L2 English spelling error analysis
An investigation of English spelling errors made by Swedish senior high school students

Felstavningsanalys i engelska som andraspråk
En undersökning av stavfel i engelska gjorda av svenska gymnasieelever

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Abstract
Proper spelling is important for efficient communication between people with different first languages in the 21st century. While Swedish functions as an intranational language within Sweden, it sees little to no use outside of Scandinavia. English fills the role as a second language that all Swedish students must learn, yet more focus appears to be given to grammar rather than spelling. Spelling is important and knowing the kinds of spelling errors Swedish learners of English tend to make can help educators improve the spelling proficiency of their students. The aim of this study is to investigate the spelling errors made by senior high school students in Sweden by analyzing a collection of essays written by students and gathered in the Uppsala Learner English Corpus (ULEC). The results of this study show that spelling proficiency nearly doubled for students in their third year in senior high school compared to their first year, yet the distribution of spelling errors remained the same. Additionally, some particular sounds that appear to be especially problematic for Swedish spellers were identified, such as /ɔ/, /l/, /s/ and /k/.

Keywords: Spelling error analysis, misspellings, English as a Foreign Language (EFL), Second Language Acquisition (SLA), Swedish learners of English, learner English, English spelling

Sammanfattning på svenska

Nyckelord: Felanalys av stavning, stavfel, English as a Foreign Language (EFL), Second Language Acquisition (SLA), svenska elever i engelska, learner English, engelsk stavning
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1. Introduction and aims

In the 21st century, where access to computers and the internet grow more and more widespread, English has taken a central role in international communication. This has made it important for regular people, not just politicians or businessmen, to learn English as a second language (L2) (for a more detailed definition of the term L2, see section 2.3 below). English is currently the main lingua franca in the world (van Gelderen, 2014, p. 251), and as such it is the most predominantly used language for bridging the communicational gap for people with different first languages. As it stands, English has more non-native speakers than any other language in the world, and is only surpassed by Chinese as having the most native speakers (Trudgill and Hannah, 2013, p. 7). Despite the fact that the English language is so wide-spread, it has an orthography, or writing system, which is hard to learn. Because most communication on the internet is done through writing, it has become vitally important to be able to properly express oneself through not just syntactically correct sentences, but with correct spellings as well.

Very few studies have been carried out on L2 user spelling mistakes (Cook, 1997, p. 474), and more attention has been directed at reading (Figueroedo, 2006, p. 874). The findings of such research could help educators determine what words, if any, to put more focus on when teaching English spelling to students. Thus, it is an important area of research.

The aim of this study is to investigate the spelling errors made by Swedish learners of English and to see if there are any emergent patterns in the misspelled words. The questions I intend to answer are fourfold:

1) What kinds of errors do Swedish learners of English make most frequently?
2) What kinds of words are most problematic for Swedish learners of English to spell correctly? (E.g., do the spelling errors occur most often in words with Germanic, Latin or French origin? Do they occur in high- or low-frequency words?)
3) Are some phonemes more problematic than others?
4) Do some types of errors, words or pronunciations appear to be more problematic for first-year students than for third-year students studying English in senior high school?

To be able to answer the research questions, a number of student essays from a corpus of learner English were investigated for spelling errors. The gathered data was then categorized and analyzed in order to answer the research questions.
2. Background

This section will first give a brief overview of English spelling and present reasons for why there is a disconnect between how words are pronounced and the way they are spelled. Then English orthography will be discussed, followed by a discussion of the process of learning a second language known as second language acquisition and the concept of language transfers. Lastly, the different kinds of spelling errors made by L2 users as presented in the literature, will be described and discussed.

2.1 History of English spelling

The English language has had a number of influences from different languages throughout its history that have contributed to making English what it is today. The Old English period began when the Angles, Saxons and Jutes invaded the British Isles in 449 CE, which led to an influence of different, but closely related, Germanic dialects on the Celts, creating the English language (Fennell, 2006, p. 56). During this time period, the English language was also influenced by Scandinavian languages, due to the invading Vikings, of which speakers of English borrowed many everyday words, such as egg, sister and sky, as well as some pronouns, prepositions and adverbs, indicating a “more intimate intermingling of the two languages” (Fennell, 2006, pp. 91-92). The Middle English period began with the conquest of England by William the Conqueror in 1066, which led to the introduction of many French loanwords such as cousin, niece, justice and siege (Fennell, 2006, pp. 106-108), as well as of French non-phonetic spellings, such as the silent word ending -e. This period also marked changes in grammatical structure, from relying on morphological markings to relying on word order (Fennell, 2006, p. 2)

It was not until the Early Modern English period, which began in the 16th century, that the English language saw fundamental changes to its spelling of words, much thanks to The Renaissance (further explained below) and technological advancements such as the invention of the printing press. Not only did the spelling of words change, but so too did the pronunciation due to the Great Vowel Shift. Before this time period, authors mostly spelled the words the way they sounded (Paine, 1920, p. 3). However, because of the printing press, a movement to standardize English spelling took place with the creation of the first English dictionaries (Fennell, 2006, p. 157). Fennel argues that at this time, the standardization did not change the words very much (Fennell, 2006, p. 158). However, it is worth noting that the first printing press operators were Dutch, who had little knowledge of English and unintentionally changed some of the spellings of words, for example, by adding an h in words such as
ghost (from the Dutch gheest), as well as in ghess and ghest which would later have the h replaced by a u under French influence (Paine, 1920, p. 4).

The Renaissance was both a cultural and an intellectual movement which was marked as a time of freedom and ideas, which meant a “freedom in creating and borrowing words” (van Gelderen, 2014, p. 159), particularly from Latin and Greek, and saw much change in the spelling of many words based on their etymology. Another reason for the inconsistencies between spelling and pronunciation during the Early Modern English period was The Great Vowel Shift, which was a major phonological change in the language, which basically meant that that all non-high vowels rose one height, and the highest vowels became diphthongs. For example, the /eː/ in beet became /iː/, and consecutively the /iː/ in bite became /aɪ/ (Fennell, 2006, pp. 159-161). While The Great Vowel shift mostly affected pronunciation of vowel sounds, more recent phases of it have also caused the spelling system of English to appear “less phonemic in character” (Fennell, 2006, p. 158).

