

# **FLUENCY DEVELOPMENT IN L2 DURING STUDY ABROAD: FINNISH STUDENTS OF RUSSIAN**

Licentiate Thesis  
Department of Languages  
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## **Abbreviations**

**L1** – First (native) Language

**L2** – Foreign Language (second, third, fourth or fifth foreign language learnt)

**SA** – Study Abroad

**ms** – Millisecond

**WPM** – Words per minute

**SR** – Speech rate

**AR** – Articulation rate

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## JYVÄSKYLÄN YLIOPISTO

Tiedekunta – Faculty Humanistinen	Laitos – Department Kielten laitos
Tekijä – Author Riikka Ullakonoja	
Työn nimi – Title Fluency Development in L2 during Study Abroad: Finnish Students of Russian (Suomalaisten venäjän opiskelijoiden sujuvuuden kehittyminen kieliharjoittelun aikana)	
Oppiaine – Subject Venäjän kieli ja kulttuuri	Työn laji – Level Lisensiaatin tutkielma
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<p>Tämä lisensiaatin tutkielma on kolmen artikkelin pohjalta tehty yhteenveto ja pohdinta. Artikkelit käsittelevät lukupuhunnan sujuvuutta vieraassa kielessä (venäjässä), tarkemmin sanottuna sujuvuuden perseptuaalista ja akustista ilmentymistä. Koehenkilöinä oli 12 naista (iältään 19-24 vuotta), jotka opiskelivat yliopistossa venäjää pääaineenaan ja joiden äidinkieli oli suomi. He lukivat pareittain nauhalle yhden suomenkielisen ja kaksi venäjänkielistä dialogia eri vaiheissa yliopisto-opinoja: ennen 3,5 kk:n vaihto-opiskelujaksoa, sen puolessavälissä ja sen jälkeen. Dialogit olivat samat kaikilla nauhoituskerroilla. Venäjänkielisestä dialogista tutkimusaineistoksi otettiin kaikilta puhujilta sama (pisin) puheenvuoro (n=36) kultakin nauhoituskerralta. Suomenkielisestä dialogista aineistoksi valittiin yhtä pitkä näyte, joka koostui kahdesta eri puheenvuorosta.</p> <p>Ensimmäinen artikkeli <i>Pausing as an indicator of fluency in the Russian of Finnish learners</i> käsittelee opiskelijoiden sujuvuutta 30 suomalaisen venäjänopettajan arvioimana sekä näiden sujuvuusarvioiden mahdollista yhteyttä tauotukseen (taukojen määrä, kesto ja sijainti). Toisen artikkelin <i>Speech rate as an indicator of fluency in the Russian of Finnish learners</i> aiheena on puhe- ja artikulaationopeus ja sen yhteys ensimmäisessä artikkelissa tehtyihin sujuvuusarvioihin. Kaksi ensimmäistä artikkelia käsittelee myös sujuvuuden kehittymistä kieliharjoittelun aikana. Kolmas artikkeli <i>Perception of L2 fluency in study abroad context</i> käsittelee sujuvuutta peilaten opettajien sujuvuusarvioita opiskelijoiden itsearviointeihin.</p> <p>Em. artikkeleissa raportoidut tulokset osoittivat mm., että sekä opettajien arvioiden että prosodisten piirteiden (tautus ja puhenopeus) mukaan suurimmalla osalla opiskelijoista luetun venäjän sujuvuus kehittyi vaihto-opiskelujakson aikana. Koska opiskelijoiden yksilöllistä kehittymistä ei seurattu ja taustatietojen mukaan ryhmittelyä ei ole juurikaan tehty, ne olisivat kiinnostavia jatko-tutkimuksen näkökulmia. Koska tauotuksen ja puhenopeuden lisäksi myös intonaatio on mainittu sujuvuuden prosodisena piirteenä, seuraava askeleeni onkin keskittyä opiskelijoiden kysymysintonaation tuottamiseen ja sen kehittymiseen vaihto-opiskelujakson aikana.</p>	
Asiasanat – Keywords Prosodia, sujuvuus, toisen kielen oppiminen, venäjä	
Säilytyspaikka – Depository Kielten laitos/ venäjän kieli ja kulttuuri	
Muita tietoja – Additional information	

