

The Relationship between L1 Fluency and L2 Fluency in Writing: A Mixed  
Methods Study of the Writing Fluency of the Finnish Learners of English by  
Using Keystroke Logging Data

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MA Thesis

English, Degree Programme for Language Teaching and Learning

School of Languages and Translation Studies

Faculty of Humanities

University of Turku

January 2020

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School of Languages and Translation Studies / Faculty of Humanities

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Second language (L2) fluency has been a widely researched topic in the field of SLA for many years. However, it is only recently that researchers have become interested in the possible effects of the first language (L1) on the L2 fluency, which means that these connections are still relatively poorly understood. Thus, the aim of this thesis was to explore the relationship between L1 and L2 fluency, focusing especially in writing fluency, which has been a neglected area of research compared to spoken fluency studies.

The research employed a mixed-methods approach to investigate the issue, where the quantitative analysis of different fluency measures was complemented with a more in-depth qualitative analysis of the fluency features of the essays. The data consisted of essays written by 16 Finnish upper-secondary school students in their L1 (Finnish) and L2 (English) by means of a keystroke recording tool *ScriptLog*. The samples were examined with the help of various writing fluency measures, which were based on participants' pausing and revision behaviour. The essays were then analysed qualitatively by using a writer profile categorization. The results revealed positive statistically significant correlations on three of the measures: the number of pauses, the mean length of pauses and P-Burst. The regression analysis further supported the findings by indicating that the L2 fluency measures could be predicted from the equivalent L1 measures to some extent. The findings of the qualitative analysis showed that seven out of 16 participants shared similar composing processes in their L1 and L2. Thus, the findings together suggest that there is a link between L1 and L2 writing fluency to some degree, which should be acknowledged in future studies which focus on different factors affecting L2 fluency. In addition, the results of the present study can be used in teaching contexts by facilitating learners' L2 writing and as a help of L2 fluency assessment.

Keywords: writing fluency, ScriptLog, L2 fluency, L1 fluency, L2 English, writer profile

## Table of Contents

1	Introduction .....	1
2	L2 Fluency.....	3
	2.1 L2 Writing Fluency .....	5
	2.2 Writer Profiles .....	9
3	The Relationship between L1 and L2 Fluency.....	13
4	Research methodology .....	19
	4.1 The Aim of the Research.....	19
	4.2 Data Collection and Processing.....	20
	4.3 Methods of Analysis.....	22
5	Fluency in Finnish Students' Writing .....	25
	5.1 The Correlations between L1 and L2 Fluency Measures.....	26
	5.2 Predicting L2 Fluency .....	28
	5.3 Qualitative Analysis: Individual Writer Profiles in L1 and L2 .....	30
6	Discussion .....	36
7	Conclusion.....	40
	References .....	42
	Finnish summary .....	46

## List of Tables

1	Means (and Standard Deviations) of the Fluency Measures .....	25
2	Correlations between L1 and L2 Fluency Measures for the Whole Sample and for the Two Groups Separately .....	27
3	Results of the Simple Regression Models .....	29

# 1 Introduction

The notion of fluency has been widely researched in the field of Second Language Acquisition (SLA) for many years. Many of the previous studies have focused on the effects of task characteristics (planning time, task difficulty, task repetition) on CAF measures, consisting of complexity, accuracy, and fluency (see e.g. Kim and Tracy-Ventura 2013; Thai and Boers 2016; Ong and Zhang 2010), L2 fluency development during residency abroad (see e.g. Hang 2013; Lennon 1990) and L2 fluency in relation to different proficiency levels (see e.g. Palviainen, Kalaja and Mäntylä 2012; Chenoweth 2001). The studies have generally examined fluency only from a foreign language learning perspective by using native speakers as a reference point. However, in recent years, the interest has shifted to the relationship between first language (L1) and second language (L2) fluency, since studies have shown that individuals vary also in their L1 fluency (see e.g. Maclay and Osgood 1959), which could indicate that factors affecting fluency in L1 could also be present in L2 performance. In other words, instead of being a language-specific state, L2 fluency could actually be more a trait-like feature which is affected by individuals' L1 characteristics (see Derwing et al. 2009).

Some studies have attempted to clarify the role of L1 fluency in L2 fluency (see e.g. Peltonen 2018; Derwing et al. 2009; De Jong et al. 2015; Huensch and Tracy-Ventura 2017). However, the results have not been able to provide a clear answer as to what extent fluency in L1 contributes to L2 fluency, since the relationship seems to depend on multiple different factors, such as the proficiency level of the speaker and cross-linguistic similarities and differences. For instance, although Derwing et al. (2009) and Huensch and Tracy-Ventura (2017) discovered positive correlations between fluency measurements in L1 and L2, they also found variation depending on the speaker's L1 background. Thus, as Derwing et al. (2009, 555) state, the L1-L2 relation needs to be further examined, especially in language pairs which are not typologically that close to one another. Furthermore, as fluency is often considered to be a feature of spoken language, the studies have mostly focused on measuring oral fluency. This means that research on writing fluency has been left scarce, especially regarding the connections between L1 and L2 writing fluency. The earlier writing fluency studies have mainly focused on examining L2 fluency in relation to different proficiency levels (see e.g. Palviainen, Kalaja and Mäntylä 2012), or studied it from a developmental perspective (see e.g. Kowal 2014). There is thus a strong need for writing fluency studies which incorporate L1 and L2 data and focus specifically on the effects of L1 fluency on L2 production.

In order to fill in the research gap, the present study set out to investigate this matter by examining Finnish upper-secondary school learners of English (n=16) for their L1 and L2 writing fluency. The data was collected in a form of essays, which participants composed by means of a keystroke recording tool *ScriptLog*. In order to examine the L1-L2 relationship profoundly, the research employed a mixed-methods approach where both, group and individual level analysis, were combined. Firstly, in the quantitative part of the study, the correlations between the L1 and L2 fluency measures were studied, after which regression analyses were conducted to examine how much of the variability in L2 measures could be predicted on the basis of L1 measures. The quantitative inspection of the data was then further complemented with a qualitative analysis, where the participants' productions were examined individually for their fluency features with the help of the categorization of different writer profiles. Exploring the L1-L2 fluency relationship profoundly in writing is important as it has practical implications not only for L2 fluency assessment, but it could also help teachers to facilitate learners' written text production. Furthermore, by using and comparing data from two morphologically and syntactically distinct languages, Finnish and English, the present study will provide more evidence on how fluency relations appear in language pairs in which is less likely that L1 knowledge and structures are directly transferred to L2.

The study will begin by discussing the notion of L2 fluency and how it has been generally measured in learners' L2 performance, especially in oral fluency studies. Then, it will move on to examine more closely L2 fluency in writing and different writer profiles, which is a related concept to writing processes and thus also employed by the present research. Theoretical framework will conclude by reviewing previous studies which have been conducted on the L1-L2 fluency relationship. After that, the data collection methods will be presented in more detail in section 3. Sections 4 and 5 will focus on reporting and interpreting the results. The final section 6 will examine the reliability and validity of the study and present the final conclusions.

## 2 L2 Fluency

Although the notion of *fluency* is commonly used and studied in the field of SLA, there does not seem to exist a single definition of the term. Moreover, all the definitions seem to concentrate on characterizing spoken fluency instead of a written one. For instance, Skehan (2003, 510) considers fluency as one component of the framework CAF, which can be used to measure L2 performance. He views fluency as “the capacity to produce speech at a normal rate and without interruption” (ibid.). Fillmore, Kempler and Wang (1979), on the other hand, seem to have combined all these components into one. They define fluency as “an ability to talk with few pauses” and in a coherent and complex manner (Fillmore, Kempler and Wang 1979, 93). In addition, fluent speakers speak appropriately in different kinds of social contexts and situations and they are able to produce creative and imaginative language (ibid.). Lennon (1990, 389–390), in turn, uses the term in two different ways; in a broad sense to cover the speaker’s overall foreign language proficiency, and in a narrower sense to refer only to the rate and smoothness of the output. In this sense, fluent speakers are able to produce language at a native-like pace without unnecessary pauses and hesitations, repetitions or false starts (Lennon 1990, 390). In regard to the underlying cognitive processes, Schmidt (1992, 358–359) views fluency as an “automatic procedural skill”, which develops as a result of proceduralized knowledge and thus, in the end, does not require much effort or attention on the speaker’s part. As can be seen from these examples, the common fluency features seem to be related to the effortlessness and smoothness of the L2 production. Additionally, the researchers seem to agree on the fact that fluency can be used as one indicator of L2 proficiency. However, the lack of a full consensus on the different features of fluency makes it a difficult research subject. Therefore, in order to measure fluency for research purposes, the researchers have had to find ways to operationalize the concept and define it more practically (Segalowitz 2010, 3; 5).

In order to create more explicit measurements for fluency, Segalowitz (2010, 48–49) has distinguished three senses of L2 fluency: *cognitive*, *perceived* and *utterance* fluency. The first one, cognitive fluency, refers to “the fluid (speed, efficiency) operation of the cognitive processes”, which enables learners to produce L2 utterances (Segalowitz 2010, 48; Segalowitz 2016, 82). The second type of fluency, perceived fluency, relates to the subjective inferences on the speaker’s fluency, which listeners make based on their impressions from speech samples (Segalowitz 2010, 48). The third and final type, utterance fluency, refers to measurable features of the utterance, which include, for instance, pauses, hesitations and repairs (ibid.). Skehan (2003, 8) has divided utterance fluency further into separate measures of breakdown fluency,

repair fluency, speech rate and automatization. Breakdown fluency is related to pausing phenomenon, while repair fluency covers reformulations, false starts and repetitions (ibid.). Speech rate can be measured by calculating e.g. words/syllables per minute and automatization via the length of run (ibid.). As all these above-mentioned models and definitions demonstrate, L2 fluency has been mainly explored in learners' oral production. However, the same definitions can be applied to written fluency as well, although the two constructs somewhat differ from one another (see section 2.2.). Therefore, the present research will also base its definition of fluency on models of Segalowitz and Skehan by focusing on the utterance fluency. In other words, the L2 fluency in the present research refers to the temporal aspects of the writing process as well as revision behaviour. The diverse measures to analyse the fluency of the text will be examined more closely in the following section.

According to Ellis and Barkhuizen (2005, 149), there are two different ways which researchers can use to assess the fluency of learner language. Firstly, they can concentrate on the perceived fluency by obtaining listener or reader ratings, which is a practical way to assess L2 performance (ibid.). The second option is to use various discourse-based measurements (cp. Skehan's model), which provide precise numbers of different aspects of fluency (ibid.). Some studies have also combined the methods and compared the results (ibid.). Many SLA researchers have opted for the second type and they have generally based their operationalisations on Skehan's model (Ellis and Barkhuizen 2005; 149; Olkkonen 2017, 15). In regard to the current study, the fluency of the texts was examined by means of different discourse-based measurements. Although listener/reader ratings were not used to assess the L2 fluency in this study, it has to be noted that they might be reflected in *the Common European Framework of Reference for Languages* (CEFR) ratings as the following section will demonstrate. CEFR evaluations, on the other hand, are based on the fluency of the final product, which differs from the fluency of the production process, i.e. the focus of the present research.

Ellis and Barkhuizen (2005, 156–158) list the most common measures of fluency, which have been applied in the previous studies. They divide the measures into two different categories: *temporal variables* and *hesitation phenomena* (ibid.). Temporal variables are related to the speed of L2 performance, and they include variables such as speech/writing rate, the number of pauses, pause length and length of run (ibid.). Hesitation phenomenon, on the other hand, relates to dysfluency, and they include false starts, repetitions, reformulations and replacements (ibid.). In regard to the four hesitation variables, Ellis and Barkhuizen (2005, 158) argue that a single variable is valid to demonstrate this aspect of fluency, since previous studies have shown a strong relationship between them. Furthermore, when it comes to oral fluency,

speech rate and silent pause phenomena have been associated with L2 proficiency more often than some other measures (Segalowitz 2010, 39). Despite the fact that some variables seem to be more suitable than others to assess fluency, choosing and applying valid measurements is not entirely unproblematic. According to Segalowitz (2010, 39; 41) and Ellis and Barkhuizen (2005, 163), researchers have not been able to fully discover which measures constitute the most valid and reliable markers of fluency. Thus, researchers have ended up using different measures and even different operationalisations, which makes comparing results across studies difficult (*ibid.*). In addition, Segalowitz (2010, 39; 41) points out that differing data collection methods can also affect the research outcome, as some studies have used interviews and others, for instance, retelling stories to elicit speech samples. Although the authors refer mostly to problems regarding measuring oral fluency, the same issues concern measuring writing fluency. In order to avoid these problems and obtain comparable results, the present research will employ similar methods and operationalisations used by other studies. By using the same measures, operationalisations and data collection methods which most of the previous studies have used, the results across diverse studies can be compared more validly. However, given the fact that all the possible limitations cannot be avoided in the research process, the results of the present study also need to be regarded with caution.

In this section, I have covered the multiple definitions of fluency and discussed the various ways it can be measured in L2 performance. Although the measures introduced in this section have been mostly used to assess spoken fluency, similar measurements can be applied to analyse written productions. However, it is good to bear in mind that writing fluency measures need to be operationalised differently and that individual's oral and writing fluency cannot be directly compared to one another due to the divergent conditions of producing written vs. spoken texts (Ellis and Barkhuizen 2005, 145; Kowal 2014, 232). Thus, before investigating writing fluency, we need to understand the cognitive processes which underlie the writing process. The following section will provide an overview of these issues by focusing on the L2 writing fluency phenomenon and introducing different means on how to measure it validly.

## **2.1 L2 Writing Fluency**

Although the actual definition of fluency is rather the same for spoken and written communication, the cognitive processes of producing written and spoken language differ from one another. Torrance and Nottbusch (2012, 404–406) list three main differences between written and spoken language processing, which need to be taken into consideration before we

can validly measure L2 writing fluency. Firstly, they point out that in speaking, more concentration on fluency is needed compared to writing, since speakers are faced with a pressure of producing a fluent utterance in real-time, whereas writers can pause and modify the text as much as they choose, without the receiver ever finding out (ibid.). The second difference in language processing is related to orthographic processing, which is only present in written production and needs thus additional attention from writers (ibid.). Thirdly, the authors note that the feedback affordance can be slower in written mode compared to speaking, because writers are able to see the produced text and, therefore, both error monitoring and correction can be postponed (ibid.). Given these divergent characteristics of producing written and spoken language, it is clear that writing fluency studies need to employ and operationalize fluency measurements differently. Additionally, as Kowal (2014, 232) notes, the conditions of producing text and speech differ from one another. While oral text emerges and disappears fast from the speaker's mind, the written text remains visible even after the writer has moved on to another topic (ibid.). Therefore, it is possible that there is a divergence between individuals' fluency in writing and speaking, which means that the results of speech and written fluency studies cannot be directly compared to one another (ibid.).