2.2 English orthography

The changes to the English language discussed above have had a profound impact on its orthography. An orthography, or the spelling system of a language, can be defined as either deep or shallow. In a shallow orthography there is a much closer correspondence between spelling and pronunciation than in a deep one. The orthographic depth of the English language is considered to be deep, or opaque, with a complex syllable structure which influences pronunciation of vowels, as well as having “inconsistent grapheme-phoneme relationships” (Russak and Kahn-Horwitz, 2015, p. 310) both in terms of spelling and pronunciation. According to Sun-Alperin and Wang (2008), this means that a single letter can be represented by several different phonemes, such as <a> being represented by /æ/ in apple, /eɪ/ in apron, /aː/ in car or /ɔː/ in alive (p. 933). Conversely, a single phoneme can be represented by several different letters or combinations thereof, such as /ei/ being represented by <ai> in aid, <ay> in bay, <a-e> in pale or <eigh> in weigh (Sun-Alperin and Wang, 2008, p. 933).

In contrast, in a language with a shallow, or transparent, orthography, such as Finnish, there is a near 1:1 correspondence between spoken and written language. The Swedish language is considered to have a fairly shallow orthography with a somewhat complex syllable structure (Duncan et al., 2013, pp. 402-403). Achieving proficiency in reading and writing in a shallow orthography is easier than in a deep orthography, as it is often sufficient to only learn basic phoneme-grapheme conversion rules in order to achieve that goal. For users of an opaque orthography it is different, as they need to not only memorize which grapheme corresponds with which phoneme, “but also for units of larger sizes, such as rhymes or even whole words” (Dich and Pedersen, 2013, p. 52). This means that spelling acquisition becomes an almost lifelong endeavor for learners of English due to the deep and complex
nature of the English orthography (Russak and Kahn-Horwitz, 2015, p. 310). However, Dich and Pedersen (2013, p. 60) argue that unpredictable phoneme-grapheme correspondences do become predictable when considering these units of larger sizes. They also argue that spellers of English become sensitive to orthographic patterns of this nature because, for them, “a rhyme represents an operational unit” (Dich and Pedersen, 2013, p. 60), such as the phoneme /e/ being most frequently represented by the graphemes <ai>, as in rain, because “in English, phonological coda often conditions the spelling of the vowel” (Dich and Pedersen, 2013, p. 60).

2.3 Second language acquisition and transfer

Second language acquisition (SLA) refers to the process in which a person learns a new language that is different from their first language (L1). A person’s L2 does not necessarily have to be a second language, but can refer to any language that is learned after the first, either inside or outside the classroom environment, and Second Language Acquisition is also the name for the study of acquiring a L2 (Ellis, 1997, p. 3).

Learning English as a second language (ESL) is very common in the world, especially among children learning English in schools in English-speaking countries while, for example, speaking another language at home, as well as for immigrants to English-speaking countries who go to English classes (Figuero, 2006, p. 874). Learning English as a foreign language (EFL) refers to the learning and use of English in countries where it is not the L1, and is mainly used for international rather than intranational communication (Mesthrie and Bhatt, 2008, p. 5). Sweden, as well as a few other nations, seems to be in a position somewhere in between ESL and EFL. Although English is widely used in Sweden, it is “in a relation with Swedish that cannot be considered diglossia” (Mesthrie and Bhatt, 2008, p. 222), since Swedish is still primarily used in education and politics in Sweden.

Language transfer occurs when a person’s knowledge of one of their languages has an effect on another. Transfers can be positive as well as negative, and occur in both directions (Kusuran, 2016, p. 5). Positive transfer can occur in instances where common features exist between the L1 and L2, whereas negative transfer can occur where language-specific knowledge in the L2 is required but has not been acquired by the learner, which could lead to knowledge of spellings in the first language to be wrongfully applied in the spellings of the second language, resulting in errors (Figuero, 2006, pp. 880-881). Figueredo (2006) argues that differences in orthographic depth between a learner’s L1 and L2 restrict knowledge about grapheme-phoneme correspondences that can be transferred (p. 887). L2 learners of English whose L1 has a shallow orthography can find it very difficult to learn certain characteristics of the English language, “such as the different representations of /k/ in cat, kite, sack,
and plaque” (Figueroedo, 2006, p. 887), and that this, along with effects on pronunciation, might result in misspellings of words.

2.4 Spelling errors by L2 users

In a discussion about spelling errors, it is important to distinguish between errors and mistakes. Spelling errors are when a learner consistently makes the same misspellings over and over again, because they do not know what is correct. Spelling mistakes, on the other hand, are when a learner only occasionally misspells a word which they most of the time spell correctly (Ellis, 1997, p. 17). In this section, I will use the term errors for the examples, but they might as well be seen as common spelling mistakes for most L2 users that have reached a certain degree of proficiency. It is worth noting that some of the examples in this section were taken from a study by Cook (1997), which was done using participants with varying L1s, such as French, Japanese, Greek, Spanish, Russian, Hebrew, Urdu, Chinese and Arabic, to name a few. The examples of misspellings provided by Swan and Smith (2001) were of Scandinavian (in some cases specifically Swedish) learners of English.

The spelling errors that people make can be divided into two types; typographic errors and cognitive errors. The former includes errors such as letter insertions, letter omissions, letter substitutions and transpositions, whereas the latter stems from phonetic similarities such as writing *acedemy1 instead of academy (Yanyan, 2015, p. 1629). Letter insertions, letter omissions, letter substitutions and transpositions, as well as problems with spelling compound words and use of the apostrophe, will be discussed in more detail below.

Letter insertions are spelling errors where one additional letter is included in the spellings of words. One of the most common insertions are known as consonant doublings, which include errors such as <gg> in *aggreement, <ff> in *proffessional or <ll> as in *allready or *carefull, and are considered “one of the most complex areas of the English spelling system” (Cook, 1997, p. 483). Other common insertions for L2 users include the insertion of <e> after <i> (as in <ie>) for sounds corresponding to /aɪ/ in misspellings such as *priemary or *dierect (Cook, 1997, p. 484). Insertions typical for Swedish learners of English include writing <sch> instead of <sh> due to influence from Scandinavian loan-words of German origin, which can lead to misspellings such as schoot (Swan and Smith, 2001, p. 26).