## FOREWORD

Monet ihmiset ovat auttaneet minua toistaiseksi lyhyellä tutkijan urallani ja myötävaikuttaneet tavalla tai toisella tämän työn syntymiseen. Kiitos kaikille, jotka ovat eri yhteyksissä kommentoineet työtäni tai esitelmiäni joko muodollisesti tai epämuodollisesti. Minun ei ole mahdollista mainita kaikkia nimeltä, mutta erityisesti haluan kiittää:

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- Mikaa... Kiitos että olet olemassa!

## LIST OF ORIGINAL PUBLICATIONS

Study I: Ullakonoja, Riikka. 2008. Pausing as an indicator of fluency in the Russian of Finnish learners. In Barbosa, Plínio A. & Madureira, Sandra & Reis, César (eds.) *Proceedings of the Speech Prosody 2008 Conference. Campinas, Brazil*. São Paulo: Editora RG/CNPq. 339-342.

Study II: Ullakonoja, Riikka. 2009. Speech rate as an indicator of fluency in the Russian of Finnish learners. In O'Dell, Michael & Nieminen, Tommi (eds.) *Fonetiikan päivät 2008 – The Phonetics Symposium 2008*. Tampere Studies in Language, Translation and Culture, Series B. 97-109.

Study III: Ullakonoja, Riikka & Dufva, Hannele. 2008. Perception of L2 fluency in study abroad context. *Academic Exchange Quarterly*, Fall 2008 (12) 3. 62-66.

# 1 INTRODUCTION

This thesis was partly motivated by my own experience of participating in a 4-month-study abroad programme some 7 years ago and finding myself becoming more confident and fluent in using Russian in such a short time. Already then I was wondering about how this happened, what lies behind fluency development of a learner and what is perceived as fluent speech. My research interest in phonetics aroused while working on my Master's degree when I had the opportunity to take part and work in two research projects: *Spontaneous Speech of Typologically Unrelated Languages (Russian, Finnish and Dutch)* (funded by INTAS) and *Russian and Finnish Prosody and its Effect on Segments* (funded by Academy of Finland). During these projects I started writing my Master's thesis (Ullakonoja 2005) which focused on the definition of syllable in Russian. It was an experimental study where the syllable structure and duration were compared in read-aloud and spontaneous speech. Some time after completing the Master's thesis I began to work on my Doctoral dissertation, the topic of which involves both phonetics and second language (L2) learning.

This Licentiate thesis is a collection of reviewed articles in which the findings of three published papers and their relevance in the research field are discussed. In addition to these three studies, I will refer, where applicable, to a number of related

pilot studies, reported in conference presentations (Ullakonoja 2007c; 2008a; 2008b; 2008c). The thesis concentrates on the acoustic correlates of L2 fluency in read-aloud speech. More precisely the interest is on Finnish university students who are learning Russian (L2). The first article “Pausing as an indicator of fluency in the Russian of Finnish learners” (see Study I, Appendix 2) focuses on the fluency development of students during their stay in Russia. More particularly it concentrates on pausing as a temporal correlate of fluency as well as teachers’ evaluations as its perceptual correlates. The second article “Speech rate as an indicator of fluency in the Russian of Finnish learners” (see Study II, Appendix 3) concentrates on the speech and articulation rates in students’ speech, which are compared with the fluency ratings obtained in the previous study. The third article “Perception of L2 fluency in study abroad context” (see Study III, Appendix 4) summarizes the results of the students’ self-assessment and investigates their relationship with the fluency ratings of Study I, as well as recalculates the ratings using normalization.