When it comes to measuring writing fluency, there are two different approaches: *product-* and *process-oriented* approaches. Product-oriented measures focus on the fluency of the end product, whereas process-oriented measures take into account the process of writing (Palviainen, Kalaja and Mäntylä 2012, 48). In the end product, fluency is related to readers' perceptions as to what constitutes as fluent text (ibid.), and much like in speech fluency studies which use listener ratings, it can be studied by obtaining reader ratings. However, as readers are unable to see how fluently the writer produces the text, they will have to base their perception of fluency on linguistic features of the text, such as text structure, coherence and cohesion. This, in turn, is linked to the overall writing proficiency, which Wolfe-Quintero, Inagaki and Kim (1998, 2) define as "an ability to produce a variety of genres and rhetorical features", as well as "the use of a range of vocabulary and syntactic structures". The writing proficiency can be assessed by using various developmental measures, such as the age of the writer or the number of years a writer has studied the language (Palviainen, Kalaja and Mäntylä 2012, 48). Moreover, writing proficiency can be measured by judging the text quality on the basis of pre-set criteria (ibid.), such as different language proficiency scales.

As mentioned in the previous section, the present research did not use reader perceptions as a direct method to assess the fluency of the texts, but rather as a measurement of the overall quality of the texts and thus providing information on the proficiency level of the participants.

However, as the texts were graded by using *The Common European Framework of Reference for Languages* (CEFR), which, in fact, mentions fluency in all of its six levels A1-C2, the grade could also be regarded as an indicator of the fluency of the end product. The CEFR is a guideline used for foreign language assessment across Europe, which defines different levels of proficiency in order to measure language learners' progress at each stage of learning (CEFR 2001, 1). In addition to general rating scales, CEFR also provides a more detailed set of level descriptions for different sub-skills of language learning, namely speaking, reading, writing and listening. In the level descriptions for writing, fluency is referred to as one of the characteristics of the written production. For instance, at the level C2, the writer should be able produce "clear, smoothly flowing, complex texts, in an appropriate and effective style and a logical structure, which helps the reader to find significant points", while at the level B1, in regard to the thematic development, the language user is supposed to "be able to reasonably fluently relate a straightforward narrative or description as a linear sequence of points" (CEFR 2001, 61; 125). As a result, it seems that the more fluent the writing process is, the better the final text is in terms of its cohesion, complexity and overall quality. The CEFR evaluations can be regarded as useful indicators of the fluency of the end-product, and many studies have in fact studied the possible relationship between the quality of the end-product and the fluency of writing process (see e.g. Lindgren, Spelman Miller and Sullivan 2008; Spelman Miller, Lindgren and Sullivan 2008; Palviainen, Kalaja and Mäntylä 2012; Stevenson 2005), albeit the results of these studies have been somewhat contradictory with one another. Nevertheless, in the present research, the role of CEFR evaluations was mainly to provide information on the proficiency level of the participants. The proficiency level, in turn, was used in the analysis in order to determine whether the degree of correlation between L1-L2 fluency measurements would be dependent on the L2 proficiency, as some studies have demonstrated (e.g. Huensch and Tracy-Ventura 2017; Peltonen 2018).

While product-oriented studies disregard the writer and focus more on the writing outcome, in the process-oriented studies, the writer becomes the subject of the research. According to Hayes and Flower's cognitive model of the writing process, writing consists of three major cognitive processes: planning, translating and reviewing (Hayes and Flower 1980, 12). These are then further divided into different subprocesses, which include for instance generating relevant information for the writing task from the long-term memory, setting goals, and reading and editing of the text (ibid.). In process-oriented studies, writing is considered to be fluent when transitions between these cognitive processes are effortless and smooth (Palviainen, Kalaja and Mäntylä 2012, 49–50). L2 writers are likely to experience difficulties

in fluent retrieval of words and grammatical structures due to their limited proficiency in L2, which will thus burden their working memory more (Lindgren, Miller and Sullivan 2008, 134; Schoonen et al. 2003, 171). This, in turn, could lead to more frequent or different pausing behaviour and more frequent revisions compared to L1 writers (Schoonen et al. 2003, 171; Hall 1990; Spelman Miller 2000). In addition, as their working memory is occupied by lower-level linguistic demands, they might be less focused on the quality of the text, for instance in terms of organizing the text properly (Schoonen et al. 2003, 171). Besides differences in pausing and formulation behaviour, previous studies have shown that L2 writers produce shorter texts, lower number of words between the pauses, devote more time in solving formulation problems and display generally a slower rate of writing compared to L1 writers (see Silva, 1993 for a review of studies; Hall 1990; Chenoweth and Hayes 2001; Roca de Larios, Manchón and Murphy 2006; Van Waes and Leijten 2015).

In regard to measuring the fluency of the writing process, studies have generally used measures which relate to speed, length and time of production (Palviainen, Kalaja and Mäntylä 2012, 50). Thus, the traditional way to measure fluency has been to divide the total number of words by the total writing time (*ibid.*), which provides the writing rate. Written fluency is, in fact, regarded mainly as a temporal phenomenon in many of the previous studies, and some studies, like Chenoweth and Hayes' (2001, 81), have even defined it as "the rate of production of text". Similarly, Wolfe-Quintero et al. (1998) viewed speed and length as the most crucial parameters of fluency while they reviewed 39 studies in an attempt to find out the most valid measures of fluency connected to language proficiency. In their analysis, they concluded the best measures to be the number of words per T-unit, a T-unit being an independent clause with possible subordinate clauses attached to it, the number of words per error-free T-unit and the number of words per clause (Wolfe-Quintero et al. 1998, 29). However, as Kowal (2014, 231) and Chenoweth and Hayes (2001, 82) point out, Wolfe-Quintero et al. (1998) did not include in their research any studies which also take into account the possible disturbances in fluency, such as pauses and false starts, and thus these measures do not really explicate the production processes which enable a writer to compose text. Instead, researchers have started to use *Burst Size*, defined by Chenoweth and Hayes (2001, 88) as the number of words produced between pauses or revisions, as a better indicator of the fluency of the writing process. Kaufer, Hayes and Flower (1986, 126–127) found early on that writers produce texts in parts rather than full sentences. These sentence parts, i.e. bursts, were identified by pauses of two seconds or more, and the average length of them seemed to be connected to the writer's proficiency level (*ibid.*). Based on the results, the authors suggested that the average length of the bursts increases when

writers' proficiency develops (ibid.). The idea of the burst has since been developed further and many studies have added a measurement of *Fluency during Burst* (see e.g. Spelman Miller, Lindgren and Sullivan 2008), referring to the speed of writing during the burst. Given the fact that the unit of a word is problematic to define and use especially in computer-based studies, researchers have started to use characters instead of words as a measurement unit (see e.g. Palviainen, Kalaja and Mäntylä 2012; Lindgren, Spelman Miller and Sullivan 2008). Moreover, by focusing on characters instead of words, researchers are also able to compare the fluency of morphologically and syntactically distinct languages (Palviainen, Kalaja and Mäntylä 2012, 51). As a result, the present research also used characters as a measurement unit in the analysis, for the length of words could vary significantly between Finnish and English.

Based on previous research, it thus seems that investigating pauses, revisions and bursts, as well as text length and production rate, could potentially provide insight into the L2 writing fluency. A closely related concept to writing processes is also writer profiles, which have been created based on individuals' pausing and revision behaviour and the duration of their writing process. As they are created on the basis of many of the fluency measurements listed in this section, they could be useful in analysing and comparing L1 and L2 fluency behaviour individually. The different writer profiles will be presented next, as they will also be used in the qualitative analysis of the present research to help to categorize the participants.

## **2.2 Writer Profiles**

As mentioned in the previous section, the writing process consists of several cognitive processes, namely planning, formulation and revising, as well as their subprocesses. These processes are not independent of one another, but rather dynamic and overlapping at times (Manchón 2013, 103). In other words, in the course of composing a text, writers activate some processes while deactivating others, and move on from one process to another in a cyclical manner rather than linearly (ibid.) Given this dynamic and recursive nature of the writing process, it is unlikely that there exists a one single writing process but instead many possible ways for a writer to compose the text.

Previous studies have demonstrated that individuals tend to adopt different writing profiles in their composing process. In one of the earliest studies on writing processes, Hayes and Flower (1980) were able to identify four different writing profiles based on their study, where they used think-aloud methods to examine college students' pen and paper writing tasks. These profiles included the following types: 1) *Depth-first*, in which the writer moves on to the

next sentence only after finishing the first one, meaning that planning, translating and reviewing of each sentence is completed before moving on to another one; 2) *Postponed review* (term used by Van Waes and Schellens 2003, 831), in which all the possible thoughts are written down first, and only later reviewed, 3) *Perfect first draft*, in which the writer's aim is to produce a perfect first draft, and 4) *Breadth-first*, in which "a draft is planned and then written out in full before any review takes place" (Hayes and Flower 1980, 19-20). Writer profiles have since been investigated more for instance by Schwartz (1983), who created a similar typology to Hayes and Flower's (1980) but consisting of nine writer profiles. The problem of both of these studies, as Van Waes and Schellens (2003, 831–832) note, is that they describe the profiles in a rather general manner and the categories are not mutually exclusive, meaning that it is possible to categorize writers to several profiles instead of only one.

In a more recent study, Van Waes and Schellens (2003) developed a new writing typology by examining and comparing the effect of the writing mode (computer/pen&paper) on writing behaviour in L1 and by adding a novel quantitative approach to the definition of writer profiles. In their research, Van Waes and Schellens (2003) used a computer program *Keytrap*, which is a tool designed to record different variables related to participants' pausing and revision behaviour, as well as the duration of their writing process. In the present research, a similar keystroke logging tool (*ScriptLog*) was used, which also provides information regarding the writing process, such as the number and length of pauses and the total duration of the writing process. Therefore, the typology proposed by Van Waes and Schellens (2003) was adopted for analysis of the present research.

Van Waes and Schellens (2003, 836–837) base their typology of writer profiles on three different aspects of the writing process. Firstly, they investigated the aspect of *the time taken and the final product*, which included variables of total duration of the writing process, duration of each phase (phase 1: from initiation to the completion of first draft, phase 2: from the completion of first draft to the completion of the final version), ratio of time spent pausing to time spent actively writing and number of words in the final text (ibid.). Secondly, the participants' *pausing behaviour* was examined by means of the number, duration and type of pauses, as well as the linguistic and temporal location of pauses (ibid.). Finally, the *revision behaviour* was studied by examining the number, level, purpose, location, remoteness and temporal location of revisions (ibid.). Based on the findings, Van Waes and Schellens (2003, 844–845) were able to establish five different profiles:

1. *Initial planners* made rather few revisions, especially during the second phase of the writing process, and they tended to pause the longest during the initial planning phase. Their average pause length and the total time spent pausing were also above the average.
2. *Average writers* showed values which were the closest to the average values of the whole group in each of the variables.
3. *Fragmentary Stage I writers* (or *Fragmentary first-phase writers*, as used by Mutta, forthcoming) tended to revise more during the first phase of the composition process compared to the second phase, and the total number of revisions was higher compared to other profiles. They spent little time on initial planning and paused relatively often during writing, although the average duration of the pauses was short. Therefore, their writing process could be considered to be highly fragmented.
4. *Stage II writers* (or *Second-phase writers* as used by Mutta, forthcoming) made most of their revisions during the second phase and above the word level. They devoted a rather long time to initial planning, but once they started to write, they paused relatively little, albeit those pauses were relatively long.
5. *Non-stop writers* revised the least of all the groups and paused less often than others. They did not spend a long time on initial planning and completed the task more quickly than other groups

Van Waes and Schellens' taxonomy was used by Mutta (forthcoming) in her research on writing processes and writer profiles. The aim of the study was to examine the relationship between L2 fluency measures and writer profiles, and how they, in turn, are related to the quality of the end product (ibid.). The online data were collected by means of the recording tool *ScriptLog* and it consisted of texts produced by 11 Finnish university students of French (ibid.). The fluency of the texts was examined by using both, the process-oriented measurements (e.g. pause length, median transition times, number of editions and deletions, length of initial writing phase) and end-product values (e.g. the number of words, type/token ratio, evaluation scores) (ibid.). The process-oriented variables differed slightly from those used by Van Waes and Schellens (e.g. the use of paragraphs instead of phases), which Mutta explained to be due to the difficulty of distinguishing different writing phases from one another (ibid.). In the end, Mutta was able to classify the participants into four different writer profiles (leaving out the average writers), although she points out that some of the writers seemed to possess characteristics of

several profiles and, therefore, the categorization was mostly done on the basis of prevailing features of the writers (ibid.). The results of the study showed that there was no linear relationship between the process-oriented fluency measures and the quality of the end product (ibid.). Consequently, it could be assumed that the different writer profiles were not connected to the success of the end product (ibid.). Writer profiles are also discussed in Mutta's (2007) doctoral dissertation, where she examined writer profiles as part of the research related to L1 and L2 writing processes. By examining the individual writer profiles, Mutta was able to find similarities between individuals' L1 and L2 writing processes (Mutta 2007, 223). Although the sample size in this case was small (N=5), the findings suggest that writers' L1 and L2 profiles could be related to one another, thus indicating also a relation between L1 and L2 fluency. The present research was set out to investigate this matter. However, before moving to the research methodology, which will present the aim and the methods of the study in more detail, I will review some of the previous studies which have been conducted on the L1-L2 fluency relationship.

### **3 The Relationship between L1 and L2 Fluency**

The last two sections have provided insight into L2 writing processes and different fluency measures. They have not, nevertheless, answered the question as to why there exists variation among L2 users in terms of their fluency. Studies suggest that at least some of the variance could be explained by learners' fluency in L1. In other words, individuals who are fluent in their L1 could also possess similar characteristics in their L2 performance. However, the relationship between L1 and L2 fluency is not entirely straightforward, as many of the earlier studies have demonstrated. Next, some of these studies and their conclusions are presented. First, this section will provide an overview of the previous research which has had the same goal as the present study. However, it has to be noted that as there does not seem to exist previous studies which have focused on L1-L2 fluency connections specifically in writing contexts, most of the studies presented here have been conducted by using oral data. Thus, their results might not be entirely comparable. They provide, nevertheless, an overview of the possible outcome also for the current research. After this, this section will also present some of the earlier writing fluency studies with a different focus compared to the present study, but which have, nevertheless, referred to L1-L2 connections briefly in their results. Thus, their findings are useful for the current study as well.