Letter omissions are spelling errors where one letter in a word is not spelled out. According to Cook (1997), the most common letter omitted by L2 users is <n> when it is used within consonant clusters, such as with the misspelling *desigs (p. 483). Other common errors include the omission of one

1 The use of an asterisk (*) in this, as well as the following sections, indicates that the word is an example of an incorrectly spelled word.
consonant in a pair of consonants, such as the omission of <c> from the consonant pairs <cq> in misspellings like *aquisition, or the <sh> from <ch> or <gh> in misspellings such as *scolarship or *thoug. Another common omission by L2 users is the silent word-final <e>, in misspellings such as *morphem and *softwar, as well as when it precedes <ly> in *unfortunatly or *completly (Cook, 1997, pp. 483-484).

Letter substitution is one of the most common errors that both L1 and L2 users make. According to Cook (1997), these errors are divided into either substitutions of single letters, or as grapheme substitutions of multiple related changes, for example writing *thort instead of thought (p. 479). Cook (1997) argues that the most common vowel substitutions occur with the letters <a>, <e>, and <i>, for example, <a> may be replaced by <e> and <i> resulting in *persueded and *imaginitive, <e> can be replaced by <a> and <i> resulting in *machinary and *convinient, and <i> can be replaced by <a> and <e> resulting in *languistics and *definitly (p. 481). One of the reasons why these vowel substitutions are so common among L2 users of English is because nearly half of them can be pronounced as schwa /ə/ (Cook, 1996, p. 481).

Consonant substitutions are more common for L2 users than L1 users, and the most common errors involve the consonants <s>, <c>, <z> and <t>, resulting in misspellings such as *immence, *influencial or *amasing (Cook, 1997, p. 482). According to Swan and Smith (2001), common Scandinavian consonant substitutions include the replacement of <v> by <w>, producing misspelling such as *wery or *wolleyball, because these spellings are perceived to sound more English (p. 26). The letter <k> is also used more frequently than the letter <c> in Scandinavian languages, which can be transferred to misspell words such as *kapitalism or *kannibal (Swan and Smith, 2001, p. 26).

Transpositions are spelling errors of words where two consecutive letters change place. Cook (1997) claims that one of the most common transposition errors occur with the letter pairs <e> and <i>, producing errors such as *concieved, *acheived or *foreigner (p. 484). The transposition of the letter pairs <t> and <e> are also common and can lead to well-known confusions of homophones such as spelling discrete as *discreet, or near-homophones such as spelling quite as *quiet (Cook, 1997, p. 485).

Compounding is the process of combining two separate words consisting of basic content word classes such as nouns or adjectives in order to create a new word (Yule, 2015, p. 53). According to Swan and Smith (2001), most compounds in Scandinavian languages are spelled solid, i.e. as one word, which can lead to some difficulties for Swedish learners of English when it comes to the use of hyphens or spaces in words such as fire-alarm (brandalarm) or front door (ytterdörr) (p. 26). This can result in
spelling errors by either writing compounds as one word (that should not be written in that way) or as two words (that should be one) (Swan and Smith, 2001, p. 26).

Another spelling error Swedish learners of English tend to make is the insertion, omission or misplacement of the apostrophe in, for example, contractions or cases with the possessive ‘s in both singular and plural nouns. This is due to apostrophes not being used in the same way in Swedish as they are in English, which according to Swan and Smith (2001) can lead to confusion in instances where there is a minimal contrast, such as with the contractive it’s and the possessive its (p. 26). It is, however, not an error that is unique to L2 learners of English, but is something that native speakers also frequently make, and makes up 8.2% of all the spelling errors made by 17- to 18-year-olds (Hokanson and Kemp, 2012, p. 242). This might be due to the limited exposure of words with apostrophes in printed texts, with the frequency of possessives covering less than 1% of all noun forms (Hokanson and Kemp, 2012, pp. 242-243).

Knowledge of what kind of spelling errors students make can help educators improve the spelling proficiency of their students. While previous research has mainly focused on spelling errors by L2 learners of English in general, very little research has been carried out specifically on Swedish learners of English. It is hoped that this study may contribute to the body of knowledge by filling this particular research gap. This study will use similar error categories as found in the research by Cook (1997), with some additions that might be particularly problematic for Swedish learners of English, based on the claims by Swan and Smith (2001). The results of this study are comparable with the results of previous research, and it is therefore possible to determine if that which has been said about common errors for L2 learners of English in general also applies to Swedish learners of English, or whether there are some errors that are uncommon for, or particularly common for, Swedish learners.

3. Materials and Method

The present paper aims to investigate the types of spelling errors made by Swedish senior high school learners of English. In order to achieve this, a corpus of learner English, the ULEC, further presented below, was selected and carefully analyzed in search of spelling errors.

3.1 Materials

This section will outline the materials used for gathering the data needed for analysis of the types of spelling errors made by Swedish learners of English.
3.1.1 Uppsala Learner English Corpus

The data is gathered from the *Uppsala Learner English Corpus* (ULEC), which is a compilation of student essays written by Swedish junior and senior high school students (Johansson and Geisler, 2011, p.1). Access to the corpus was given by kind permission from Docent Christer Geisler at Uppsala University, Sweden. The data for the ULEC is collected by teacher students as part of their degree projects, and each year the corpus grows in size through the addition of new student essays. As of this moment, the ULEC is comprised of a total of 266,612 words written in 1,196 essays by junior and senior high school students. The participating students wrote the essays on computers using “a simple web interface” (Johansson and Geisler, 2009, p.1). The collection of essays come in several .txt-files, with the year in school, high school program, name of teacher student who collected the essays and essay collection number in the name of every file. Accompanying the corpus is a list of essay topics for all of the essays, as well as an annotation which explains the structure of the essays. Some of the topics the students had to write about for the essays include, for example, if they believe in ghosts, what their dream job is, or what they would do if they won one million dollars.

Because this paper focuses on senior high school students’ spelling errors, only those particular essays will be investigated. Of those senior high school student essays, only the ones from the first and the third year will be investigated. The reasoning behind the decision for which student essays to investigate was that most students stop studying English after their third year in senior high school when they enter university. As such, it would be of interest to find out which aspects of spelling could be improved upon to further increase the English spelling proficiency of Swedish students. Essays by first-year students would also be investigated in order to determine what the difference in spelling proficiency is between the two groups.