The abovementioned three studies discussed in this Licentiate thesis will also be a part of my future Doctoral dissertation which will expand the perspective so that the development of L2 learners’ prosody during study abroad will be regarded more thoroughly by studying pitch patterns. Table 1 below recapitulates the studies completed (Studies I, II, III and IV) and the intended future study (Study V): their focuses, language varieties, titles and information about the type of publication. The table shows that the three studies presented here (Studies I, II and III, in bold) will form a part of the Doctoral dissertation, where, as already mentioned, a broader focus on prosody in learners’ speech will be taken.

Study	Main Focuses	Language varieties	Title and reference	Information about the publication
<b>Study I</b>	<ul style="list-style-type: none"> <li>Evaluated fluency</li> <li>Pausing</li> </ul>	Russian (L2)	R.U. 2008. Pausing as an indicator of fluency in the Russian of Finnish learners. In Barbosa, Plinio A. & Madureira, Sandra & Reis, César (eds.) <i>Proceedings of the Speech Prosody 2008 Conference. Campinas, Brazil</i> . São Paulo: Editora RG/CNPq. 339-342.	Anonymously reviewed International Conference proceedings
<b>Study II</b>	<ul style="list-style-type: none"> <li>Speech rate</li> <li>Articulation rate</li> </ul>	Russian (L2), Finnish (L1)	R.U. 2009. Speech rate as an indicator of fluency in the Russian of Finnish learners. In O'Dell, Michael & Nieminen, Tommi (eds.) <i>Fonetiikan päivät 2008 – The Phonetics Symposium 2008</i> . Tampere Studies in Language, Translation and Culture, Series B. 97-109.	National Conference proceedings
<b>Study III</b>	<ul style="list-style-type: none"> <li>Normalized fluency evaluations</li> <li>Self-evaluation of language skills</li> </ul>	Russian (L2)	R.U. & H. Dufva. 2008. Perception of L2 fluency in study abroad context. <i>Academic Exchange Quarterly</i> , Fall 2008 (12) 3. 62-66.	Double-blind-peer-reviewed international print journal
<b>Study IV</b>	<ul style="list-style-type: none"> <li>Pitch range</li> </ul>	Russian (L1), Russian (L2), Finnish (L1)	R.U. 2007. Comparison of Pitch Range in Finnish (L1) and Russian (L2). In Trouvain, Jürgen & Barry, William J. (eds.) <i>Proceedings of the 16th International Congress of Phonetic Sciences, 6-10 August 2007, Saarbrücken, Germany</i> . Saarbrücken: Universität des Saarlandes. 1701-1704.	Anonymously reviewed International Conference proceedings
<b>Study V</b>	<ul style="list-style-type: none"> <li>Development of pitch patterns in questions</li> </ul>	Russian (L2), Russian (L1)	(forthcoming)	International Journal

Table 1. Studies that my Doctoral dissertation consists of. The studies in bold are the ones discussed in this Licentiate's thesis.

The outline of the Licentiate thesis is structured as follows. After this introductory first chapter, the second chapter introduces the research material and methods. The third chapter addresses the theoretical issues involved and defines the key terminology and theoretical framework. Finally, the fourth chapter discusses the results of the three studies and in the fifth, some conclusions are drawn. As outlined above, the aim is to discuss the main findings of the three studies and provide some relevant theoretical background that could not be included in the actual articles. The results of the studies as well as their theoretical background are found in the articles (see Appendices 2-4).

## **1.1 Russian as L2 in Finland**

The linguistic context in this study focuses on Finnish students' prosody in L2 Russian. Hence, in this study, Finnish is the L1 of the participants and Russian their L2. The L1 and L2 of the subjects are typologically quite different: Russian belongs to Slavic languages whereas Finnish is a Finno-Ugric language. Because the languages have differences both on segmental and prosodic levels, Finns face a challenge in learning Russian pronunciation. On the segmental level, the Russian sound system has voicing-opposition and palatalisation-opposition of segments which are not present in the Finnish sound system. On the prosodic level, on the other hand, the Russian word stress is not fixed and its place has a distinctive nature. It also causes quantitative and qualitative reduction of unstressed vowels. In Finnish, on the other hand, the word stress is fixed on the first syllable and the pronunciation of unstressed vowels does not differ from the stressed ones as much as in Russian. In addition to that, intonational features of Russian, and functions of intonation are different from Finnish. (de Silva & Ullakonoja 2009.)