As mentioned, many of the previous studies which have examined the use of L1 in L2 productions have mainly focused on measuring speaking or reading skills. The studies have found that there does, in fact, exist a relationship between L1 and L2 skills at least to some extent, although the relationship seems to depend on multiple different factors, such as L2 proficiency level and crosslinguistic similarities and differences. One of the first comprehensive studies examining the topic was conducted by Derwing et al. (2009), who compared L1 and L2 oral productions of 16 Slavic and 16 Mandarin beginner learners in their longitudinal study. They found statistically significant correlations between L1 and L2 fluency at the initial stages of L2 exposure for both groups, although the correlation was found to be stronger for the Slavic group (Derwing et al. 2009, 552–553). At the later stages of data collection, the findings revealed a correlation only for the Slavic group (*ibid.*). The authors explain that the variance between the two groups might be due to the typological closeness of Slavic speakers' L1 to English, which might have given them an advantage over the Mandarin speakers especially at the beginning of learning (*ibid.*). In addition, they argue that some of the individuals in the Mandarin group might not have developed during the study, which could explain the lack of correlation at the later stages of data collection (*ibid.*). The results of the study are thus

inconclusive as to what extent the L1 fluency influences the L2 fluency, since the correlations were not consistent and significant at all the stages of the data collection process. Therefore, the authors emphasize the need for further longitudinal investigations, involving also a wider variety of L1s in order to examine fluency in different language pairings (Derwing et al. 2009, 555).

In a more recent study, De Jong et al. (2015) investigated two different L1 language groups (n=53), English and Turkish, and compared their speech samples in L2 Dutch. Besides examining the cross-linguistic differences of the two L1 groups, their aim was to investigate whether measures of L2 fluency which were corrected for L1 fluency behaviour could predict the overall L2 proficiency (measured by a productive vocabulary task) better than uncorrected L2 measures (De Jong et al. 2015, 226). The results revealed statistically significant correlations between all the L1 and L2 fluency measures, the strength of the correlation ranging from  $r = .37$  for mean syllable duration to  $r = .76$  for mean silent pause duration between ASU (Analysis of Speech Units) (De Jong et al. 2015, 233). In addition, the findings of the regression analyses showed that all the L2 fluency measures could be predicted from the L1 measures, the success of prediction varying from 21 % for mean syllable duration to 57 % for mean length of pauses between ASU (De Jong et al. 2015, 234). Moreover, the results indicated that both, uncorrected and corrected measures, predict L2 proficiency equally well, except for mean syllable duration, for which the corrected measure was a stronger predictor than the uncorrected one (De Jong et al. 2015, 237). Regarding the question of cross-linguistic differences, the results showed that the two language groups differed in their L1 fluency in syllable duration, the number of silent pauses and repetitions, but no similar differences were found in their L2 (De Jong et al. 2015, 231–232). Therefore, the authors concluded that the typological closeness of L1 did not affect the predictive value of L2 measures (*ibid.*).

Huensch and Tracy-Ventura (2017) studied longitudinally the connections between L1 (English) and L2 (Spanish and French) (n=49) oral fluency by employing similar research design and fluency measures as Jong et al. (2015). By taking into account not only L1 fluency, but also cross-linguistic differences and the L2 proficiency (measured by Elicited Imitation Test), they wanted to explore the relative contribution of each variable in predicting the L2 fluency (Huensch and Tracy-Ventura 2017, 761). Overall, the results demonstrated weak to strong positive correlations between the L1 and the L2 fluency measures both before and after 5 months' residence abroad, although only a subset of the correlations was statistically significant (Huensch and Tracy-Ventura 2017, 773). Regression analyses showed that before the residence abroad, only three of the measures (mean syllable duration, the number of silent

pauses per second, mean silent pause duration within ASU) could be predicted based on L1 measures, L2 group status and proficiency; L1 fluency only contributing to the first two of these (Huensch and Tracy-Ventura 2017, 774; 779–780). In contrast, after the residence, L1 fluency contributed significantly to all the L2 measures, while the L2 group contributed to measures where cross-linguistic differences had been found between the native speakers as a result of a separate analysis comparing native English, Spanish and French speakers (*ibid.*). L2 proficiency, on the other hand, did not contribute any of the measures (*ibid.*). Based on these findings, the authors conclude that the role of L1 fluency and cross-linguistics differences seem to change as learners improve in L2 fluency; the relationship being weaker at the initial stages of learning and explaining variance in L2 fluency more as learners develop (Huensch and Tracy-Ventura 2017, 780).

The connections between L1 and L2 oral fluency have also been examined in the Finnish context by Peltonen (2018), who studied Finnish learners of English (n=42) by using a mixed-methods approach. The school level of the participants, ninth grade and second-year upper secondary school, was taken into account in the analysis in order to determine the L2 proficiency level of the learners (Peltonen 2018, 679). Peltonen (*ibid.*) examined fluency from two different perspectives: quantitatively by analysing rank-order correlations and regression models, and qualitatively by selecting a number of participants and analysing their L1 and L2 productions more closely. The results of the rank-order correlation analyses showed statistically significant positive correlations between the majority of the fluency measures, the strength of the correlations varying from medium to large effects (Peltonen 2018, 687). The strongest correlations were found in the mean length of end-clause SPs, mean length of SPs, mid-clause SPs/min and articulation rate, which are part of the temporal fluency measurements (Peltonen 2018, 684). Similarly, the regression analyses revealed that the L2 fluency measures could be predicted from the equivalent L1 measures at least to some extent (Peltonen 2018, 689). In regard to the role of L2 proficiency, the results seemed to be in line with the previous studies, as they indicated that the L1-L2 correlations were stronger for the more proficient group (Peltonen 2018, 688).

The same question of L1 and L2 interrelations has also been studied in writing contexts. It has been found that writers resort to their L1-based strategies for a variety of different functions, such as planning and organizing the text, solving linguistic and stylistic problems, as well as monitoring and controlling the writing process by changing languages (Manchón 2013, 109; Manchón, Roca de Larios and Murphy 2007, 239–242). Moreover, research has provided evidence that the use of L1 strategies is related to L2 proficiency (Manchón 2013, 109; Wang

2003). If the L2 proficiency is low, L1 has mainly a compensatory function, which is reflected, for instance, as a higher number of borrowings and translations (Manchón 2013, 110; Wang 2003; Navés, Miralpeix and Celaya 2005; Sasaki 2000). As the L2 proficiency develops, fluency increases, and learners start to use L1 as a means for more higher-level writing processes and overall aspects of language generation, such as solving rhetorical and discourse problems (Manchón, Roca de Larios and Murphy 2007, 242; Wang 2003; Manchón 2013, 110).

Although there are many studies which examine the use of L1 in L2 writing, especially concerning writing skills and strategies as the previous paragraph demonstrates, the number of studies focusing solely on the fluency aspect in writing has been scarce. Those writing fluency studies, which have used and compared both L1 and L2 data, have mostly focused on L2 fluency in relation to different proficiency levels (see e.g. Chenoweth and Hayes 2001) or studied fluency from a developmental perspective (see e.g. Lindgren, Spelman Miller and Sullivan 2008; Yang and Sun 2015; Kobayashi and Rinnert 2013). Chenoweth and Hayes (2001) explored the relationship between writing fluency and linguistic experience by studying native speakers of English (n=13) who were learning French or German as a third-semester or as a fifth- or sixth-semester course. In the analysis, they used the texts composed by the students, as well as think-aloud methods and videotapes of the writing sessions (Chenoweth and Hayes 2001, 86-87). The results revealed that the L2 experience had an impact on the fluency of the texts, which they measured in their study by words written per minute (Chenoweth and Hayes 2001, 89). When investigating and comparing L2 and L1 fluency separately, the findings showed that although the more proficient learners were more fluent in their L2, the average number of words written in minute being 10.91 compared to 10.61 produced by the less proficient group, they were also surprisingly less fluent in their L1, the average being 13.831 words while the other group produced 20.1 words (Chenoweth and Hayes 2001, 89-90). The authors suggested that the fifth-year students of their study happened to have lower verbal skills in general, which led to a reduced fluency in both, L1 and L2 (*ibid.*). In addition, the authors found out that differences in fluency were related to the length of P-Bursts, the burst sizes being longer with the more proficient group, and in general longer in L1 compared to L2 with all the learners (Chenoweth and Hayes 2001, 91-92).

Lindgren, Spelman Miller and Sullivan (2008) examined the development of fluency of Swedish high-school students (n=17) longitudinally over the course of two consecutive years by comparing texts the students wrote in their L1 Swedish and L2 English. The fluency of the texts was evaluated by using measurements of *fluency*, *burst* and *fluency during burst*, and they analysed the data with the help of ANOVA and linear regression models (Lindgren,

Spelman Miller and Sullivan 2008, 138-141). The results indicated that the linguistic experience had a positive effect on all the three fluency measures, as well as on the quality of the text, measured by grade, and the number of conceptual revisions, meaning that learners focused more on the conceptual aspects of writing once their proficiency developed (Lindgren, Spelman Miller and Sullivan 2008, 146-147). In regard to differences between L1 and L2 fluency measures, the results revealed that students were more fluent in their L1 writing compared to L2 (ibid.). However, interestingly, the findings also indicated that they improved more in fluency measures in L1 over a two-year period (ibid.). The authors suggested that one explanation for the results was that the students developed their writer status more in L1 during this time, while fluency problems continued to be present in L2 writing (ibid.). The measures between L1 and L2 also revealed that the learners employed different writing and revision processes in these two languages, where they, for instance, revised more in L2 and paused less in L1 (ibid.).

Yang and Sun (2015) focused on the development of L2 complexity, accuracy and fluency by studying undergraduate multilingual learners' (n=5) L1 (Chinese), L2 (English) and L3 (French) writing longitudinally during one academic year. In their study, fluency was measured by the mean number of words per t-unit, in which they also took into account the syntactic differences of languages by defining the concept differently in Chinese (Yang and Sun 2015, 301). The results showed that the developmental patterns in CAF measures were not linear and they were characterized with constants changes, increases and backsliding (Yang and Sun 2015, 306). In addition, when the authors examined the relationship between complexity, accuracy and fluency within one language, as well as across all the languages, the findings implied there to be a relation between them to a certain degree, although the only statistically significant correlation was found between L1 and L3 accuracy (Yang and Sun 2015, 304-305). Thus, the study further demonstrates that multilingual learners' different languages interact with each other (Yang and Sun 2015, 307).

As the results of these studies demonstrate, learners exhibit some differences in writing processes and writing fluency between the L1 and L2. However, as these studies have had a slightly different emphasis and have mainly focused on the possible differences in fluency between L1 and L2 data, the actual L1-L2 connections of writing fluency on the individual level have still remained an under-researched issue. The relationship between L1 and L2 writing proficiency, on the contrary, has been a subject of many studies, and many of them have in fact been able to attest a relation between the two constructs (see e.g. Sasaki and Hirose 1996; Schoonen et al. 2003; Schoonen et al. 2011). Consequently, as fluency is

generally regarded as one of the possible indicators of L2 proficiency (see section 2.1.), the results of these writing proficiency studies could indicate that also L1 fluency somewhat correlates with L2 fluency.

This section has discussed the possible effects of L1 fluency on L2 fluency and introduced some of the earlier studies which have been conducted on the subject. Nevertheless, it has to be noted that since many of these studies have examined oral fluency instead of a written one, the results might not be entirely comparable to the current research. After all, as it was already mentioned in section 2.2., individuals' oral and written fluency might differ from one another due to the divergent cognitive processes required to produce the modes. Despite these issues, it was important to have some reference points, and therefore, the findings presented in this section will also work as a starting point for the current study.

## **4 Research methodology**

In this section, the research methodology will be presented in more detail. First, the research questions and the hypotheses will be explained. Second, the data collection methods will be described in more detail, and finally, the methods of analysing the data.

### **4.1 The Aim of the Research**

The data were collected as a part of the larger research project, which explores how formulaic sequences are used and how they can be recognized in three morphologically different languages (Swedish, English, Finnish). It has collected written online data from upper-secondary school students in the form of essays. The linguistic background of the participants also varies, as students with diverse L1s (Finnish, Swedish) have composed essays in different L2s (English, Swedish and/or Finnish depending their L1).

The present research used the already collected data for the purpose of examining and comparing the essays in terms of their fluency. The objective was to examine the connections between first and second language fluency by analysing the features of the writing process. The L1-L2 connections were explored first quantitatively by using correlation and regression models. Subsequently, a more profound qualitative approach was used in which the essays were examined individually with the help of the categorization of writer profiles. The following research questions were addressed:

- 1) To what degree do measures of L1 fluency correlate with equivalent measures of L2 fluency?
- 2) To what extent can L2 measures of fluency be predicted from the equivalent L1 measures of fluency?
- 3) To what extent do writer profiles in L1 and L2 correspond to one another?

Based on the findings of the previous studies, it was hypothesized that the present research would also find a relation between L1 and L2 fluency measures; the correlation potentially being stronger for the more proficient learners. Additionally, it was expected that the participants could somewhat be categorized to different writer profiles, and that these profiles would also correspond to one another in the individual's L1 and L2. In other words, it was presumed that writers who belong to a certain group in their L1 writing would also possess similar characteristics in their L2 writing, which would further reinforce the relation between L1 and L2 fluency. By using a mixed-methods approach, where quantitative research questions

were complemented with a more profound qualitative analysis on personal writing characteristics, the aim was to study L2 fluency from a new perspective, and thus contribute to the currently under-researched field of L1-L2 writing fluency connections.