The group of first-year senior high school students consisted predominantly of 15- to 17-year-olds, as well as a few 19-year-olds, studying English courses at level A, whereas the third-year senior high school students consisted of 16- to 19-year-olds, studying English courses at levels B and C. English A, B and C are the three English language courses that students can study in senior high schools in Sweden. While the names for these three course levels have changed from A, B and C to 5, 6 and 7, respectively, the ULEC still uses the old designations for all the essays. A total of 157 essays consisting of 39,250 words by first-year students, and 164 essays consisting of 39,600 words by third-year students were investigated for spelling errors.

3.1.2 Word processing software

The word processing software used for data gathering in this paper was Microsoft Word 2010. The essays in the ULEC corpus are in .txt-format, which made it easy to copy and paste them into Microsoft Word. This word processing software was chosen for its built-in spell checker which would
help ease the task of finding the more obvious spelling errors. However, the spell checker is not without its flaws, as many of the misspellings were not identified by the program, such as writing single word compounds as two words or misspellings that formed actual words.

3.2 Method

Each group of essays from the corpus was copied over into Microsoft Word, with proofing language set to both the U.K. and the U.S. varieties of English for the spell checker to work. While the spell checker made it easier to find certain kinds of spelling errors, each essay had to be carefully read in order to not miss any spelling errors. The spelling errors were categorized according to one of six types of spelling errors:

- Letter insertion
- Letter omission
- Letter substitution
- Transposition
- Compounding
- Apostrophes

Each category was selected based on the study by Cook (1997), as well as errors that are more common specifically to Swedish learners of English, such as compounding errors and wrong usage of apostrophes (Swan and Smith, 2001, p. 26). The categories themselves are very broad and could potentially be split up into several additional sub-categories, but for the purpose of this paper, I found no necessity to split them up further. The errors were sorted in alphabetical order based on the intended spelling in tables consisting of: spelling error, intended spelling, misspelled phoneme, misspelled grapheme, the number of times misspelled with number of different student essays in which the misspelling was found in parenthesis, as well as the frequency rating (further explained below) and the origin of the word. See Table 1 for an example selection of the letter omissions category for first-year students.

Table 1. Examples of letter omissions in all essays by first-year students.

<table>
<thead>
<tr>
<th>Misspelling</th>
<th>Intended spelling</th>
<th>Phoneme(s)</th>
<th>Grapheme(s)</th>
<th>Number of times</th>
<th>Frequency rating</th>
<th>Word origin according to the OED Online</th>
</tr>
</thead>
<tbody>
<tr>
<td>becaus</td>
<td>because</td>
<td>/ə/, /ɔ/ or /ɑː/</td>
<td>&lt;e&gt;</td>
<td>2 (2)</td>
<td>7</td>
<td>French</td>
</tr>
<tr>
<td>becus</td>
<td>because</td>
<td>/ə/, /ɔ/ or /ɑː/</td>
<td>&lt;a&gt; &amp; &lt;e&gt;</td>
<td>4 (1)</td>
<td>7</td>
<td>French</td>
</tr>
</tbody>
</table>
The total number of written essays, words and errors for each age group were counted and analyzed in order to determine whether any words, phonemes or types of words appear to be particularly problematic for a Swedish learner of English to spell correctly. The reason for the two age groups was to see if there is a difference in spelling proficiency between first- and third-year senior high school students, as well as to see if the first-year students have more difficulty with certain kinds of spellings than third-year students. Compiling all of misspellings in a manageable appendix turned out to be very time-consuming, and beyond the time restrictions of this project, so a decision was made to omit the inclusion of the data in an appendix.

Some misspelled words contained two different types of misspellings and therefore had to be counted as both. An example of this would be the incorrect spelling *reccomend, which would be counted as both an insertion of <c> and omission of <m>. In cases where it was difficult to determine what type(s) of error a misspelled word contained, such as if it contained an insertion and omission or if it contained a substitution, a closer look at the phonemes representing the misspelled letters had to be taken in order to accurately categorize the error(s).

Not all of the misspellings found in the ULEC corpus were used in the results of this paper. Some of instances of misspellings were discarded for being typos, errors that students would not have made had they done the writing with pen and paper. These errors include misspellings such as *itäs for it’s, *cvousin for cousin or *fopr for for, to name a few. Other errors that were not used were grammatical errors rather than spelling errors, for example; incorrect use of tense forms, such as writing *beated instead of beat, incorrect use or omission of capitalization, such as writing *i instead of I, the incorrect use of indefinite articles, such as writing *a instead of an and vice versa. Vocabulary mistakes were also discarded where it was evident that the student did not know a particular word, such as replacing the word with a Swedish word by, for example, writing *brandstation instead of fire station, as well as replacing the word with a similar word, for example, writing *flows instead of floats.

<table>
<thead>
<tr>
<th>becuse</th>
<th>because</th>
<th>/ə/, /ɔ/ or /ɑː/</th>
<th>&lt;e&gt;</th>
<th>8 (3)</th>
<th>7</th>
<th>French</th>
</tr>
</thead>
<tbody>
<tr>
<td>befor</td>
<td>before</td>
<td>/ɔː/</td>
<td>&lt;e&gt;</td>
<td>1</td>
<td>6</td>
<td>Germanic</td>
</tr>
<tr>
<td>bigest</td>
<td>biggest</td>
<td>/ɡ/</td>
<td>&lt;ɡ&gt;</td>
<td>2 (2)</td>
<td>7</td>
<td>“of unknown origin”</td>
</tr>
<tr>
<td>bigets</td>
<td>biggest</td>
<td>/ɡ/</td>
<td>&lt;ɡ&gt;</td>
<td>1</td>
<td>7</td>
<td>“of unknown origin”</td>
</tr>
<tr>
<td>bran</td>
<td>brand</td>
<td>/d/</td>
<td>&lt;d&gt;</td>
<td>1</td>
<td>6</td>
<td>Germanic</td>
</tr>
</tbody>
</table>
The *Oxford English Dictionary Online* (OED Online) was used to determine the origin of the misspelled words. It was also used to determine which phonemes were misspelled by examining both the British and the U.S. pronunciations, as well as strong and weak forms of the word. The OED Online was also used to determine if each misspelling occurred in low- or high-frequency words. After categorizing all misspellings by word origin according to the OED Online, an average frequency score was calculated for each category in order to determine if low- or high-frequency words cause the most problems. Each word has a frequency rating of between 1 and 8, with 1 representing a very low-frequency word and 8 representing a very high-frequency word. The frequency scale is logarithmic, and means that an 8 represents a word which occurs more than 1000 times per one million words in regular modern English writing, a 7 represents 10 times less than that, between 100-999 occurrences per million, a 6 represents 10 times less than that, between 10-99 occurrences per million and so on (http://public.oed.com/how-to-use-the-oed/key-to-frequency/, henceforth referred to as “Key to frequency”).