In Finland Russian is spoken by more than 42,000 people as L1 (Alanen 2007). That is about 0.8 % of the total population of Finland which was 5.3 million on the 1st of

January 2008 (Väestörekisterikeskus 2008). Despite the geographical proximity and economical contacts between Russia and Finland, Russian is not very popular as a foreign language to be studied in Finland. In fact, if we look at the L2s chosen by Finnish high school students in their matriculation exam (end-of-high school exams), there are on average only 274 students yearly who have enrolled for the exam for the full syllabus (pitkä oppimäärä) during the past 10 years, and on average 663 yearly for the abridged one (lyhyt oppimäärä) (see Table 2). Both of these together make only about 0.4 % of the average total of students (22,753) enrolled each year for the exam. (Ylioppilastutkintolautakunta 2008, 14-15, 17.)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Full syllabus (Russian)	271	263	210	193	213	258	280	338	345	371
Abridged syllabus (Russian)	741	764	834	884	756	589	540	493	495	537
Total number of students	230122	228687	233133	233704	233869	226912	220966	219259	231697	216988

Table 2. Frequency of the students who have enrolled for the matriculation examination in Russian during the past 10 years (Ylioppilastutkintolautakunta 2008, 14-15, 17).

The decline in numbers may be partly explained by the fact that students are now taking more exams in other subjects than foreign languages and mathematics (Ylioppilastutkintolautakunta 2008, 18). The fact that this general tendency has had no impact on the participants of the exam of the full syllabus can be explained by the increasing number of Russian immigrants (or children of immigrants) who are taking the exam.

In tertiary education in Finland, Russian is currently taught as a major subject (either Russian “Philology” or translation) in six universities (University of Helsinki, University of Joensuu, University of Jyväskylä, University of Tampere, University of Turku and Åbo Akademi). About 140 major students begin their studies each year which makes it about 15 % of all the students enrolling for the matriculation exam in Russian each year. (Mustajoki 2007, 49.)

## 1.2 Background

This section introduces mainly earlier phonetic research from L2 point of view, but also briefly mentions the most important studies on fluency and study abroad context. In phonetic research L2 perception and production can be studied from segmental or prosodic points of view. From the prosodic point of view, previous studies have investigated rhythm, intonation, word stress, sentence stress, duration, fundamental frequency, pausing, speech, and articulation rates and boundaries. From the L2 point of view, the interest has been on foreign accent, fluency, or teaching phonetics. My focus in this Licentiate thesis is the development of Russian prosody by Finnish university students, and more precisely the fluency development. My main interest was to find out how the exchange period (3.5 months) in Russia affected students' fluency of read-aloud speech. The material for this longitudinal study consists of several recordings done throughout the university studies of the subjects.

I chose the topic also because it seems that today the majority of the international research community in phonetic sciences has set its focus on prosody. However, when studying phonetics of L2 speech, studying learners' perception of L2 has been the main direction taken. The theoretical justification for this focus is that perception is traditionally thought to precede production (Lado 1961, 78; 1964, 85; Nord 1980). To mention some researchers, for example Cruz-Ferreira (1989), Baker & Trofimovich (2001), Humalajoki et al. (2006), Frieda & Nozawa (2007), Altenberg (2005) and Chen & Fon (2007) have recently concentrated on L2 perception. For example, Cruz-Ferreira (1989) analysed the perception of intonation patterns in L2. Baker & Trofimovich (2001) were interested in the dilemma "does perception precede production" and studied that experimentally in the perception and speech of Korean-English bilinguals. Humalajoki et al. (2006) and Frieda & Nozawa (2007) analysed the perception of vowel categories in L2. Furthermore, Altenberg studied

(2005) the perception of word boundaries in L2 English, and Chen & Fon (2007) the perception of English liquids.