## 4.2 Data Collection and Processing

The online data consisted of essays written by Finnish upper secondary school students (N=16, 3 males, 13 females; aged between 16 and 17 years) in their L1 (Finnish) and L2 (English and Swedish). Given the scope of the present study, only the essays written in Finnish and English were analysed. However, for future research, it could be useful to examine not only the relation between an individual's L1 and L2, but also the role of the possible L3s or L4s in the process. In the data collection phase, the students were asked to write the essays by means of the keystroke recording tool *Sriptlog* (Strömqvist and Karlsson 2002), which is a programme designed to record every keystroke, mouse and cursor movement during the writing session. First, the students were given 30 minutes to plan and compose an argumentative essay in Swedish, and then another 30 minutes to write one in English. Lastly, they had 30 minutes to complete a similar argumentative essay in their L1 (Finnish). The length of the essays was instructed to be around 150-250 words and they had to be composed without the help of dictionaries or other resources. In order to determine the language proficiency level of participants, the L2 essays were later evaluated by two reviewers who gave the grade according to the CEFR-scale. Two of the essays were graded as A2 (referred in this study as P1 and P2), six as B1 (P3-P8), seven as B2 (P9-P15) and one as C1 level (P16). The instructions given to the students regarding L2 English essay were as follows:

*“Youth for Understanding organization is inviting texts from the young from different parts of the world to create a website depicting life around the globe. The topic of the text is 'Today's people only care about themselves and not about the whole community' - Please write a text in English presenting and arguing for your views and opinions. Write a title yourself.”*

For the L1 Finnish essay the students were instructed as follows:

*“Ruotsin kielen opetuksesta suomenkielisissä kouluissa käydään paljon keskustelua. Miksi ruotsin kieltä kannattaa opiskella? Ota kantaa ja pohdi, mitä etua ja hyötyä ruotsin osaamisesta on opinnoissa ja työelämässä. Perustele näkemyksesi. Kirjoita kantaottava teksti Suomen Lukiolaisten liiton kampanjaan monipuolisesta kielitaidosta.”*

*“Mandatory Swedish in Finnish schools has been a hot topic of conversation. Why do you think students should study Swedish? Write an argumentative text on the subject for The Union of Upper Secondary School Students in Finland, which campaigns for a versatile knowledge of languages. You should argue your opinions clearly and discuss what advantages learning Swedish might give to further studies and working life.”* (my translation)

The fluency of the writing process was measured by employing a set of variables which have been used by previous studies and, therefore, have shown to characterize well the underlying writing process. These included measures which can automatically be extracted from *ScriptLog* logfiles, namely the total number of typed characters (including spaces, letters and punctuation marks), total writing time, the total number of pauses, total pause time, average pause length and mean transition time. In addition, the length of the initial planning phase (from the beginning to the start of the second sentence), the length of the revision phase (time reserved for revising text after completing the first draft) and the number of revisions were calculated based on the LIN files. The original categorization of writer profiles by Van Waes and Schellens (2003) and the categories used by Mutta (forthcoming) were also mainly based on these variables. Furthermore, the measures of fluency (linear), fluency (product), burst and fluency during burst were applied as they have often been used in the writing fluency studies (e.g. Palviainen, Kalaja and Mäntylä 2012; Schoonen et al. 2003; Lindgren, Spelman Miller and Sullivan 2008). The measures were operationalized as follows:

- *Fluency (linear)* = number of characters produced per minute
- *Fluency (product)* = number of characters produced per minute in the final text
- *Burst* = total number of typed characters / (total number of revisions + total number of pauses)
- *Fluency during Burst* = total number of typed characters / (total writing time – total pausing time)

Bursts were further examined by calculating separately *P-Bursts*, which in this study denotes the mean number of characters the writer produces between pauses, and *R-Bursts*, which refers to the mean number of revisions which writers perform during one burst. Despite the fact that these two notions have not been widely used in previous studies, they were incorporated into the current study in the hope of examining the concept of *Burst* more thoroughly. In regard to pauses, a threshold level of 2000 milliseconds was used to determine which interruptions could be considered as pauses during the writing process, and which could be excluded as so-called “technical pauses”, resulting from writers correcting typological errors. Furthermore, it enabled the comparison of results with the previous studies which have used the same time criterion

(e.g. Mutta, forthcoming). Revisions included all the backspaces and deletions which writer performed during the writing process in order to edit the text. It has to be noted that some studies have included also insertions of characters to the notion of revision (e.g. Palviainen, Kalaja and Mäntylä 2012; Lindgren, Spelman Miller and Sullivan 2008). However, as it was difficult to determine when the writer was editing the text instead of producing it, insertions of the characters were left out from the current research. For future research, it might be useful to combine computer-based analysis with a retrospective think-aloud method, in which writers could verbalize their thoughts after the composing process to explain in which instances they edited the text and where they produced new pieces of text. This way, the individual writing processes would become more explicit also for research purposes.

The burst refers to the average number of characters typed between pauses and/or revisions while fluency during burst to the speed of typing between pauses or revisions, which can both be seen as indicators of the general smoothness of the composition process. Similarly, the variable of mean transition time (TT) is related to the speed of writing, since it measures how fast the writer proceeds between letters in a word (Kowal 2014, 236). Mean transition time is related to the automaticity in writing, the assumption being that a writer with higher automaticity is able to retrieve language items more quickly and, as a result, produce text faster compared to a writer whose cognitive processes have yet to automatize (ibid.).

### **4.3 Methods of Analysis**

Once all the values were collected from the participants' personal *ScriptLog* files, the statistical analyses were performed by means of SPSS. First, the Shapiro-Wilk test was conducted in order to investigate whether the data were approximately normally distributed. The assumption of normality is a prerequisite for many statistical procedures, including parametric tests (Razali and Yap 2011, 21). The Shapiro-Wilk test was chosen to assess the normality, as it has been generally used with small sample sizes and it has been showed to be one of the best indicators of non-normality among the other tests (Razali and Yap 2011, 25; Shapiro, Wilk and Chen 1968, 1371). Since some of the variables were non-normally distributed in the data, a nonparametric test was selected for the purpose of examining the correlations. Nonparametric tests are preferred in cases where the sample size is rather small and there is a possibility of marked departures from the normal distribution (Dörnyei 2007, 227; Şen 2017, 69). Therefore, to answer the research question number 1, the Spearman rank-order correlation coefficients were conducted to test the correlation of the fluency measures between L1 and L2. It was

decided that not all the possible variables were tested, but those which were regarded as good indicators of overall written fluency. These variables included measures related to pausing behaviour (total pause time, the number and mean length of pauses, pause time in relation to the total typing time), speed of writing (fluency product, fluency linear), as well as the concept of burst (burst, P-burst, R-burst, fluency during burst) and revisions. Besides calculating the correlations for the group as a whole, they were also computed separately for groups with different proficiency levels in order to see whether the degree of correlation between L1-L2 fluency measurements would be dependent on the L2 proficiency. Since the sample size was rather small and there were not enough participants for all the six CEFR levels, it was decided that levels A2 and B1 formed one group ( $n=8$ ), while B2 and C2 formed another ( $n=8$ ). This enabled comparing and testing two different proficiency groups. The effect sizes were interpreted by using Plonsky and Oswald's (2014, 889) levels, where  $r$ s close to .25 is considered small, .40 medium, and .60 large, since they have been frequently applied in L2 research. To examine the second research question, simple linear regression analyses were performed to those variables where correlations were found. By using regression analyses, one is able to look into which factors independently contribute to explaining the variance in the studied variable (Larson-Hall 2016, 224-225), and thus it suited well for the present research as well, as the purpose was to explain and predict the phenomenon profoundly. The proficiency level was also taken into account in the analysis by carrying out hierarchical multiple regressions, where the L1 fluency measure was added first, and the proficiency level next to see whether the explained variance in L2 measures would increase by adding a proficiency group. The assumptions of regression analysis, including linear relationship, normal distribution of errors, homoscedasticity, checking for outliers and multicollinearity (for hierarchical regression), were checked and met for these variables, so there was no need for transforming the data.

After the quantitative description of the data, the writing processes of the participants were examined individually with the help of Van Waes and Schellens' (2003) and Mutta's (forthcoming) categorization of writer profiles. Although the variables used were mostly the same, there were some changes in interpreting the results. For instance, in the original Van Waes and Schellens' categorization, the second-phase writers were characterised to have more revisions in their second phase compared to the first one. However, as none of the participants actually revised the texts more during the second phase, it was decided that in this group would belong those who revised clearly more than average during the second phase. Moreover, the present research did not examine the type, level nor the location of pauses. Instead, the total

number of pauses and the mean length of them were calculated and they were then considered in relation to the total typing time. In the analysis, individuals' values were compared to the mean values of the group in order to see which writer profile they would belong to. A qualitative description of the data also enabled a closer examination of different proficiency levels. This was necessary since due to the small number of participants, the quantitative analysis alone would not have been enough to demonstrate the possible differences between the groups. In the qualitative analysis of the proficiency groups, the participants of the same CEFR levels were grouped together and examined individually, and their values were then compared to the mean values of the group. By this, the present research aimed to get more insight into the possible differences of the proficiency groups. The results of the analysis will be presented next.

## 5 Fluency in Finnish Students' Writing

This section will start by presenting the descriptive statistics for all the variables in L1 and L2 for the whole sample. It will then move on to reporting the results of the quantitative analysis, namely, the correlations between the fluency measures and regressions analyses. These are further complemented with a group level qualitative analysis. Lastly, the participants' essays are examined individually and the fluency-related features of their writing processes in L1 and L2 are explored more profoundly.

The descriptive statistics for the whole group in L1 and L2 are presented in Table 1.

**Table 1.** Means (and Standard Deviations) of the Fluency Measures

Measure	L1 (Finnish) <i>M (SD)</i>	L2 (English) <i>M (SD)</i>
Total pause time (s)	327.75 (14.15)	530.51 (162.98)
The number of pauses	35.19 (12.58)	66.63 (23.53)
The mean length of pauses (s)	9.83 (3.95)	8.56 (3.71)
Pause time / typing time (%)	44.50 (12.00)	52.25 (14.74)
The number of revisions	329.69 (222.59)	396.88 (332.35)
Fluency (product)	99.64 (27.37)	65.27 (27.25)
Fluency (linear)	128.81 (29.56)	89.39 (32.60)
Burst	5.24 (2.24)	4.26 (2.43)
P-Burst	46.65 (16.63)	24.36 (11.59)
R-Burst	9.67 (5.73)	6.00 (4.26)
Fluency during Burst	236.54 (45.78)	188.38 (40.82)
The length of the initial planning phase (s)	27.94 (22.92)	95.81 (147.53)
The length of the revision phase (s)	82.00 (119.27)	114.81 (129.63)
Mean transition time (s)	0.17 (0.04)	0.19 (0.06)

As can be seen from the table, the participants seemed to be more fluent in their L1 overall, which is line with the previous findings (see e.g. see Silva, 1993 for a review of studies). The only exceptions were the mean length of pauses, which was longer in L1, and R-Burst, which indicated that the participants revised the L1 text more during one burst compared to L2 text. Although the pauses were longer in L1, the mean number of pauses was significantly lower compared to L2 texts and P-Bursts were longer, thus indicating that even though the participants might have allocated more time on thinking what to write next, once they started to write the process was smooth. Similarly, R-Burst sizes might also be reflected by the smoother writing process; when writing in L1, writers do not have to pay extra attention to the language structures, and therefore, they might easily make extra keystrokes by mistake, especially when typing fast with a keyboard. This hypothesis is also supported by the values of the mean transition time, which in L1 was shorter, meaning that the participants typed slightly faster in their L1. Overall, the mean transition time was short for almost all of the participants in both languages, indicating that they were all experienced users of a computer keyboard. The only exception in the group was P2, whose value in L1 was 0.3 and in L2 0.38. Hence, it seems that P2 could have been slightly less experienced with using a keyboard compared to others. However, overall in this study, the mean transition time did not provide any information on the possible individual differences in fluency, since most of the participants seemed to be within the range of normal individual variation in this variable.

## **5.1 The Correlations between L1 and L2 Fluency Measures**

The first research question examined to which degree the L1 fluency measures correlate with the equivalent L2 fluency measures. The results of the Spearman's rank order correlations are presented in Table 2.

**Table 2.** Correlations between L1 and L2 Fluency Measures for the Whole Sample and for the Two Groups Separately

Measure	Groups combined	Group A2-B1	Group B2-C2
Total pause time	.226	.476	-.024
The number of pauses	.418	.443	.708*
The mean length of pauses	.708*	.905*	.515
Pause time / typing time	.354	.635	.187
The number of revisions	.191	.381	-.071
Fluency (product)	.159	.310	-.095
Fluency (linear)	.229	.238	.167
Burst	.071	.190	.084
P-Burst	.491	.476	.714*
R-Burst	.037	.381	-.168
Fluency during Burst	.068	.214	-.214

Note \*  $p < .05$

For the whole group, the results indicated only a weak and statistically not significant correlation for the majority of the measures. The only exception was the mean length of pauses, where the correlation was found to be strong and statistically significant ( $r_s = .708$ ,  $p = .002$ ). The variables of P-Burst ( $r_s = .491$ ,  $p = .053$ ) and the number of pauses ( $r_s = .418$ ,  $p = .107$ ) also showed moderate correlations, although they did not quite reach the required statistical significance level. However, it has to be noted that as P-Burst was quite close to the required level even with a small number of participants, a larger number of data might already be enough to show a positive significant correlation between the L1 and L2 in this variable. Overall, based on the correlation analysis, it seems that there could potentially be a relation between the individual's writing processes in L1 and L2 in regard to pausing behaviour, since measures which covered pauses showed the strongest correlations. The more complex measures which also entailed revisions in some form, on the other hand, did not seem to correlate as strongly in

L1 and L2 writing processes. The possible explanations for this will be discussed in more detail in the following section.

The results of the group-level analysis revealed surprisingly somewhat stronger correlations for the less proficient group, although the only statistically significant positive correlation was found in the mean length of pauses ( $r_s = .905$ ,  $p = .002$ ). In the second group, on the other hand, the measures of number of pauses ( $r_s = .708$ ,  $p = .050$ ) and P-Burst ( $r_s = .714$ ,  $p = .047$ ) were strongly connected. Based on these results, it is difficult to say overall whether the L1 and L2 measures correlate stronger for one group over the other, since only a few of the measures showed statistically significant correlations.

A closer qualitative analysis of the different proficiency groups seemed to corroborate these findings. For instance, in the A2 level (P1+P2), the writers' total pausing time was above the group average, and the size of their P-Bursts was somewhat shorter compared to other participants. However, when these same writers were composing texts in their L1, they did not share the same characteristics. Although they still spent slightly above the average time pausing while writing, their P-Burst sizes varied. P1's burst size was one the highest of the whole group in L1, while P2 still produced very few characters between the pauses compared to others. Similarly, there was individual variation in other proficiency levels. For instance, one of the B2 level participants, P9, had very similar writing processes in L1 and L2. He paused quite many times for a short period of time in both languages, which also made the P-Bursts and R-Bursts in both languages relatively short. On the contrary, P10 from B2 level had a very dissimilar composing processes, as he revised the L2 text the least compared to others, making thus the R-Burst size small, whereas in L1, his R-Bursts were the longest of the whole group. Therefore, based on these findings, it seems that there might be some differences between the groups with different proficiency levels. However, the findings do not provide any conclusive answer as to whether the connections between L1 and L2 fluency measures actually increase when learners become more proficient in L2. The fluency characteristics of the individual writers in L1 and L2 are discussed more in section 4.3. Before that, the connections between the L1 and L2 fluency measures are further explored with simple and hierarchical regression analysis.

## **5.2 Predicting L2 Fluency**

The second research question examined how much of the variability in L2 measures could be predicted on the basis of the equivalent L1 fluency measures. To address this question, simple linear regressions were conducted on those measures, where statistically significant correlations

were found in the previous section. These measures included the mean length of pauses, the number of pauses and P-Burst. After this, the possibility of proficiency level increasing the explained variance was examined with hierarchical multiple regression analysis. The results of the simple regression analysis are presented in Table 3.

