING PERSONAL DATA
NSD finds that the planned processing of personal data will be in accordance with the principles under the General Data Protection Regulation regarding:

- lawfulness, fairness and transparency (art. 5.1 a), in that data subjects will receive sufficient information about the processing and will give their consent
- purpose limitation (art. 5.1 b), in that personal data will be collected for specified, explicit and legitimate purposes, and will not be processed for new, incompatible purposes
- data minimisation (art. 5.1 c), in that only personal data which are adequate, relevant and necessary for the purpose of the project will be processed
- storage limitation (art. 5.1 e), in that personal data will not be stored for longer than is necessary to fulfil the project's purpose

THE RIGHTS OF DATA SUBJECTS
Data subjects will have the following rights in this project: transparency (art. 12), information (art. 13), access (art. 15), rectification (art. 16), erasure (art. 17), restriction of processing (art. 18), notification (art. 19), data portability (art. 20). These rights apply so long as the data subject can be identified in the collected data.

NSD finds that the information that will be given to data subjects about the processing of their personal data will meet the legal requirements for form and content, cf. art. 12.1 and art. 13.

We remind you that if a data subject contacts you about their rights, the data controller has a duty to reply within a month.

FOLLOW YOUR INSTITUTION'S GUIDELINES
NSD presupposes that the project will meet the requirements of accuracy (art. 5.1 d), integrity and confidentiality (art. 5.1 f) and security (art. 32) when processing personal data.

If you are using a data processor in the project, the processing must meet the requirements under the General Data Protection Regulation arts. 28 and 29.

To ensure that these requirements are met you must follow your institution’s internal guidelines and/or consult with your institution (i.e. the institution responsible for the project).

FOLLOW-UP OF THE PROJECT
NSD will follow up the progress of the project at the planned end date in order to determine whether the processing of personal data has been concluded.

Good luck with the project!

Data Protection Services for Research: +47 55 58 21 17 (press 1)