Today there seems to be less researchers who are interested in learners' L2 oral production (see Zampini 2008 for an extensive review). However, for example Flege and colleagues (Flege & Hillenbrand 1986; Bohn & Flege 1990; Flege 1993; Flege et al. 1999; McAllister et al. 1999; MacKay et al. 2001) have studied segmental production in L2. Furthermore, Flege (1995) has developed an SLM (=Speech Learning Model) for being able to understand and to model the learning process better. In addition to that, Flege's interest has been e.g. on the L2 perception of segments. Relevant from my study's point of view, he and colleagues have also examined the influence of the mother tongue on the perception, as well as studied people who have resided some time in an L2 country (see e.g. Flege & Hillenbrand 1986). For example, Cebrian (2006), Aoyama et al. (2004) and Jia et al. (2006) have also studied learners' productions in L2 on the segmental level.

Learner's segmental production in L2 has been studied contrastively in Finland e.g. by Vihanta (1977; 1978) and Suomi (1976). Vihanta is one of the few Finnish researchers focusing their interest on learning phonetics of some other language than English or Finnish. In his case, the target language was French. Vihanta's studies (1977; 1978) focused on the pronunciation and perception of stressed French vowels by Finnish learners. Peacock (1990; 2002) and Lintunen (2004; 2005), on the other hand, were interested in the role of instruction in learning pronunciation. Lintunen (2005, 211-212, 222-224), for example, found that the better Finnish students learn phonetic transcription of English (L2), the more they improve their pronunciation. Lintunen concludes that for learners whose L1 has a close grapheme-phoneme correspondence (like Finnish), transcription would be an effective teaching method. Also Iivonen et al. (2006) have been interested in phonetics' teaching methods, but differently from Lintunen, with the help of multimedia.

Studies dealing with non-segmental aspects of speech have commonly focused on the evaluation of foreign accent, intelligibility or comprehensibility of the L2 speaker

(Flege et al. 1995; Munro & Derwing 1995; Munro 1995; Magen 1998; Munro & Derwing 1998; Piske & MacKay 1999; Guion et al. 2000; Piske et al. 2001; Derwing et al. 2006; Flege et al. 2006; Trofimovich & Baker 2006; Bent et al. 2007; Meister & Meister 2007; Aoyama et al. 2008). Most of these studies have concentrated on the age of acquisition, i.e. the age of the learners when starting to learn L2, or the length of residence in an L2 country. They have attempted to find out if “a critical period” exists and if so, at what age and also what influence does the length of residence have. Also the intelligibility of non-native speech to L2 learners has been investigated (Pihko 1997).

However, only few researchers have focused their attention on learners’ L2 production on the suprasegmental (prosodic from here on) level. Mennen and others have studied pitch range (Mennen et al. 2007) and intonation (Arvaniti et al. 1998; Mennen 1998; Ladd et al. 2000; Mennen 2004; 2007; Chen & Fon 2008) in L2 speech. Jilka (2007) also studied intonation, but from the point of view of foreign accent. Furthermore, Möhle (1984) and Trofimovich et al. (2006) have studied temporal variables of L2 speech including the aspect of SA context in their tests. Other aspects of learning prosody have been investigated e.g. by Markus & Bond (1999), Kondo (1999; 2005), Gut (2003; Gut et al. 2007) and Aoyama & Guion (2007). Chen et al. (2001) on the other hand compared acoustic characteristics of English sentence stress of Mandarin (L2) and English (L1) speakers. Also Aho, Toivola and colleagues (Aho & Toivola 2008; Toivola et al. 2009) have studied L2 prosody, namely that of Russian immigrants learning Finnish.

Some purely contrastive studies on prosody have also been completed (see e.g. Lehtonen et al. 1977; Grosjean 1980b; Nevalainen 1990) where the aim has mostly been to apply the results into L2 learning. Nevalainen (1990) and Lehtonen et al. (1977) studied Finnish and English contrastively, whereas Grosjean’s (1980b) languages were French and English. Ylinen (formerly Nenonen) and colleagues (Nenonen 2001a; 2001b; Nenonen et al. 2003; 2005; Ylinen et al. 2005a; 2005b;

2006) have investigated L2 speakers of Finnish and their perception of Finnish phonological length in comparison of native Finnish speakers.