**Table 3.** Results of the Simple Regression Models

Measure	<i>B</i>	Std. error	Beta	<i>F</i> (1,14)	<i>p</i>	Adj. <i>R</i> <sup>2</sup>
The mean length of pauses	.591	.195	.630	9.223	.009	.354
The number of pauses	.675	.466	.361	2.094	.170	.068
P-Burst	.430	.147	.617	8.604	.011	.336

As can be seen from the table, the models predicting L2 measures from L1 measures were significant for the mean length of pauses, where the L1 measure accounted for 35% of the variance in L2 measure, and for P-Burst, where the L1 measure explained 34% of the variability. Hierarchical regression analyses revealed the proficiency level not to be a statistically significant predictor in the models, despite the fact the explained variance increased in two of the variables. For P-Bursts, including the proficiency level in the model increased the explained variance from 34% to 47% (Adj. *R*<sup>2</sup> = .471, *F* (2,13) = 7.676, *p* = 0.052). Similarly, for the number of pauses, the explained variance increased from 7% to 21% (Adj. *R*<sup>2</sup> = .206, *F* (2,13) = 2.954, *p* = .087). However, the increase was not statistically significant, as was not the original model where only the effect of L1 measures was tested. In regard to the mean length of pauses, adding the proficiency level as a predictor did not increase the explained variance. Overall, the results of the regression analyses showed that L2 fluency measures could be predicted from L1 measures to some extent, and therefore they support the findings of the correlational analyses. However, the role of the proficiency level in L1-L2 connections remains unclear, since it did not turn out to be a statistically significant predictor in the models in this case.

### **5.3 Qualitative Analysis: Individual Writer Profiles in L1 and L2**

The third research question focused on exploring the possible individual differences in L1 and L2 fluency. For this purpose, the essays were analysed individually for their fluency characteristics with the help of the categorization of different writer profiles.

#### **P1 (L2 proficiency level A2):**

P1 is a great example of an initial planner in his L2. His initial planning time exceeded significantly the average time in L2 writing. Moreover, although P1 paused relatively few times, he spent around 75% of the total writing time pausing, and the average length of pauses was markedly longer compared to others. Based on the revision strategies, P1 could also be classified in the same group, as he revised the text very little, especially during the second phase of writing. Similarly, in his L1 essay, P1's pauses were relatively long and the number of overall revisions small, although in L1 he did not devote as much time to initial planning as in his L2 essay. It is also noteworthy, that P1's total typing time was shorter than the average in both, L1 and L2 essays. Overall, the writing processes in L1 and L2 seemed to be very similar in regard to pausing and revision behaviour.

#### **P2 (L2 proficiency level A2):**

P2 differed slightly in his L1 and L2 writing processes. In his L2 essay, P2 had a long initial planning phase, he paused very often, and the total pause time was above average, although the mean length of pauses stayed below average. Furthermore, P1 made very few revisions overall. Thus, he could be regarded mainly as an initial planner in L2. In L1 writing, however, P2 had mainly characteristics of a non-stop writer. He revised the text very little and paused relatively few times, although the total pause time and mean length of pauses showed somewhat average values. Moreover, he did not allocate much time to initial planning and completed the task fairly quickly, although it has to be noted that he also typed the least during the assignment, which might have contributed on its part to the short completion time. P2's pausing and typing behaviour might have also been influenced by slightly longer mean transition time compared to others, indicating that he might not be as experienced with using a keyboard.

#### **P3 (L2 proficiency level B1):**

P3 could be categorized as a non-stop writer in both languages. In L2, he completed the writing task more quickly than others and spent only little time on initial planning. In addition, he

paused few times and the mean length of pauses and the total pause time were shortest compared to all the other participants. Similarly, in his L1 writing, P3's initial planning phase, mean length of pauses and the total time spent pausing all clearly laid lower than the average. As for his revision behaviour, P3 seemed to have similar strategies in L1 and L2, since he revised both texts very little, especially during the second phase of writing.

**P4 (L2 proficiency level B1):**

In L2, P4 revised the text more than average focusing on the first phase. In his L1 writing, P4 revised less, but all the revisions were made in a similar manner during the first phase. The number of pauses and total pause length were quite close to the average values in both languages, although the mean length of pauses was slightly above average. The length of the initial phase did not surpass the average level in L2 writing, while in L1 it did. Overall, P4 could be categorized as a fragmentary first-phase writer in L2 and as an initial planner in L1.

**P5 (L2 proficiency level B1):**

P5 could be regarded as a fragmentary first-phase writer in his L2. Although the initial planning time was relatively long for the profile in question, P5 revised the text a lot during the first phase, and he paused many times for a relatively short period, which made the process highly fragmented. In his L1 writing, although P5 did not revise the text as much as in L2, the revisions were also centred on the first phase and the pauses were relatively short. However, as the number of pauses, total pause time and total typing time were all below average, P5 had mainly the characteristics of a non-stop writer in his L1.

**P6 (L2 proficiency level B1):**

In L2, P6 revised the text significantly more compared to other participants. A closer examination of the writing process revealed that P6 had accidentally used a copy-paste – shortcut in the middle of writing, which pasted the earlier essay written in Swedish inside the text. He had to remove the Swedish text before continuing the essay, which naturally left a trace to the programme. Therefore, the values related to P6's revision behaviour might be slightly erroneous. Despite this incident, P6 revised the text a lot also otherwise. He also paused quite often for a short period of time, for which he could be considered mainly as a fragmentary first-phase writer. In L1, P6's values did not differ significantly from average values, with the exception of mean length of pauses, which was shorter and initial planning phase, which was longer than average. Consequently, P6 was predominantly an initial planner in L1.

**P7 (L2 proficiency level B1):**

In L2, P7 paused more than any other participant did, although the length of pauses remained short. In L1, on the contrary, the number of pauses was slightly below average, and the length of them was not considerably shorter compared to others. Despite the differing pausing behaviour, P7 had similar revision strategies. Overall, the number of revisions remained quite close to the mean values, and they were mainly conducted during the first phase. Additionally, P7's allocation of time to the initial planning was below average in both languages. However, due to the differing pausing behaviour, P7 did not share the same writer qualities in his L1 and L2. In L2, he was more of a fragmentary first-phase writer, whereas in L1, he was closer to an average writer.

**P8 (L2 proficiency level B1):**

In L2, P8 conducted very few revisions overall, and they occurred mostly during the first phase. Other variables seemed to be rather close to the average values, apart from the mean length of pause, which exceeded the average length, making also the total pause slightly above average. However, due to the small number of revisions and the fact that many of the other variables stayed slightly below the mean values, P8 could be mainly regarded as a non-stop writer in his L2. On the contrary, in L1 writing, P8 revised significantly more than average, although the revisions were also made in a similar manner than in L2, i.e. during the first phase of writing. In other variables, P8 seemed to have values somewhat close to the average values of the whole group. In general, P8 did not seem to belong clearly to any of the profiles in his L1, but based on revision behaviour, he could be mostly regarded as a fragmentary first-phase writer.

**P9 (L2 proficiency level B2):**

P9 seemed to have similar pausing behaviour in both, L1 and L2, composing processes. He paused many times, while the average length of pauses remained short. Moreover, he did not allocate much time to initial planning in either of the languages. He revised both texts quite the average amount, and after the completion of the first draft, he hardly altered the texts at all. Thus, P9 had the characteristics of a fragmentary first-phase writer in both languages.

**P10 (L2 proficiency level B2):**

P10 revised the least the L2 essay compared to others. In addition, all the values related to pausing behaviour (total pausing time, total typing time, the total number of pauses, mean pause length) were slightly below the average, with the exception of initial planning time, which

exceeded the average length. Despite the long initial planning phase, P10 could be classified predominantly as a non-stop writer in his L2. On the contrary, in L1, P10 was one of the participants who revised the most on their texts during the writing process. In addition, all the pausing variables exceeded the average values and the initial planning phase was the longest of the group. As a result, P10 was clearly an initial planner in his L1.

**P11 (L2 proficiency level B2):**

P11 was quite close to the average values when it comes to the total pausing time and the number of revisions. He paused fewer times than average, although the mean length of pauses was above the average. He did not spend much time on initial planning. P11 was, therefore, quite hard to categorize, as he could be regarded as somewhat average writer with second-phase writers' pausing behaviour. Interestingly, in L1, P11 has similar values compared to his L2. He paused less than average, while the mean length of pauses was long. The total pausing time and the number of revisions were similarly close to the average values, and he did not allocate much time to initial planning in L1 either. Hence, it could be argued that he shared the same writing profile in both languages, albeit it was difficult to determine which profile.

**P12 (L2 proficiency level B2):**

P12 was a fine example of a non-stop writer in both languages. He paused few times, revised the texts less than average, and began to write the texts without devoting much time to preliminary planning. Moreover, the mean length of the pauses and the total pause time stayed clearly below the average.

**P13 (L2 proficiency level B2):**

P13's composing process was characterised by a large number of revisions made during the second phase of writing in both, L1 and L2 essays. When it comes to pausing behaviour, the L1 and L2 writing differed slightly. In L2, the number of pauses stayed below average, whereas the mean length of them was above the average values. In contrast, P13 paused more than average in L1, while the mean length of pauses was below average. The initial planning time also varied between the two languages. Therefore, it cannot be inferred that the writing profiles are exactly the same ones in L1 and L2, as there are some differences in regard to pausing behaviour. Nevertheless, they are not entirely dissimilar either, since the revision behaviour was identical. Solely based on the revision behaviour, he could be classified as a second-phase writer.

**P14 (L2 proficiency level B2):**

P14 revised more than average in L2 and many of the revisions were made during the revision phase. As for his pausing behaviour, he did not spend much time on initial planning and he paused more than average, while the mean length of pauses stayed close to the average level. Despite this, he could be regarded mainly as a second-phase writer in L2. In L1, P14 similarly paused more than average, and the mean length of pauses was below average. He also revised the text more than average overall, although unlike in L2, he did not alter the text after finishing the first draft. Hence, P14 had the characteristics of a fragmentary first-phase writer in his L1.

**P15 (L2 proficiency level B2):**

P15 clearly shared similar writing processes in his L1 and L2 writing. After the completion of the drafts, he spent a long time revising the texts and made a significantly higher number of revisions during the second phase compared to others. When analysing the type of revisions, it turned out that many of them were made at a level above the word. In regard to pausing behaviour, P15 spent roughly the same amount of time pausing (~60%) in both of the languages. Although he clearly did not allocate much time on initial planning in either of the languages, the mean length of pauses surpassed the average level in both, L1 and L2. Despite the relatively short initial planning phase, P15 is a good example of a second-phase writer in both languages.

**P16 (L2 proficiency level C1):**

In L2 writing, P16 had mainly the characteristics of a non-stop writer. Although he revised the text more than average, he did not pause very often, and total time spent pausing clearly laid below average. Moreover, P16 devoted little time for initial planning and he composed the essay in a shorter period of time. In his L1 essay, on the contrary, P16's pauses were long, making also the total pausing time longer, and he spent quite some time on initial planning. However, similarly to his L2 essay, he revised the L1 text quite a lot, although many of the revisions were realized after completing the first draft. Therefore, P16 could be categorized as a second-phase writer in his L1 writing.

**Comparison of different writer profiles**

Overall, the results of the qualitative analysis showed that seven out of 16 participants shared the same writer profile in their L1 and L2 composing processes. In addition, there were cases, such as P14, who seemed to possess similar writer characteristics in some areas, but were still

classified into two separate profiles due to the categorization. From those who shared the same profile in L1 and L2, one participant had the characteristics of an initial planner, two were clearly non-stop writers, while two were second-phase writers. In addition, there was one person who was classified as a fragmentary first-phase writer and one who had mostly values of an average writer. Thus, it seems that all the writer profiles were somewhat evenly presented in the data, also within those who shared the same profile in their L1 and L2. In regard to different proficiency levels, the groups differed slightly in their writer profiles. While there were some initial planners among the G1 participants (2/8), none of the G2 members were classified in this profile. There were also more fragmentary first-phase writers in G1 (4/8) compared to G2 (1/8). The G2 members, on the contrary, had many second-phase writers (4/8), whereas none of the G1 members had similar characteristics. One possible explanation for the results could be that the more proficient group members were also more motivated in general to write the essay, and thus they devoted some time after the completion of the draft to reading the text and making sure that language was correct. Therefore, it could be that they also made more revisions to the text during the second-phase compared to G1 members. Moreover, the fact that initial planners were found only among the less proficient group members is interesting. It could be that this profile is somehow linked to the proficiency level of the writer, indicating that less proficient writers need more time at the beginning of the writing process to think and plan, as their level in L2 is not strong enough for them to start writing immediately first things that come to their mind. However, as there does not seem to exist any previous results confirming these hypotheses, they should be further investigated in longitudinal studies focusing on the development of individual writers. Interestingly, non-stop writers were found in both of the groups, two participants in G1 and three in G2, although the characteristics of non-stop writers are linked to a fluent writing process in many ways, and thus one might expect to find it to be a more prominent profile within the more proficient writers. However, based on these results, it seems there is no single profile in particular which could be linked to features of fluency. These results are also in line with Mutta's (forthcoming) findings, which showed that there was not a link between different writer profiles and the text quality.

Interestingly, when examining participants in a group level, it seems that the G2 members shared the same profile more often (5/8) compared to the less proficient group G1 (2/8). Although these results are slightly contradictory to the outcome of the correlation analyses, they could indicate that the relationship between L1 and L2 fluency shifts with developing proficiency, as some of the previous studies have suggested (e.g. Huensch and Tracy-Ventura 2017). The implications of the results will be discussed in more detail next.

## 6 Discussion

The goal of the present study was to investigate the extent to which writers' L1 fluency characteristics contribute to fluency in L2 productions. The rank-order correlations demonstrated positive correlations between the majority of L1 and L2 fluency measures ranging from weak to strong effects both within the whole group and for the two groups separately, yet only a subset of these correlations was statistically significant. The strongest correlation for the whole group was found in the mean length of pauses. Moreover, the measures of the number of pauses and P-Burst also correlated significantly depending on the group. The regression analyses on these measures revealed that L2 measures could be predicted from the L1 measures in the mean length of pauses and P-Burst, although the proficiency level had a minor role compared to the findings of the correlational analysis. A further individual examination of the essays also corroborated the results of the quantitative part of the study, as they indicated that participants' writer profiles are connected to some extent, reinforcing thus the connections between the L1 and L2 fluency. These results support the findings of the earlier studies, which have found a relation between L1 and L2 oral fluency measures, especially in temporal measures of fluency (Peltonen 2018; De Jong et al. 2015). Similarly, in the current study, the strongest correlations between the L1 and L2 measures were found in variables related to writers' pausing behaviour. Moreover, it is noteworthy, that these correlations were statistically significant even with a small sample size, indicating that there exists a strong connection in learners' L1 and L2 pausing behaviour, irrespective of the mode of how language is produced (oral or written). The variables related to revisions, on the other hand, did not seem to correlate much in the quantitative part of the study, although the closer examination of the essays showed there to be some similarities between individual writers' revision behaviour in some cases. Overall, the results of the present study seem to be in line also with those few writing fluency studies (e.g. Yang and Sun 2015), which have attested a link to some degree between the CAF measures of multilingual writers' different languages or the relation between L1 and L2 writing proficiency (e.g. Sasaki and Hirose 1996; Schoonen et al. 2003; Schoonen et al. 2011). Moreover, as Chenoweth and Hayes (2001) demonstrated in their study that the length of P-Bursts was related to writing fluency, the fact that the variable correlated between L1 and L2 in this study supports the hypothesis that the L1 fluency behaviour somewhat contributes to the L2 fluency.