In regards to word origin, it does not strictly mean the true origin of the word, but rather from which language it was borrowed into English. A word could, for example, have come into English as a borrowing from French. The word origin would therefore be counted as French, even though the French word itself might have in turn been borrowed from Latin. This is due to the influence the French word had on the spelling of the word in English.

Determining the origin of the misspelled word was not always easy. Many words are formed within English itself through derivation, conversion, compounding or clipping, and in those instances, the origin of the root word was selected as the word origin. However, if the misspelling occurred in the prefix, suffix or any other English morphemes, it would be considered of English origin, because the affix can usually not function as a word on its own and is primarily used in the creation of new English words. In some cases, a word could have two or more etymons and be said to have multiple origins. An example of this would be the word *exist*, which is in part a borrowing from French (*exister*) and in part a borrowing from Latin (*existere*), in which case it would be counted as of both French and Latin origin.

Some words were of unknown or uncertain origin according to the OED Online, and were therefore not counted when calculating the frequency of word origins in the misspelled words. This could be due to a lack in early written records of the word, or that it appears in two languages at around the same time, making it difficult to say for certain from where the word originated, in which case a decision would be made to not count the word rather than potentially skew the results.
3.3 Limitations

There are some limitations to using the ULEC that need to be addressed. One such drawback is that the informants produced the text on computers. While section 3.2 mentions the typos that were found and discarded, some typos might have been misinterpreted as being spelling errors. The more obvious ones were weeded out, but it is possible that some were mislabelled.

It is also important to note that not all informants may have had Swedish as their first language. This was made evident in the content of the essays, as some of the informants wrote that their best vacation memories were when they visited their homelands, and one list of essays had the students write down their L1. Their respective proficiency in the languages they speak, if they are early or late bilinguals, or if Swedish is their L1 or L2 is unknown. However, whether Swedish is their L1 or L2, both negative and positive spelling transfers may occur from their other known language to English (as their L3) (Kusuran, 2016, p. 5), which could be errors that L1 Swedish learners of English would not normally make. While this might affect the results of the paper to a certain degree, the data would still be valuable for educators of the multicultural Swedish classrooms of today.

4. Results and Analysis

This section will give a detailed overview of the results of the present study, beginning with a general overview of the collected data, followed by a closer examination of each type of error and the origins of the misspelled words.

The total word count for the 157 essays written by the first-year students was 39,250, with an average of 250 words per essay. The total number of spelling errors made by first-year students was 1,756, making it an average of about 1 spelling error per 22 words, or about 11 errors per essay. In contrast, the total word count for the 164 essays written by the third-year students was 39,600, with an average of around 241 words per essay. The total number of spelling errors made by third-year students was 1011, making it an average of about 1 spelling error per 39 words, or about 6 errors per essay. Based on these results, it is safe to say that the first-year students made significantly more errors than the third-year students, and that the number of errors made by Swedish learners of English drops by over 1.7 times from their first year in senior high school to their third year.
4.1 Types of errors

The following table shows the distribution of spelling errors by type of error for first- and third-year students.

**Table 2. Distribution of spelling errors by error type for first- and third-year students.**

<table>
<thead>
<tr>
<th>Type of error</th>
<th>Year 1 Absolute number (percentage of all spelling errors)</th>
<th>Year 3 Absolute number (percentage of all spelling errors)</th>
<th>Total Absolute number (percentage of all spelling errors)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter insertion</td>
<td>307 (17.48%)</td>
<td>181 (17.90%)</td>
<td>488 (17.64%)</td>
</tr>
<tr>
<td>Letter omission</td>
<td>516 (29.39%)</td>
<td>283 (27.99%)</td>
<td>799 (28.88%)</td>
</tr>
<tr>
<td>Letter substitution</td>
<td>418 (23.80%)</td>
<td>205 (20.28%)</td>
<td>623 (22.51%)</td>
</tr>
<tr>
<td>Transposition</td>
<td>93 (5.30%)</td>
<td>72 (7.12%)</td>
<td>165 (5.96%)</td>
</tr>
<tr>
<td>Compounding</td>
<td>230 (13.10%)</td>
<td>147 (14.54%)</td>
<td>377 (13.63%)</td>
</tr>
<tr>
<td>Apostrophe</td>
<td>192 (10.93%)</td>
<td>123 (12.17%)</td>
<td>315 (11.38%)</td>
</tr>
<tr>
<td><strong>Total misspellings</strong></td>
<td>1756 (100%)</td>
<td>1011 (100%)</td>
<td>2767 (100%)</td>
</tr>
</tbody>
</table>

The results indicate that the distribution of spelling errors across all six categories between first- and third-year students does not appear to change very much and only differs by less than 3%. Judging by the results it is clear that letter omissions are the most frequently made spelling errors by Swedish first and third year high school students, followed by letter substitutions and letter insertions. These three categories accounted for 71% of the first-year students’, and 66% of the third-year students’ total spelling errors. The remaining 29% and 34%, respectively, were errors that fell into the categories of transpositions, compounding errors, as well as misuses or omissions of apostrophes.

4.1.1 Letter insertion

Letter insertion was the third largest category for both groups of informants, and comprises both vowel insertion and consonant insertion. The most common vowel insertion was <e>, which constituted 58% for first-year students’, and 41% for third-year students’ overall vowel insertions. For third-year students, in most cases the <e> was inserted at the end of a word or kept after using the -ing ending, such as in *believing*, and in very few cases it was doubled where the representing phoneme was /iː/, as in *theese*. The doubling of <e> was more common for the first-year students, as well as the insertion of <e> at the end of words.
The second most common vowel insertion for third-year students was <o>, which constituted 29% of all vowel insertions, and mostly occurred with the misspelling of the homophones too and to. Misspellings involving the other vowels were misspelled close to the same number of times. The insertion of <a> was also common for both groups, and it was for the most part inserted next to another vowel, such as <e>, <o> or <i>, resulting in the misspellings *answears, *coasier and *arraival.