Prosody in the foreign language (namely English) speech production of Finnish university/polytechnic students has been the focus of some studies. The first studies were conducted in the 1970's when Lehtonen and colleagues (Lehtonen et al. 1977; Lehtonen 1987) attempted to find ways of automatically (and acoustically) evaluating fluency of learners' speech. Hirvonen (1967; 1970) and Toivanen (1998; 1999; Toivanen & Waaramaa 2005; Toivanen 2006) on the other hand, concentrated their attention on how Finns acquire English intonation. Hirvonen (1967; 1970) had a contrastive approach towards intonation research: his works describe the English (L2) and Finnish (L1) intonational systems as well as include both perception and production experiments of Finnish students of English. Toivanen (1999) on the other hand provides a detailed description of English intonation and compares the English intonation of Finnish students to native English speakers. The most recent study (Paananen-Porkka 2007) in this field, however, concentrated on the acquisition of some rhythmic parameters of speech by Finnish high school students.

Finnish students' acquisition of Russian prosody has been discussed in few studies. For example, Koivisto (1980) and Kuusiniemi (2001) studied the acquisition of Russian intonation by Finnish university students in their Master's theses. It is only since the end of the 20th century that the topic has aroused more interest and has provoked a few studies. De Silva, Volskaya, Kuosmanen, Kärkkäinen and Ullakonoja (de Silva & Shserbakova 1998; de Silva 1999; 2002; Kuosmanen & de Silva 2003; de Silva & Volskaya 2005; Kärkkäinen et al. 2006; Kuosmanen & de Silva 2007; Ullakonoja et al. 2007; de Silva & Ullakonoja 2009), Shserbakova (2001; 2002) and Lyubimova (1998) were interested in Finnish students learning Russian prosody.

Kärkkäinen et al. (2006) focused on the role of the fundamental frequency in dividing speech into intonation units in Russian and Finnish. Ullakonoja et al. (2007)

presented preliminary results on the learning of intonation unit division as well as pitch patterns in Russian. De Silva, has studied, for example, the rhythmic structure of Finnish and Russian words (de Silva & Shserbakova 1998), the perception of word stress in Russian by Finns (de Silva 1999), and how Finns pronounce Russian sounds compared to native speakers (de Silva 2002). Furthermore, de Silva & Volskaya (2005) discussed the applicability of the Common European Framework of reference for languages to teaching Russian oral skills in Finland. Kuosmanen & de Silva (2003; 2007) investigated Finnish university students' (n= 10) question intonation in Russian. Their studies included both production and perception experiments where they obtained that it is indeed very difficult even for competent Finns to produce intonation in Russian yes-no questions comprehensibly even on the advanced level.

Some experimental research on fluency has been done in the field of speech pathology and logopaedics where its aim has been to find out efficient techniques of evaluating the fluency of patients (Korpijaakko-Huuhka 1996; Moore & Korpijaakko-Huuhka 1996). In SLA (second language acquisition) studies fluency has been a more infrequent research topic in the recent decades. Most previous studies have concentrated either on acquisition of fluency (Segalowitz & Freed 2004; Segalowitz 2007), effect of experience (Freed 1995; Lapkin et al. 1995; Freed, Segalowitz & Dewey 2004), or acoustic parameters of fluent speech (Lehtonen 1978; 1981; Simões 1996; Paananen 1998; Wennerstrom 2000) such as pausing, speech rate, articulation rate and intonation.

Some research on fluency has been done in relation to the length of residence in the L2 country. The setting in these studies is either immigration to L2 country, or L2 students spending some time in L2 country. These studies (Walsh 1994; Freed 1995; Simões 1996; Towell et al. 1996; Freed et al. 2003; Lafford 2004; Segalowitz & Freed 2004; Trofimovich & Baker 2006) have yielded, as one might expect, that L2 context is advantageous to learners in improving their oral skills and becoming more fluent. However, some researchers (Freed, Segalowitz & Dewey 2004) have shown

that the relationship is not as simple as that: it has been found that not all learners necessarily improve their fluency more than the students in the control group at home.