In addition to exploring the L1-L2 writing fluency within the whole sample group, the role of the proficiency level in L1-L2 connections was also examined. The results revealed there

to be some differences between the different proficiency groups in how L1 and L2 fluency are connected. Nevertheless, they did not provide a clear answer as to whether the connections were stronger for one group over the other, since the findings of the quantitative and qualitative parts were slightly contradictory to one another. These results are not entirely in line with previous studies (see e.g. Peltonen 2018; Huensch and Tracy-Ventura 2017), which have generally shown a stronger relationship for the more proficient participant group. There might be several reasons for the differing results. Firstly, due to the small sample group, all the proficiency levels from A2-C2 did not have enough participants, which meant that some of the proficiency levels had to be combined for the correlational analyses. This might have affected the outcome, since combining levels could have evened out some of the possible differences between the two extremes. Secondly, the proficiency level of the writers was evaluated based solely on one essay, which might not be a valid indicator of the true competence of the participants. Naturally, it is more accurate than for instance school level or the age of the learner, which many of the earlier studies have used, but for future research, it should be combined with a more profound and extensive assessment of the proficiency. Moreover, the group as a whole seemed to be rather homogenous, for the majority of the participants belonged to either B1 or B2 level. Therefore, the differences in L2 competence and fluency might not be as prominent within this sample as within a group including a larger number of A2 and C2 level participants. It could also be that the more proficient writers happened to have lower verbal skills in general, thus also affecting the results on its part, as Chenoweth and Hayes' (2001) study demonstrated. Taking all the above-mentioned issues into account, it is possible that the quantitative analysis of the fluency aspects might not be entirely valid when it comes to the role of the proficiency level. Therefore, the results of the qualitative analysis of the writing processes might illustrate the differences between the groups more accurately. More research on the subject is, however, needed.

In regard to the variables used in the study, it seemed that many of the reliable indicators of fluency, such as Fluency (product, linear), Burst, R-Burst and Fluency during Burst, correlated surprisingly little between L1 and L2 in the present research. The notions of Burst and R-Burst included the number of revisions as part of the formula, which might have impacted the results, since revisions in general did not seem to correlate in the quantitative analysis. However, it does not explain why Fluency (product, linear) and Fluency during Burst produced such low effects, while P-Burst correlated strongly. After all, these variables have been found to be valid indicators of fluency and thus have been used in many previous studies (see e.g. Palviainen, Kalaja and Mäntylä 2012; Lindgren, Spelman Miller and Sullivan 2008). There is,

thus, a need for further research on these variables, and they should be studied with a larger number of data in order to get valid results. However, in addition to these, it is important to include also the simple variables in the analysis, since they might show more clearly the possible similarities and differences between individuals.

The categorization of Van Waes and Schellens (2003) was indispensable in helping to classify the participants' writing characteristics. Nevertheless, in some cases, it was difficult to categorize the participants if they possessed characteristics of various different profiles. In those cases, the participants had to be classified based on their prevailing features, despite the fact they might not share all the described characteristics of the profile in question. One possible explanation for the difficulty of classification in this study might be related to the fact that the participants were so-called digital natives, who have used technical devices from their early childhood onwards. Their typing skills, and thus also writer profiles, might differ from Van Waes and Schellens' categorization, which was, after all, created almost 20 years ago. Therefore, in future studies, it might be useful to explore and compare also other possible writer profile categorizations (see e.g. Torrance, Thomas and Robinson 2000), and decide which might work best for the data in question. The more in-depth qualitative analysis provided more insight into the individual writing processes, especially regarding the pausing and revision behaviour, which in this study seemed to correlate rather differently. As can be seen from the results of the qualitative examination, although in some cases learners revised the texts in a similar manner (e.g. P1, P3, P7), there were also individuals whose revisions strategies were the total opposite of one another in L1 and L2 (e.g. P4, P8, P10). There thus seems to be a bit more variation between individuals' L1 and L2 in revisions compared to pauses. A possible explanation for the results could be that revision behaviour is simply not a feature that learners share in their L1 and L2 in writing, at least not as strongly compared to pausing behaviour. However, this hypothesis needs to be further studied on L2 learners of various ages and from diverse language backgrounds before one can make any definite conclusions. The differing correlational results might also be related to different writing and revision processes in L1 and L2, as Lindgren, Spelman Miller and Sullivan (2008) found out in their study. In other words, it could be that writers' revision strategies and processes differ from one another when writing L1 compared to L2, while pausing strategies remain similar between the languages. However, this also needs to be studied further. Moreover, it has to be pointed out that the notion of revision was defined somewhat differently in the present study compared to some of the earlier studies, which could have affected the outcome as well. A different definition of the term, or even different categorization of writer profiles, might yield differing results. Overall, the findings of the

qualitative part of the study suggested that writer profiles were connected to another in individuals' L1 and L2, corroborating thus also Mutta's (2007) results.

Since the present research was one of the first ones to examine written data to find out L1-L2 connections, there were not any previous findings which could have worked as a reference point for the results. Therefore, the results had to be mostly compared on spoken fluency studies which have used a similar research design, although, as mentioned in section 2.2, the constructs of speaking and writing require different cognitive processes, and thus might not be comparable to one another. However, since the findings of the present study somewhat corroborated the results obtained from similar oral fluency studies, it seems that these two modes are not entirely unconnected. In future studies, it might thus be useful to study both, writing and speaking fluency features, from the same participants in order to compare the two modes on an individual level and find their possible differences. Suggestions for other future studies are discussed next, along with the final conclusions.

## 7 Conclusion

The present study examined the relationship between L1 and L2 fluency in writing among Finnish learners of English by using a mixed-methods approach, where an in-depth qualitative analysis of the essays was employed together with quantitative statistical methodologies. Based on the findings, it can be concluded that L1 and L2 writing fluency are connected to some degree, although the relationship seems to be rather complex and depend on various different factors, such as the proficiency level of the learner. Therefore, the findings also highlight the importance of employing diverse research methodologies, both quantitative and qualitative, in exploring the connections, for they provide more insights into this complex relationship. In future investigations, the computer-based analysis should be complemented with learners' own retrospective thoughts, since they provide more detailed and accurate information on the writing processes. Although keystroke recording tools, such as *ScriptLog*, are valuable in giving quantitative information on writers' behaviour, they do not uncover what writers are actually thinking while pausing or revising their texts.

Besides the lack of complementary think-aloud procedures, the present research has also other limitations which should be acknowledged. Firstly, there is naturally the question of diverse motivational and affective factors, which can always affect the outcome when studying humans. In this case, the participants wrote altogether three essays consecutively during a 90-minute time period. Naturally, the lack of concentration and motivation, and even the fact that the writing task was a so-called low stakes assignment, might have affected the production process, especially during the last essay. However, the order of the essays was well-thought, since the L1 essay was left out to be the last one, thus eliminating the risk that the participants might translate or transfer the ideas directly from L1 to L2. Due to the small scope of the present research, the essays written in Swedish were left out from the analysis. The connections between the possible L3 fluency to L2s and L1s should, nevertheless, be investigated more profoundly in the future. Secondly, one of the limitations of the present study was the small number of data, consisting mainly of females, and the fact it was conducted as a single task. Future research could investigate the issue more thoroughly by using a larger number of participants with diverse language backgrounds and examine the L1-L2 connections longitudinally, so that the effect of the proficiency level in the process becomes clearer. Moreover, instead of using only argumentative texts, learners could write different types of essays, e.g. descriptive or narrative, so that the task itself does not become an obstacle to anyone.

Despite the possible limitations, the results of the study provided valuable insight into the complex relationship between L1 and L2 writing fluency, which has long been an underresearched subject compared to the spoken fluency studies. The findings have also significant implications especially for pedagogical contexts. In case L1 writing fluency does play a role in explaining aspects of L2 writing fluency, like the findings of the present study suggest, teachers could take this into account when assessing the fluency of the texts or when facilitating learners' writing processes to become more fluent. The learners themselves are also able to utilize this information in order to become aware of their individual writing processes. Moreover, and perhaps of more importance, the results of this study can work as a starting point for more extensive investigations of the L1-L2 connections, especially for writing contexts involving typologically different language pairs.

## References

- Chenoweth, N. Ann, John R. Hayes. 2001. "Fluency in Writing: Generating Text in L1 and L2." *Written Communication* 18, no. 1: 80–98. Accessed 19 April 2019. <http://dx.doi.org/10.1177/0741088301018001004>.
- Council of Europe. 2001. "Common European Framework of Reference for Languages: Learning, teaching, assessment." Accessed 4.7.2019. <https://www.coe.int/en/web/portfolio/the-common-european-framework-of-reference-for-languages-learning-teaching-assessment-cefr->
- De Jong, Nivja H, Rachel Groenhout, Rob Schoonen, and Jan H Hulstijn. 2015. "Second Language Fluency: Speaking Style or Proficiency? Correcting Measures of Second Language Fluency for First Language Behaviour." *Applied Psycholinguistics* 36, no. 2: 223–243. Accessed 19 April 2019. <http://dx.doi.org/10.1017/S0142716413000210>.
- Derwing, Tracey M., Murray J. Munro, Ronald I. Thomson, and Marian J. Rossiter. 2009. "The Relationship between L1 Fluency and L2 Fluency Development." *Studies in Second Language Acquisition* 31, no. 4: 533–557. Accessed 19 April 2019. <http://dx.doi.org/10.1017/S0272263109990015>.
- Dörnyei, Zoltán. 2007. *Research Methods in Applied Linguistics*. Oxford: Oxford University Press.
- Ellis, Rod, and Gary Barkhuizen. 2005. *Analysing Learner Language*. Oxford: Oxford University Press.
- Fillmore, Charles J., Daniel Kempler, and William S-Y. Wang. 1979. *Individual Differences in Language Ability and Language Behaviour*. New York: Academic Press.
- Hall, Chris. 1990. "Managing the Complexity of Revising across Languages." *TESOL Quarterly* 24, no. 1: 43–60. Accessed 2 July 2019. <http://dx.doi.org/10.2307/3586851>.
- Hang, Du. 2013. "The Development of Chinese Fluency During Study Abroad in China." *Modern Language Journal* 97, no. 1: 131–143. Accessed 19 April 2019. <http://dx.doi.org/10.1111/j.1540-4781.2013.01434.x>.
- Hayes, J. R., and L. S. Flower. 1980. "Identifying the organization of writing processes." In *Cognitive Processes in Writing*, edited by L. W. Gregg and E. R. Steinberg, 3–30, Hillsdale, NJ: Lawrence Erlbaum.
- Huensch, Amanda, and Nicole Tracy-Ventura. 2017. "Understanding Second Language Fluency Behaviour: The Effects of Individual Differences in First Language Fluency, Cross-linguistic Differences, and Proficiency over Time." *Applied Psycholinguistics* 38, no. 4: 755–785. Accessed 19 April 2019. <http://dx.doi.org/10.1017/S0142716416000424>.
- Kaufert, Davis S., John R. Hayes, and Linda Flower. 1986. "Composing Written Sentences." *Research in the Teaching of English* 20, no. 2: 121–149. Accessed 5 July 2019. <https://www.jstor.org/stable/40171073>.
- Kim, Youyjin, and Nicole Tracy-Ventura 2013. "The Role of Task Repetition in L2 Performance Development: What Needs to Be Repeated During Task-based Interaction?" *System* 41, no. 3: 829–840. Accessed 26 September 2019. <http://dx.doi.org/10.1016/j.system.2013.08.005>.
- Kobayashi, Hiroe, and Carol Rinnert. 2013. "L1/L2/L3 Writing Development: Longitudinal Case Study of a Japanese Multicompetent Writer." *Journal of Second Language Writing* 22, no. 1: 4–33. Accessed 14 July 2019. <http://dx.doi.org/10.1016/j.jslw.2012.11.001>.
- Kowal, Iwona. 2014. "Fluency in Second Language Writing: a Developmental Perspective." *Studia Linguistica Universitatis Jagellonicae Cracoviensis* 131: 229–246. Accessed 8 May 2019. <http://dx.doi.org/10.4467/20834624SL.14.013.2321>.

- Larson-Hall, Jenifer. 2016. *A Guide to Doing Statistics in Second Language Research Using SPSS and R*. New York: Routledge, Taylor & Francis Group. EBSCOhost.
- Lennon, Paul. 1990. "Investigating Fluency in EFL: A Quantitative Approach." *Language Learning* 40, no. 3: 387–417. Accessed 12 April 2019. <http://dx.doi.org/10.1111/j.1467-1770.1990.tb00669.x>.
- Lindgren, Eva, Kristyan Spelman Miller, and Kirk P.H. Sullivan. 2008. "Development of Fluency and Revision in L1 and L2 Writing in Swedish High School Years Eight and Nine." *ITL International Journal of Applied Linguistics* 156: 133–151. Accessed 2 July 2019. <http://dx.doi.org/10.2143/ITL.156.0.2034428>.
- Maclay, Howard, and Charles E. Osgood. 1959. "Hesitation Phenomena in Spontaneous English Speech." *Word* 15, no. 1: 19–44. Accessed 19 April 2019. <http://dx.doi.org/10.1080/00437956.1959.11659682>.
- Manchón, Rosa M, Julio Roca de Larios, and Liz Murphy. 2007. "A Review of Writing Strategies: Focus on Conceptualizations and Impact of the First Language." In *Language learner strategies: thirty years of research and practice*, edited by Andrew D. Cohen and Ernesto Macaro, 229–250. Oxford: Oxford University Press.
- Manchón, Rosa M. 2013. "Writing". In *Psycholinguistics of Bilingualism*, edited by François Grosjean and Ping Li, 100–115. Chichester: John Wiley & Sons.
- Mutta, Maarit. 2007. "La Conscience Métapragmatique et L'attitude Métacognitive Épistémique des Scripteurs Universitaires: la Révision de Texte en Temps Réel. [Metapragmatic Consciousness and Epistemic Stance of University Writers: The Case of Online Revision]. Dissertation, University of Turku.
- . 2019 in press. "L2 Fluency and Writer Profiles." In *Fluency in L2 Learning and Use*, edited by Pekka Lintunen, Maarit Mutta and Pauliina Peltonen. Bristol: Multilingual Matters.
- Navés, Teresa, Immaculada Miralpeix, and M. Luz Celaya. 2005. "Who Transfers More... and What? Crosslinguistic Influence in Relation to School Grade and Language Dominance in EFL." *International Journal of Multilingualism* 2, no. 2: 113–134. Accessed 12 July 2019. <http://dx.doi.org/10.1080/14790710508668380>.
- Olkkonen, Sanna. 2017. "Second and Foreign Language Fluency from a Cognitive Perspective: Inefficiency and Control of Attention in Lexical Access." Dissertation, University of Jyväskylä.
- Ong, Justina, and Lawrence Jun Zhang. 2010. "Effects of Task Complexity on the Fluency and Lexical Complexity in EFL Students' Argumentative Writing." *Journal of Second Language Writing* 19, no. 4: 218–233. Accessed 14 July 2019. <http://dx.doi.org/10.1016/j.jslw.2010.10.003>.
- Palviainen, Åsa, Paula Kalaja, and Katja Mäntylä. 2012. "Development of L2 Writing: Fluency and Proficiency." *AFinLA-E: Soveltavan Kielitieteen Tutkimuksia* 4: 47–59. Accessed 19 April 2019. <https://journal.fi/afinla/article/view/7037>.
- Peltonen, Pauliina. 2018. "Exploring Connections Between First and Second Language Fluency: A Mixed Methods Approach." *The Modern Language Journal* 102, no. 4: 676–692. Accessed 19 April 2019. <http://dx.doi.org/10.1111/modl.12516>.
- Plonsky, Luke, and Frederick L. Oswald. 2014. "How Big Is 'Big'? Interpreting Effect Sizes in L2 Research." *Language Learning* 64, no. 4: 878–912. Accessed 15 September 2019. <http://dx.doi.org/10.1111/lang.12079>.
- Razali, Nornadiah Mohd, and Bee Wah Yap. 2011. "Power Comparisons of Shapiro-Wilk, Kolmogorov-Smirnov, Lilliefors and Anderson-Darling Tests." *Journal of Statistical Modeling and Analytics* 2, no.1: 21-33. Accessed 8 November 2019. <https://bit.ly/2NTJJeZ>.