Consonant insertions were more common than vowel insertions for both groups, constituting 64% of all first-year students’ and 58% of all third-year students’ letter insertions. For first-year students, consonant doublings constituted 61% of all their consonant insertions, whereas for third-year students it was under half at 46%. The majority of all consonant doublings for first-year students involved doublings of <l>, <p>, <s> and <r>, whereas for third-year students, <l> and <r> stood out as the most doubled consonants. Words beginning in al- or ending in -ful were misspelled the most, with misspellings such as *allways and *wonderfull being somewhat common. Doublings of <p> seemed to be most common with words where the Swedish spelling uses two p’s, such as *upp, *topp and *shopp. Doublings of <s> were most common when it is pronounced just after a /ɪ/, as in *dissappear, *vissit, or *bussiness. Doublings of <t> were most common when it was at word final position, resulting in misspellings such as *sitt or *forgett. Doublings of <r> only occurred just after <a>, <e> and <o>, in misspellings such as *scarry, *verry or *borryng.

The most common insertion of a non-doubled consonant for both groups was <h> and constituted 45% of all first-year students’ and 50% of all third-year students’ non-doubled consonant insertions. For the most part, insertions of <h> occurred just after <t> or <w>, resulting in misspellings such as writing *threat instead of treat or *where instead of were. Another common consonant insertion was with <t>, which mostly occurred in words with the /tʃ/-sound or just after an <h>, which resulted in misspellings such as *mutch, *eatch and *tought.

4.1.2 Letter omission

Letter omission was the largest category for both groups of informants. Vowel omissions were most common for both groups of students, encompassing 59% of the first-year students’ and 54% of the third-year students’ letter omissions. The most frequently omitted vowel was <e>, which constituted 60% of all first-year students’, and 66% of all third-year students’ vowel omissions. <e> was mostly omitted in places where it could be pronounced as either /ə/ or /iː/. The most common misspelling was *belive which was misspelled 23 times by first-year students and 32 times by third-year students. Other common ones include *diffrent, *becuse and *intrested. It was also commonly omitted in word final position, such as in *climat and *som, or when preceding the suffix -ly, such as in *unfortunatly.
and *extremely. Another commonly omitted vowel was <a>, which mostly occurred in words where it is either next to or in between other vowels, resulting in misspellings such as *beautiful or *restaurant.

The most frequently omitted consonant for both groups was <h>, and was mostly omitted when positioned right after a <t> or a <w>, resulting in the misspellings; *trough, *tought, *wich or writing *were instead of where. <l> was another commonly omitted consonant, and was mostly omitted when /l/ comes after /ə/ as in *litte instead of little, *coud instead of could or *woud instead of would, as well as from words ending in -ally, resulting in misspellings such as *realy, *taly and *personaly. Some consonants were mostly or only omitted by first-year students, such as <d> and <f>. <d> was omitted from the letter combinations <and> or <end>, resulting in misspellings such as *friends for example. <f> was mostly omitted in doubled positions, resulting in the misspellings *aford and *trafic.

4.1.3 Letter Substitution

Letter substitution was the second largest category for both groups of informants. Vowel substitutions constitute the largest portion of all letter substitutions, with 73% for first-year students and 66% for third-year students. The most frequently substituted vowel was <a>, and was substituted by <e> 89 times and <i> 6 times, and resulted in misspellings such as *advice, *mey and *villege. <e> was the second most frequently substituted vowel, and was substituted by <a> 41 times and <i> 19 times, and resulted in misspellings such as *speach, *sociaty and *dispite. <i> on the other hand was substituted by <e> 20 times and <a> only 2 times, resulting in misspellings such as *definately, *activeties and *excating. <o> and <u> were also commonly substituted by one another, with <u> replacing <o> 8 times and <o> replacing <u> 17 times, resulting in misspellings such as *octupus, *sommer and *costum. <o> was also replaced by <a> 11 times, and replaced <a> 35 times, resulting in misspellings such as *becouse and *a’clock. 36% of all vowel substitutions for first-year students, and 40% for third-year student could be pronounced as schwa /ə/.

In regards to consonant substitutions, the most frequent substitutions occurred with <c>, which was commonly replaced by <s> and <k>. <c> was replaced by <s> 37 times and took the place of <s> 18 times in words with the /s/-sound, resulting in misspellings such as *chanse, *twise and *noice. <c> was replaced by <k> 26 times, but only took the place of <k> 2 times in words with the /k/-sound, resulting in misspellings such as *doktor, *inkluding and *snorcle. Another consonant substitution occurred between <v> and <w>, however they were not as common, with <v> taking the place of <w> 5 times and <w> taking the place of <v> 9 times, resulting in misspellings such as *wisitting and *svimming and *windovs.
4.1.4 Transposition

Transpositions are the least common spelling errors that a Swedish learner of English makes, and only represent an average of approximately 6% of all the errors a learner in first and third year of high school makes. While most transpositions appear to be one-off events, there are some that stand out as being fairly common. What appears to be the most frequently transposed letters <c> and <a>, transposed 15 times, as well as <b> and <y>, transposed 13 times, only reflect a select few misspelled words, such as *beacuse and *maby/*mabye. One of the most frequent transpositions involve the letter <e> and it was mostly transposed with <l> and <r> when it was pronounced as /ə/, resulting in misspelled words such as *exampel, *travle, *preform and *hierd. However, this appears to be mostly common for first-year students, as they made 8 out of 9 substitutions between <e> and <r>, and 15 out of 18 substitutions between <e> and <l>. <e> was also fairly often transposed with <s>, resulting in misspellings such as *dosen’t and *eles. Another common transposition was between the letters <o> and <u>, resulting in misspellings such as *qoute or *cuold, as well as between <a> and <u>, resulting in misspellings such as *becuase and *actaully.

4.1.5 Compounding

The majority of the compounding errors were due to writing two words as one, which encompassed 73% of first-year students’ and 70% of third-year students’ compounding errors, and it is also how most compounds are written in Swedish. The most common of these spelling mistakes were *alot, *eachother and *ofcourse. Writing one word as two was not as common but still occurred 26% of the time for first-year students, and 29% of the time for third-year students. The most common of these spelling mistakes were *In to, *my self and *every one. The remaining 1-2% of compounding errors were due to incorrect usage of hyphens.