### 1.3 Research questions

This experimental phonetic research will be based on methods of acoustic analysis of the speech corpus and their statistical analysis. The main interest is in studying pauses and speech rate through the acoustic analysis. This study belongs to the field of pedagogical (i.e. didactic) and instrumental phonetics. Uniting these two approaches is relatively rare, especially since the interest lies in the learners' speech production. As was mentioned above, in most studies the perspective has been that of perception.

Hence, this study stands at the crossroads of experimental phonetics and learning Russian as a foreign language<sup>1</sup> (L2). The aims of the study were, firstly, to investigate how pausing and speech/articulation rate function as prosodic characteristics of fluent L2 read-aloud speech, and secondly, to detect possible fluency development of the learners during their study abroad period using both acoustic measures and teachers' evaluations of fluency. The aims are met by addressing the following research questions empirically:

#### **Fluency**

1. How do the Finnish FL speakers of Russian develop in read-aloud fluency during the study abroad period? Does the amount of experience (1.5 months vs. 3.5 months) have a significant influence on the development? (Study I, Study III)

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<sup>1</sup> Русский язык как иностранный (РКИ), Russkij yazyk kak inostrannyj (RKI)

2. Do temporal/acoustic variables (such as speech and articulation rate and pausing) correspond with the fluency ratings? (Studies I and II)

### **Pausing**

3. Are speakers thought to be more fluent in their L2 if they have less and shorter pauses and at syntactically appropriate locations? (Study I)

### **Speech and articulation rate**

4. Are speakers evaluated to be more fluent in their L2 if their speech and/or articulation rate is faster? (Study II)
5. Are speech and/or articulation rate speaker and/or language dependent? (Study II)

### **Students' self-assessment**

6. Is there a relationship between speaker's self assessment and language behaviour in Russia and their fluency rating? (Study III)

Studies that combine both acoustic and perceptive fluency measurements and focus on development of fluency during the stay abroad are relatively rare. To my knowledge this is one of the first studies combining both the acoustic analysis of pauses and speech rate, foreign-language teachers' fluency evaluations of learners' speech and language development during experience in the country of the target language. A roughly similar to the present study is a study by Towell et al. (1996) where the focus was on SLA in a study abroad setting, and which combined both quantitative (speech rate, articulation rate, mean length of run and phonation time ratio) and qualitative aspects (what was being said) of spontaneous speech of advanced students of French. However, their study on spontaneous speech did not include perceptual ratings of fluency by teachers but was based only on the perception of the researchers themselves about the fluency of the students' speech and on the assumption that faster speech and articulation rate are "automatically" more fluent. The experimental design was in other ways very similar to the present study, there was no control group or no comparison of different learning environments that can be found in for example Freed and colleagues' numerous studies (Collentine & Freed 2004; Freed, Segalowitz & Dewey 2004; Lafford 2004; Segalowitz & Freed 2004; Segalowitz et al. 2004).

## **2 EXPERIMENTAL DESIGN, MATERIAL AND METHODS**

This chapter will focus on the material and methods of the study. To begin with a summary, Figure 1 below describes different data used in this study and how they were analysed. The principal data consists of recorded speech. In addition, background information of the subjects was collected and perception tests (fluency ratings from hereon) of the teachers were used.

This chapter will begin with an introduction to the speech data. First, I will describe the subjects whose read-aloud performances were recorded, and then discuss the background questionnaires they were asked to fill in. After that I will introduce the texts that were recorded, then tell about the recording procedure and, finally, about the analysis of the speech data. The second section of the chapter deals with the fluency evaluation task where teachers were asked to evaluate samples of the recorded speech for the perceived fluency. The last section of the chapter shortly describes the statistical methods used in this study.