- Roca de Larios, Julio, Rosa M. Manchón, and Liz Murphy. 2006. "Generating Text in Native and Foreign Language Writing: A Temporal Analysis of Problem-Solving Formulation Processes." *Modern Language Journal* 90, no. 1: 100–114. Accessed 2 July 2019. <http://dx.doi.org/10.1111/j.1540-4781.2006.00387.x>.
- Sasaki, Miyuki, and Keiko Hirose. 1996. "Explanatory Variables for EFL Students' Expository Writing." *Language Learning* 46, no. 1: 137–168. Accessed 12 July 2019. <http://dx.doi.org/10.1111/j.1467-1770.1996.tb00643.x>.
- Sasaki, Miyuki. 2000. "Toward an Empirical Model of EFL Writing Processes: An Exploratory Study." *Journal of Second Language Writing* 9, no. 3: 259–291. Accessed 12 July 2019. [http://dx.doi.org/10.1016/S1060-3743\(00\)00028-X](http://dx.doi.org/10.1016/S1060-3743(00)00028-X).
- Schmidt, Richard. 1992. "Psychological Mechanisms Underlying Second Language Fluency." *Studies in Second Language Acquisition* 14, no. 4: 357–385. Accessed 12 April 2019. <http://nflrc.hawaii.edu/PDFs/SCHMIDT%20Psychological%20mechanisms%20underlying%20second%20language%20fluency.pdf>.
- Schoonen, Rob, Amos Van Gelderen, Kees De Glopper, Jan Hulstijn, Annegien Simis, Patrick Snellings, and Marie Stevenson. 2003. "First Language and Second Language Writing: The Role of Linguistic Knowledge, Speed of Processing, and Metacognitive Knowledge." *Language Learning* 53, no. 1: 165–202. Accessed 2 July 2019. <http://dx.doi.org/10.1111/1467-9922.00213>.
- Schoonen, Rob, Amos Van Gelderen, Reinoud D. Stoel, Jan Hulstijn, and Kees de Glopper. 2011. "Modelling the Development of L1 and EFL Writing Proficiency of Secondary School Students." *Language Learning* 61, no. 1: 31–79. Accessed 12 July 2019. <http://dx.doi.org/10.1111/j.1467-9922.2010.00590.x>.
- Schwartz, Mimi. 1983. "Revision Profiles: Patterns and Implications." *College English* 45, no. 6: 549–558. Accessed 8 July 2019. <http://dx.doi.org/10.2307/377139>.
- Segalowitz, Norman. 2010. *Cognitive Bases of Second Language Fluency*. New York & London: Routledge.
- . 2016. "Second Language Fluency and Its Underlying Cognitive and Social Determinants." *IRAL* 54, no. 2: 79–95. Accessed 8 May 2019. <http://dx.doi.org/10.1515/iral-2016-9991>.
- Şen, Zekâi. 2017. *Innovative Trend Methodologies in Science and Engineering*. Springer International Publishing.
- Shapiro, S.S., M.B. Wilk, and H.J. Cohen. 1968. "A Comparative Study of Various Tests for Normality." *Journal of the American Statistical Association* 63, no. 324: 1343–1372. Accessed 8 November 2019. <http://dx.doi.org/10.2307/2285889>.
- Silva, Tony. 1993. "Toward an Understanding of the Distinct Nature of L2 Writing: the ESL Research and Its Implications." *TESOL Quarterly* 27, no. 4: 657–677. Accessed 2 July 2019. <http://dx.doi.org/10.2307/3587400>.
- Skehan, Peter. 2009. "Modelling Second Language Performance: Integrating Complexity, Accuracy, Fluency, and Lexis." *Applied Linguistics* 30, no. 4: 510–532. Accessed 12 April 2019. <http://dx.doi.org/10.1093/applin/amp047>.
- Spelman Miller, Kristyan. 2000. "Academic Writers On-line: Investigating Pausing in the Production of Text." *Language Teaching Research* 4, no. 2: 123–148. Accessed 2 July 2019. <http://dx.doi.org/10.1191/136216800675510135>.
- Spelman Miller, Kristiyan, Eva Lindgren, and Kirk P.H. Sullivan. 2008. "The Psychologic Dimension in Second Language Writing: Opportunities for Research and Pedagogy Using Computer Keystroke Logging." *Tesol Quarterly* 42, no. 3: 433–454. Accessed 14 July 2019. <http://dx.doi.org/10.1002/j.1545-7249.2008.tb00140.x>.

- Stevenson, M.M.C. 2005. "Reading and Writing in a Foreign Language: A Comparison of Conceptual and Linguistic Processes in Dutch and English." Dissertation, Universiteit van Amsterdam.
- Strömqvist, Sven, and Henrik Karlsson. 2002. "Scriptlog for Windows – User's Manual. Technical Report." University of Lund, Department of Linguistics, and University College of Stavanger, Centre for Reading Research.
- Thai, Chau, and Frank Boers. 2016. "Repeating a Monologue Under Increasing Time Pressure: Effects on Fluency, Complexity, and Accuracy." *TESOL Quarterly* 50, no. 2: 369–393. Accessed 19 April 2019. <http://dx.doi.org/10.1002/tesq.232>.
- Torrance, Mark, Gkyn V. Thomas, and Elizabeth J. Robinson. 2000. "Individual Differences in Undergraduate Essay-Writing Strategies: A Longitudinal Study." *Higher Education* 39, no. 2: 181–200. Accessed 24 September 2019. <http://dx.doi.org/10.1023/A:1003990432398>.
- Torrance, Mark, and Guido Nottbusch. 2012. "Written Production of Single Words and Simple Sentences." In *Past, Present, and Future Contributions of Cognitive Writing Research to Cognitive Psychology*, edited by Virginia Wise Berninger, 403–422, New York: Taylor & Francis Group.
- Van Waes, Look, and Peter Jan Schellens. 2003. "Writing Profiles: the Effect of the Writing Mode on Pausing and Revision Patterns of Experienced Writers." *Journal of Pragmatics* 35, no. 6: 829–853. Accessed 26 September 2019. [http://dx.doi.org/10.1016/S0378-2166\(02\)00121-2](http://dx.doi.org/10.1016/S0378-2166(02)00121-2).
- Van Waes, Look, and Mariëlle Leijten. 2015. "Fluency in Writing: A Multidimensional Perspective on Writing Fluency Applied to L1 and L2." *Computers and Composition* 38: 79–95. Accessed 14 July 2019. <http://dx.doi.org/10.1016/j.compcom.2015.09.012>.
- Wang, Lurong. 2003. "Switching to First Language among Writers with Differing Second-language Proficiency." *Journal of Second Language Writing* 12, no. 4: 347–375. Accessed 26 September 2019. <http://dx.doi.org/10.1016/j.jslw.2003.08.003>.
- Wolfe-Quintero, Kate, Shunji Inagaki, and Hae-Young Kim. 1998. *Second Language Development in Writing: Measures of Fluency, Accuracy and Complexity*. Honolulu: Second Language Teaching & Curriculum Center.
- Yang, Wenxing and Ying Sun. 2015. "Dynamic Development of Complexity, Accuracy and Fluency in Multilingual Learners' L1, L2 and L3 Writing." *Theory and Practice in Language Studies* 5, no. 2: 298–308. Accessed 26 September 2019. <http://dx.doi.org/10.17507/tpls.0502.09>.

## Finnish summary

Tämän tutkielman tavoitteena oli kartoittaa äidinkielen sujuvuuden vaikutusta vieraan kielen sujuvuuteen kirjoitetussa kielessä. Sujuvuuden vaikutusta tutkittiin vertailemalla suomenkielisten englanninoppijoiden (n=16) äidinkielellään (L1) kirjoittamia esseitä heidän toisella kielellä (L2), eli tässä tapauksessa englanniksi, kirjoittamiin esseisiin. Aineisto kerättiin ScriptLog-tietokoneohjelman avulla, ja sitä analysoitiin yhdistämällä laadullista ja määrällistä tutkimusmenetelmää. Kokonaisuutena tutkielman tavoitteena oli siis syventää käsitystä vieraan kieleen sujuvuudesta nimenomaan kirjoitetussa kielessä sekä tutkia siihen vaikuttavia tekijöitä.

Sujuvuutta on tutkittu paljon toisen kielen oppimisen ja omaksumisen tutkimuksen (SLA) tieteenalalla. Monet aikaisemmista tutkimuksista ovat keskittyneet mm. L2 sujuvuuden kehittymisen tutkimiseen (kts. Kowal 2014) tai tutkineet L2 sujuvuuden yhteyttä eri taitotasoihin (kts. Palviainen, Kalaja ja Mäntylä 2012). Näissä tutkimuksissa sujuvuutta on kuitenkin pidetty yhtenä vieraan kielen oppimisen piirteenä, joka liittyy vieraan kielen kielitaitoon eikä niinkään yksilön muihin piirteisiin. Viime vuosina äidinkielen vaikutuksista vieraan kielen sujuvuuteen ollaan kiinnostettu enemmän, kun on havaittu, että yksilöiden sujuvuudessa esiintyy vaihtelevuutta myös heidän äidinkielellään. Tämä voisi tarkoittaa, että sujuvuus olisikin enemmän yksilön ominaisuus kuin vieraan kielen oppimisen piirre (kts. Derwing ym. 2009).

Äidinkielen ja vieraan kielen välisiä yhteyksiä on tutkittu aiemmin jonkin verran puhutussa kielessä (kts. esim. Peltonen 2018; Derwing ym. 2009; De Jong ym. 2015; Huensch & Tracy-Ventura 2017), mutta ei niinkään kirjoitetussa kielessä. Tutkimukset ovat osoittaneet, että äidinkielen ja vieraan kielen sujuvuuden välillä on yhteys, joskin se riippuu monista osatekijöistä, kuten oppijan vieraan kielen taitotasosta tai äidinkielen ja vieraan kielen samankaltaisuudesta.

Tutkielman alussa esitellään vieraan kielen sujuvuuden eri määritelmiä ja mittareita, joita on käytetty enimmäkseen puhutun aineiston tutkimuksissa. Vieraan kielen sujuvuutta on vuosien saatossa määritelty monella eri tapaa, mutta yleisesti sillä on viitattu vaivattomaan ja sulavaan tapaan tuottaa kieltä. Lisäksi sitä pidetään yhtenä yleisen kielitaidon mittareista. Toisistaan osittain poikkeavat sujuvuuden määritelmät ovat kuitenkin aiheuttaneet haasteita sen tutkimiselle. Segalowitz (2010, 48–49) onkin jaotellut sujuvuuden eri ulottuvuudet kolmeen eri kategoriaan helpottaakseen sen tutkimista. Hänen mukaansa sujuvuutta voidaan tarkastella ensinnäkin kognition toiminnan kautta (engl. cognitive fluency), joka viittaa kognitiivisten toimintojen sujuvuuteen, eli kuinka sujuvasti esimerkiksi prosessoimme vieraskielistä puhetta

tai tekstiä. Sujuvuutta voidaan tutkia myös kuulijan tai lukijan näkökulmasta (engl. perceived fluency), joka perustuu kuulijan/lukijan näkemykseen kuinka sujuvaa kieltä puhuja tuottaa. Näiden lisäksi sujuvuutta voidaan myös mitata erilaisilla mittareilla, joihin kuuluvat esimerkiksi tauot, epäröinnit ja korjaukset (engl. utterance fluency). Skehan (2003, 8) on vuorostaan jaotellut nämä mittarit eri kategorioihin: taukosujuvuuden (engl. breakdown fluency), vauhtisujuvuuden (engl. speech rate), korjaussujuvuuden (repair fluency) ja automatisoitumisen (automatization) mittareihin. Vaikka näitä mittareita onkin käytetty enimmäkseen puhutun kielen sujuvuuden tutkimuksessa, niitä voidaan soveltaa myös kirjoitetun kielen tutkimukseen. Tästä syystä myös tämä tutkielma pohjaa sujuvuuden määritelmän Segalowitzin ja Skehanin malleihin ja keskittyy tutkimaan sujuvuutta eri mittareilla arvioituna. Tutkielmassa sujuvuudella siis viitataan sekä taukosujuvuuteen, eli esimerkiksi taukojen määrään ja pituuteen, sekä korjaussujuvuuteen, eli siihen, kuinka paljon kirjoittavat korjaavat tekstiään prosessin aikana.

Kirjoitetun kielen sujuvuuden mittarit ovat yleensä jaettu valmiin tuotetun tekstin sujuvuuden mittareihin (product-oriented measures) ja kirjoittamisprosessin sujuvuuden mittareihin (process-oriented measures) (Palviainen, Kalaja ja Mäntylä 2012, 48). Valmiin tekstin sujuvuus perustuu lukijan arvioon siitä, minkälaista sujuva teksti on. Koska lukija ei näe itse kirjoittamisprosessia, hänen on perustettava käsityksensä tekstin kielellisiin piirteisiin, kuten tekstin rakenteeseen, koherenssiin ja koheesioon. Kirjoittamisprosessin sujuvuutta taas on mitattu erilaisilla nopeuden, tekstin pituuden ja ajan mittareilla (Palviainen, Kalaja ja Mäntylä 2012, 50). Näiden mittareiden takana on ajatus siitä, että teksti on sujuvaa silloin, kun kirjoittaja pystyy vaivattomasti siirtymään kirjoittamisen eri kognitiivisten prosessien, eli suunnittelun, kääntämisen ja arvioimisen, välillä (Palviainen, Kalaja ja Mäntylä 2012, 49–50). Vieraan kielen oppijoilla nämä prosessit eivät välttämättä ole kehittyneet aivan äidinkielen tasolle, mikä johtaa mm. erilaiseen taukokäyttäytymiseen ja/tai suurempaan muokkausten määrään tekstissä (Schoonen ym. 2003, 171; Hall 1990; Spelman Miller 2000). Taukojen ja muokkausten tutkimisen lisäksi kirjoitusprosessin sujuvuutta ollaan tutkittu niin sanottujen ”kirjoitusjaksojen” (engl. Burst) avulla. Kirjoitusjaksoilla viitataan sanojen määrään, jonka kirjoittaja tuottaa kahden tauon tai muokkauksen välillä (Chenoweth ja Hayes 2001, 88). Sanojen sijasta tutkijat käyttävät nykyään merkkien määrää, sillä merkki on helpompi määrittellä ja analysoida eri kielten välillä erityisesti tietokoneella kerätyissä aineistoissa (Palviainen, Kalaja ja Mäntylä 2012, 51).