While the most frequently misspelled compounds appear to be non-prototypical, such as misspellings of into covering 6% of first-year students’ and 5% of third-year students’ compounding errors, the errors involving prototypical compounds constitute 47% of all compounding errors for both first- and third-year students. While there were fewer instances of each individual prototypical compounding error, there was a greater variety of misspelled words which fall into this definition (as explained in 2.4). The vast majority, 98% of first-year students’ and 97% of third-year students’ misspellings of prototypical compounds were compound nouns, for example, *hand ball, *icecream and *dreamjob. There were a few instances of misspelled compound adjectives as well, which occurred in words such as open-minded, red-haired and flower-printed.
4.1.6 Apostrophe

The majority of apostrophe errors, 90% of all errors for both first and third-year students, were due to the omission of an apostrophe. 60% of all omitted for first-year students and 41% of all omitted for third-year students were caused by the misspellings of 4 contractions; *Don’t, I’m, it’s* and *that’s*. Of all apostrophe errors, 15% for first-year students, and 20% for third-year students were due to the incorrect usage or omission of the *‘possessive ‘s’. Errors regarding the plural -s ending were three times more likely to be made by the first-year students than by the third-year students.

4.2 Word origins and word frequency of spelling errors

The following table shows the distribution of all spelling errors by word origin, as well as the average frequency score by word origin, with the score that occurs most often for each language of origin in parenthesis (i.e. mode, the value that is repeated most often), for both first- and third-year students.

<table>
<thead>
<tr>
<th>Language of origin</th>
<th>Year 1</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percentage of all spelling errors by word origin</td>
<td>Average frequency score by word origin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average frequency score (score that occurs most often)</td>
</tr>
<tr>
<td>Germanic</td>
<td>26.80%</td>
<td>6.66 (7)</td>
</tr>
<tr>
<td>French</td>
<td>34.70%</td>
<td>6.22 (6)</td>
</tr>
<tr>
<td>Latin</td>
<td>14.44%</td>
<td>6.22 (7)</td>
</tr>
<tr>
<td>Scandinavian</td>
<td>5.68%</td>
<td>6.48 (6)</td>
</tr>
<tr>
<td>Dutch</td>
<td>4.02%</td>
<td>6.16 (6)</td>
</tr>
<tr>
<td>English</td>
<td>12.06%</td>
<td>6.83 (7)</td>
</tr>
</tbody>
</table>
The majority of all misspelled words can be traced back to having French, Germanic or Latin origin, which encompass 76% of all misspelled words for first-year students and 80% for third-year students. The remaining 24% and 20%, respectively, cover words with English, Scandinavian and Dutch origins, as well as a few others, including Scottish, Spanish, Portuguese, Arabic, Italian and Greek. While the percentages for each word origin for both first- and third-year students were very similar, there were some differences in which word origins seemed to cause the most trouble for both age groups. Words with French origin seem to be the most troublesome for first-year students, whereas words with Germanic origin caused the most problems with third-year students. There were no major differences between the misspellings of low- and high-frequency words for both groups.

Despite both Swedish and English being Germanic languages, many of the spelling errors made were on words with Germanic origin. There are, however, two possible reasons for this. The first is that many of the common spelling errors of words with Germanic origin were of what the OED Online considers high-frequency words (7 or greater on the frequency scale). Examples of such words include also, some and all, and were words that the students would also frequently misspell. Another reason is that many of the word origins were labeled as ‘common Germanic’, and the language it was borrowed from might be difficult to trace, so it was labeled as such to encompass most Germanic languages.

The high number of misspelled words with French and Latin origins mostly occurred between medium- and high-frequency words, with only a single instance of any particular spelling error having occurred. However, there were some outliers that occurred more frequently, such as misspellings of the words hotel, school or different. The great number of French and Latin word origins can also be explained in part due to many of the misspelled words being counted as having multiple origins, both French and Latin. While this does lead to the same misspelling being counted twice, a decision was made not to split these two language origin categories into three, one for French, one for Latin and one for both French and Latin, so as to reduce the number categories and follow suit with the labeling of words with ‘common Germanic’ and ‘common West Germanic’ origin. Another reason for the great number of French and Latin word origins might be that the spellings of these words could be difficult for Swedish learners to master as they originate from languages with different orthographic depths.

The misspellings of words with English origin were due to misspellings of, for example, the suffixes of words formed within English through derivation, such as the misspelling of the -ed ending in opened as *opend, but also from words formed within English, such as hallway. The misspellings of
the words with Scandinavian origin were mostly of higher-frequency words (with a frequency rating of above 6) such as want or they, but there were also some lower-frequency words such as scare and call. The reason for Dutch having a category of its own and why it stood out over some of the other languages was partly due to some words, such as ghost, being considered as being of ‘common West Germanic’ origin according to the OED Online, which encompasses both Germanic and Dutch.

5. Discussion

The fact that misspellings of words with Germanic and Scandinavian origins, as seen in section 4.2, seem to occur in higher frequency words than words with Romance (French, Latin, et cetera) origins, is most likely because at its core, English is a Germanic language. As pointed out by Fennell (2006), in its infancy, English was exposed to Germanic and Scandinavian languages in the Old English period, and it was not until hundreds of years later in the Middle English time period that French loanwords were introduced (p. 106-108), by which point a solid foundation comprised of everyday words had already been set. It stands to reason that these everyday words would be some of the most commonly used words by speakers of English, even to this day.

The largest category for first-year students was misspellings of words with French origin, and it was the second largest for third-year students, which could be due to a number of reasons. The first is simply the large amount of French loan words in the English language would naturally lead to a larger share of misspellings. Another is that French, just like English, has a deep orthography (Sun-Alperin and Wang, 2008, p. 933), and Swedish spellers might not be as sensitive to the orthographic patterns of words with French origin as suggested by Dich and Pedersen (2013, p. 60). However, judging by the results in section 4.2, Swedish learners of English seem to become more sensitive to these orthographic patterns by their third year in senior high school compared to their first year, which can also be seen by the distribution of misspellings of words with English origin as third-year students make fewer mistakes involving the different affixes and morphemes of the English language. Although there is no information on the informants’ L3, it is possible that some of them study French as an L3, which could help them correctly spell words of French origin.