Kirjoitusprosesseihin liittyvät vahvasti myös erilaiset kirjoitusprofiilit, jotka perustuvat taukojen ja muokkausten määrään ja laatuun. Van Waesin ja Schellensin (2003) typologiaa on

käytetty aiemmissa tietokonepohjaisissa kirjoitusprosessien tutkimuksissa (kts. esim. Mutta, tuleva). Van Waes ja Schellens (2003) käyttivät aineiston keräämiseen tavallisen kynä ja paperi-metodin lisäksi *Keytrap*-tietokoneohjelmaa, joiden pohjalta he loivat kirjoittajaprofiilit. Van Waesin ja Schellensin (2003) luokittelua voi näin ollen käyttää myös tämän tutkimuksen metodina, kun tarkoitus oli analysoida kirjoitusprosesseja myös laadullisesti. Heidän luokittelussa kirjoittajat jaetaan viiteen eri profiiliin perustuen taukojen ja muokkausten määrään, keston, tyyppiin ja paikkaan, sekä tekstin pituuteen ja sen kirjoittamiseen kuluneeseen aikaan (Van Waes ja Schellens 2003, 836–837). Näihin profiileihin kuuluvat alkusuunnittelijat (engl. initial planners), fragmentaariset ensimmäisen vaiheen kirjoittajat (engl. fragmentary first-phase writers), toisen vaiheen kirjoittajat (engl. second-phase writers), non-stop kirjoittajat (engl. non-stop writers) sekä keskivertokirjoittajat (engl. average writers) (Van Waes ja Schellens 2003, 844–845).

Teoreettisen viitekehyksen lopuksi tässä tutkielmassa kartoitettiin aikaisempien tutkimusten tuloksia, mitkä ovat keskittyneet tarkastelemaan äidinkielen ja vieraan kielen sujuvuuden välisiä yhteyksiä. Koska kirjoitettua kieltä ei ole vielä tutkittu nimenomaan sujuvuuden näkökulmasta vertaillen äidinkieltä ja vierasta kieltä, tutkielmassa esitellyt tutkimustulokset pohjaavat lähinnä puhuttuun kieleen. Tutkimustuloksista on käynyt ilmi, että L1 ja L2 sujuvuuden välillä on yhteys (Derwing yms. 2009; De Jong yms. 2015; Huensch ja Tracy-Ventura 2017; Peltonen 2018), joskin se saattaa riippua monista osatekijöistä, kuten L1 ja L2 välisistä yhtäläisyyksistä ja eroavaisuuksista (Derwing yms. 2009). Peltonen (2018) ja Huensch ja Tracy-Ventura (2017) onnistuivat myös osoittamaan, että oppijan vieraan kielen taitotaso saattaisi vaikuttaa siihen, kuinka vahvasti L1 sujuvuus vaikuttaa L2 sujuvuuteen. Äidinkielen ja vieraan kielen yhteyksiä on tutkittu myös kirjoitetussa kielessä, mutta tutkimukset ovat aiemmin keskittyneet lähinnä kirjoitustaidon vertailuun L1 ja L2 välillä. Näissä tutkimuksissa on huomattu, että äidinkielen kirjoitustaidolla on vaikutus myös vieraan kielen kirjoitustaitoon (Sasaki ja Hirose 1996; Schoonen yms. 2003; Schoonen yms. 2011). Lisäksi on todistettu, että oppijat turvautuvat äidinkielessään käyttämiin kirjoitusstrategioihin myös vieraalla kielellä kirjoittaessaan (Manchón 2013, 109; Manchón, Roca de Larios ja Murphy 2007, 239–242). Näiden tutkimustulosten pohjalta voitiin olettaa, että myös sujuvuuden näkökulmasta löydettäisiin yhteys L1 ja L2 välillä tässä tutkielmassa. Osassa kirjoitussujuvuuden tutkimuksista on myös käytetty L1 aineistoa L2 aineiston lisäksi, joskin näissä tutkimuksissa on joko keskitytty kirjottamissujuvuuden kehittymiseen (kts. esim. Lindgren, Spelman Miller ja Sullivan 2008; Yang ja Sun 2015; Kobayashi ja Rinnert 2013) tai L2 sujuvuuden ja eri taitotasojen välisiin yhteyksiin (esim. Chenoweth ja Hayes 2001). Näin

ollen L1 ja L2 väliset yhteydet ovat jääneet vähemmälle huomiolle näissä tutkimuksissa, lukuun ottamatta Yangin ja Sunin (2015) tutkimustuloksia, jotka osoittivat, että kirjoittajan sujuvuus, tarkkuus ja kompleksisuus vaikuttavat jossain määrin toisiinsa kirjoittajan eri kielten välillä.

Tutkimuksessa käytetty aineisto on kerätty osana Turun yliopiston tutkimushanketta, jonka tarkoituksena on tarkastella sanastokeskittymiä morfologisesti erilaisissa kielissä (suomi, ruotsi, englanti). Tätä tutkimusta varten aineistosta valittiin suomenkielisten lukiolaisten vain suomeksi ja englanniksi kirjoittamat esseet analysointia varten. Aineistonkeruutilanteessa oppilailla oli aikaa yhteensä 90 minuuttia kirjoittaa argumentoiva essee ensiksi ruotsiksi, sitten englanniksi, ja lopuksi suomeksi. Kirjoitusprosessit tallennettiin *ScriptLog*-ohjelman avulla. Lopuksi esseet arvioitiin Eurooppalaisen viitekehyksen taitotasoihin perustuen (2 arvioijaa). Taitotasoa käytettiin tässä tutkielmassa koehenkilöiden kielitaidon mittarina. Tutkimuskysymykset olivat seuraavat:

- 1) Miten paljon L1 sujuvuuden mittarit korreloivat vastaavien L2 mittareiden kanssa?
- 2) Missä määrin L2 sujuvuuden mittarit voidaan ennustaa vastaavista L1 mittareista?
- 3) Miten paljon kirjoitusprofiilit vastaavat toisiaan L1 ja L2 tuotoksissa?

Hypotesina oletettiin, että myös tässä tutkielmassa L1 ja L2 sujuvuuden väliltä löytyisi yhteyksiä, kuten aiemmat tutkimukset ovat osoittaneet. Samoin odotettiin, että L1 ja L2 sujuvuuden yhteys olisi vahvempi kielitaidoltaan taitavimmilla kirjoittajilla.

Sujuvuuden mittaamiseen käytettiin samoja mittareita, joita aiemmat tutkimukset ovat käyttäneet. Näihin kuuluivat kirjoitettujen merkkien määrä, kokonaiskirjoitusaika, taukojen määrä ja kesto, suunnitteluun käytetty aika (aika alusta toisen lauseen alkuun saakka), muokkaamiseen käytetty aika (ensimmäisen version kirjoituksen jälkeinen aika), sekä muokkausten määrä. Tämän lisäksi käytettiin kompleksisempia sujuvuuden mittareita, kuten ”kirjoitusjakso” (engl. Burst), ”sujuvuus kirjoitusjakson aikana” (engl. Fluency during Burst), sekä laskettiin, kuinka monta merkkiä keskimäärin koehenkilöt tuottivat minuutissa (engl. Fluency linear) ja kuinka monta merkkiä he tuottivat keskimäärin minuutissa lopulliseen tekstiin nähden (engl. Fluency product). Kirjoitusjaksoista tarkasteltiin vielä erikseen, kuinka paljon koehenkilöt keskimäärin muokkasivat tekstiä yhden jakson aikana (engl. R-Burst) ja kuinka paljon he keskimäärin tuottivat merkkejä kahden tauon välissä (engl. P-Burst). Aineistoa tutkittiin määrällisesti käyttämällä Spearmanin järjestyskorrelaatiokerrointa ja regressioanalyysia, jonka jälkeen tuotoksia tutkittiin laadullisesti kirjoitusprofiilien avulla, ja pyrittiin näin tunnistamaan yksilöiden sujuvuuden piirteitä. Koska aineisto oli lukumäärältään pieni, eri taitotasot yhdistettiin toisiinsa (A2+B1 ja B2+C1), jotta voitiin vertailla myös taitotason vaikutusta korrelaatiokerrotimeihin.

Spearmanin korrelaatiokertoimen tulokset osoittivat, että L1 ja L2 sujuvuuden mittarit korreloivat toistensa kanssa jossain määrin, joskin vain osa tuloksista oli tilastollisesti merkittäviä. Myös korrelaatioiden vahvuus vaihteli taitotasoryhmien välillä. Ainoa tilastollisesti merkittävä mittari koko ryhmälle oli taukojen keskimääräisen pituus, joka korreloi vahvasti ( $r_s = .708$ ,  $p = .002$ ) L1 ja L2 välillä. Ryhmien välinen vertailu osoitti, että korrelaatiokertoimet olivat suurimmaksi osaksi yllättäen hieman vahvemmat taitotasoltaan huonommalla ryhmällä, joskin vain yksi näistä mittareista, taukojen keskimääräinen pituus, oli tilastollisesti merkittävä ( $r_s = .905$ ,  $p = .002$ ). Taitotasoltaan vahvemmallalla ryhmällä taas taukojen määrä ( $r_s = .708$ ,  $p = .050$ ) sekä P-Burst ( $r_s = .714$ ,  $p = .047$ ) korreloivat tilastollisesti merkittävästi. Tulosten perusteella on vaikea sanoa, onko L1 ja L2 sujuvuuden välinen yhteys vahvempi jommallakummalla ryhmällä, sillä vain osa mittareista korreloi tilastollisesti merkittävästi. Regressioanalyysin tulokset osoittivat, että L2 sujuvuuden mittarit voitiin jossain määrin ennustaa vastaavien L1 mittareista kahdessa kolmesta mittarista, joissa tilastollisesti merkittävää korrelaatiota löytyi. Keskimääräisen taukojen pituuden kohdalla L1 mittari selitti 35% ja P-Burstin kohdalla 34% variaatiosta vastaavassa L2 mittarissa. Hierarkkisen regressionanalyysin tulokset paljastivat, ettei taitotaso ollut tilastollisesti merkittävä ennustaja malleissa.

Laadullisen tutkimuksen tulokset osoittivat, että kaiken kaikkiaan seitsemällä koehenkilöllä oli sama kirjoitusprofiili L1 ja L2 tuotoksissa. Tämän lisäksi oli muutamia henkilöitä, joilla selkeästi oli samantyyppisiä piirteitä molemmissa kirjoitusprosesseissaan, mutta heidän kokonaisprofiilinsa olivat silti erilaiset. Eri profiilit esiintyivät myös tasaisesti koko aineistossa. Eroja löytyi kuitenkin eri tasoryhmien väliltä. Siinä missä taitotasoltaan heikommassa ryhmässä oli enemmän alkusuunnittelijoita, taitotasoltaan vahvemman ryhmän jäsenet olivat useammin toisen vaiheen kirjoittajia. Yhtenä selityksenä eroille voisi olla, että vahvemman ryhmän jäsenet olivat motivoituneempia muokkaamaan tekstiä vielä ensimmäisen luonnoksen kirjoittamisen jälkeenkin. Heikomman ryhmän jäsenet taas saattavat tarvita enemmän aikaa kirjoitusprosessin aluksi suunnitellakseen tekstiä, sillä heidän kielitaitonsa ei ole vielä riittävä siihen, että he voisivat alkaa suoraan kirjoittamaan vieraskielistä tekstiä. Non-stop kirjoittajia löytyi toisaalta molemmista ryhmistä, eli näyttäisi siltä, ettei ainakaan sujuvuuden piirteitä voida yhdistää yhteen tiettyyn kirjoitusprofiiliin. Mitä tulee eri tasoryhmiin, tulokset osoittivat myös, että kielitaidoltaan vahvemmillä kirjoittajilla oli useammin sama kirjoittajaprofiili (5/8) L1 ja L2 välillä verrattuna heikompiin kirjoittajiin (2/8). Nämä tulokset ovat hieman ristiriidassa määrällisen tutkimuksen tulosten kanssa, mutta toisaalta ne tukevat mm. Peltosen (2018) ja Huenschin ja Tracy-Venturan (2017) tuloksia.

Kaiken kaikkiaan tämän tutkielman tulokset osoittivat, että L1 ja L2 sujuvuuden välillä on jonkinlainen yhteys kirjoitetussa kielessä. Määrällisen tutkimuksen perusteella parhaiten korreloivat mittarit, jotka liittyivät kirjoittajien taukokäyttäytymiseen. Myös Peltonen (2018) ja De Jong yms. (2015) löysivät samanlaisia tuloksia suullisen aineiston tutkimuksissaan, mikä saattaisi tarkoittaa, että kirjoittaminen ja puhuminen eivät olisikaan loppujen lopuksi täysin erillisiä toisistaan. Muokkausten määrässä ja tavassa ei ollut yhtä paljon nähtävissä samankaltaisuutta L1 ja L2 välillä, vaikka esseiden laadullinen tarkasteleminen osoittikin, että monet kirjoittajista myös muokkasivat tekstejään samoilla tavoin. Yhtenä syynä tuloksille voi olla, että tekstin muokkaamisen suhteen L1 ja L2 ei ole yhtä suurta yhteyttä verrattuna taukojen määrään ja pituuteen. Tosin myös muokkausten määritelmällä voi olla vaikutusta tämän tutkielman tuloksiin. Yllättäen myös monet tekstien yleistä sujuvuutta mittaavat mittarit, kuten kirjoitusjaksot, korreloivat heikosti L1 ja L2 välillä. Tutkimuksia aiheesta tarvitaan siis lisää, ja erityisesti suuremmalla aineistonmäärällä, sekä toisenlaisilla muokkausten määritelmillä. L1 ja L2 välisiä yhteyksiä kirjoitetussa kielessä voidaan tutkia myös käyttämällä ääneen ajattelu -metodia tekstintallennusohjelmien tukena, jolloin päästään syvemmälle yksilöiden kirjoitusprosesseihin. Määrällisen ja laadullisen tutkimuksen yhdistäminen on elintärkeää näin monisyisen ilmiön tutkimiseen, kuten tämänkin tutkielman tulokset osoittivat.