Many of the spelling errors made by the Swedish learners of English were, just like Figueredo (2006, p. 887) claimed, due to negative transfers caused by a lack of grapheme-phoneme correspondences because of differences in orthographic depth between Swedish and English, along with the Swedish pronunciations of these words. This led to phonetic spellings of words such as *dosen’t or *hierd, as well as where the spelling is similar to the spelling of the Swedish word, such as with *exampel (Sw. exempel), but also with the doublings of <p> in words where the Swedish spelling uses two p’s. The
first few examples of phonetic spellings of words are not indicative of the relevance of the learners’ L1, seeing as how those are mistakes that L1 English speakers could also make. However, this appears to not be the case for the latter examples, because of the fact that the misspellings were similar to the spellings of the Swedish words, indicating that the spellings of the L2 has been affected by interference from the students’ L1.

The apostrophe errors could, in part, be attributed to negative transfer as well, seeing as how 90% of them were due to the omission of an apostrophe. The apostrophe is not only rarely used in Swedish, but also used in a different way than it is in English. However, it is worth noting that, just as Hokanson and Kemp (2012) write, 8.2% of all spelling errors for native English speakers of a similar age group as the informants of this study, are errors involving the apostrophe, which is close to that of the Swedish senior high school students. This would indicate that the L1 of the learner does not appear to be very relevant when it comes to apostrophe errors.

Comparing the results of this paper with previous studies on L2 spelling errors, both similarities and differences were revealed. While consonant doublings were, just as Cook (1997, p. 483) suggested, one of the most common types of insertions for Swedish learners of English, the doublings of <g> and <f> were not as common as doublings of <l>, with there only being one recorded instance of <g> being doubled in the misspelling *bigg. Furthermore, the few instances of substitutions between <a> and <i> would indicate that they do not appear to be as common as suggested by Cook (1997), and appear to be less common than the substitutions between <a> and <o>, at least not for Swedish learners of English at a senior high-school level of proficiency. These differences could be explained by the fact that the study by Cook (1997) was done with L2 speakers of many different languages, which might not necessarily specifically apply to Swedish learners of English, but rather to L2 learners in general. However, there were instances where the results of this paper confirmed the previous research by Cook (1997), such as with omissions of <e> being common in word-final position or when it occurs just before -ly. The results also showed that 36% of the first-year students’ and 40% of the third-year students’ vowel substitutions could be pronounced as /ə/, which is close to what Cook (1997) suggested.

Contrary to what is suggested by Swan and Smith (2001) in section 2.4, substitutions between <v> and <w> do not appear to be as common as many of the other substitutions, with there being only 14 recorded instances. 11 out of these 14 substitutions were made by the first-year students, which could indicate that it might still be a frequently made spelling error among younger learners, but that it seems to disappear among Swedish learners of English by the time they reach third year senior high school levels of proficiency. Additionally, the insertions of <c> between <s> and <h> did not appear to be as common as Swan and Smith (2001, p. 26) suggested, and only two such misspellings were
found, *shopping and *sold. However, the study confirms what Swan and Smith (2001) wrote about <k> most often replacing <c>, with <k> taking the place of <c> 26 out of the 28 substitutions between the two letters. The results of this study also confirm what Swan and Smith (2001) suggested about errors involving compounds. While the number of errors decreased for third-year students compared to first-year students, the distribution of compounding errors remained similar, with the majority being two words written as one, just as most compounds are written in Swedish, indicating that that particular negative transfer does not seem to disappear by the time Swedish learners of English reach the end of senior high school. What is interesting to note is the great number of spelling errors involving non-prototypical compounds, rather than the more prototypical ones consisting of, for example, two nouns or a noun and an adjective. Additionally, nearly all of the errors involving prototypical compounds were of compound nouns. This would indicate that the formation of compounds appear to be difficult for the Swedish students to grasp, with compound nouns and certain non-prototypical compounds (as shown in 4.1.5) causing the most problems.

6. Conclusion

The purpose of this paper was to ask and answer four questions; What kinds of errors Swedish learners of English most frequently make, what kinds of words appear to be most problematic for Swedish learners of English to spell correctly, if there were any phonemes that seem to be particularly problematic for Swedish learners of English to spell correctly, and to see if there are some types of errors, words or phonemes that are more problematic during a students’ first year in senior high school than they are during their third year.

The types of errors that resulted in most spelling errors for both groups were omissions and substitutions, closely followed by insertions. Transpositions and errors involving compounds and apostrophes were not as common, but still occurred fairly frequently. While third-year students had improved their spelling by showing lower levels of spelling errors across all six categories by nearly half of that of first-year students, they showed greater improvement on spelling errors involving omissions and substitutions than transpositions. Although there were no major differences in the distribution of errors between first- and third-year students, a couple of differences appeared when a closer examination of each individual type of error was conducted. One example is that out of all consonant insertions, first-year students were 33% more likely to double their consonants than third-year students and would double <p>, <s> and <t> more frequently, whereas the third-year students would be more likely to double <r>. 

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The vowel sound that was most problematic for Swedish learners of English to spell correctly was the schwa /ə/, and it caused the most problems in all error categories for both first- and third-year students, especially with letter omissions and transpositions. /i:/ was another vowel that appeared to be problematic for spelling errors involving insertions and omissions. Certain consonant sounds were also problematic for both groups of students, such as /l/, /s/ and /k/. While errors involving consonant sounds covered the largest portion in most of the different types of errors, each individual vowel sound was generally misspelled more times than each individual consonant sound, which could be attributed to the larger number of consonant sounds, as well as the smaller number of vowel letters, in the English language.

When it comes to the frequency of use and word origin of the misspelled words, there was a fairly even distribution between low- and high-frequency words, as well as the origin of each word between the two groups, although there were some slight differences. Words with French origin appeared to be the most problematic for Swedish first-year senior high school students to spell correctly, and each spelling error only occurred once or twice compared to the more common mistakes students would make on words with Germanic origin. When the students reach their third year in senior high school, it would appear that words with Germanic origin cause slightly more problems than those of French origin.

Future research could be done on ways to improve the spelling proficiency of students in Sweden by, for example, instructing students early about the spellings of compound nouns, as well as a few commonly misspelled non-prototypical compounds such as into and a lot. By doing so it would be possible to determine if direct instructions such as that would have a positive long-term effect on the students’ spelling proficiency.
References