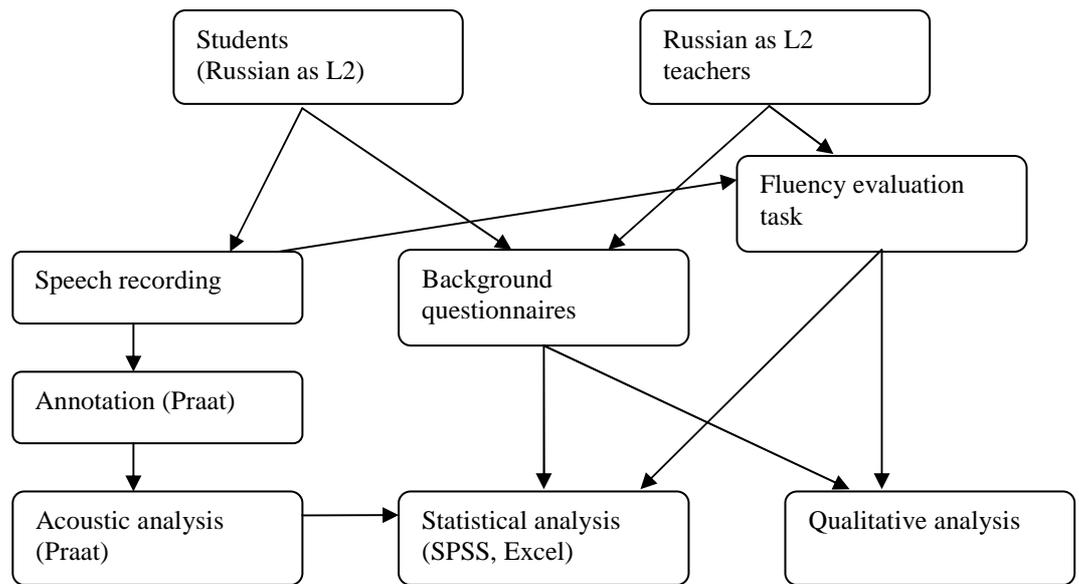


Figure 1. Data collection and data analysis procedures.

## 2.1 Speech data and methods

To begin with, the data collection procedure for the phonetic analysis will be presented. First, the linguistic and educational background of the subjects who participated in the study, are described in detail. Then, I will introduce the texts the subjects read and on which the phonetic data is based (see subsection 2.1.3), and explain the recording procedure (see subsection 2.1.4). I will also briefly discuss the features of read-aloud data in general. After that, I will describe the questionnaires that were used for collecting the background information. Finally, this section ends with the description of the segmentation and acoustic analysis (see subsection 2.1.6) and the introduction of the Praat software used for phonetic analysis.

### 2.1.1 Subjects

Twelve Finnish L2 learners of Russian participated as speakers in the experiments. They were 19–24 year-old female undergraduate major students of Russian at a university. All were native L1 Finnish speakers who reported having no hearing or speaking disabilities. They all also participated in a 3.5-month-study exchange in Russia as part of their university studies of Russian.

As the students did not participate in any language skills test for the purposes of this study, their Russian competence will not be discussed here nor taken into account in the analysis. However, according to my subjective evaluation, no great differences were observed between students who had studied Russian 7-10 years and students who had studied Russian less than that. Most students had not been exposed to the Russian language community before their 3.5-month-stay in Russia during their second year, with the exception of few short trips.

Table 3 below presents the position of Russian in their foreign language studies and the years of studying Russian prior to university.

Russian as 1st FL	Russian as 2ndFL	Russian as 3rd FL	Russian as 4th FL
1 (10 years)	1 (7 years)	3 (4-5 years)	7 (1-3 years)

Table 3. Frequency of the students studying Russian as a foreign language (years of studying Russian before university in brackets).

The subjects had studied Russian 4.17 years on average (std = 2.368) prior to university studies. Only one subject had studied Russian as her first foreign language<sup>2</sup> (starting on the 3rd grade), 10 years before she started university studies. One student had also studied Russian as her second foreign language, starting on the 5th grade, whereas the rest had studied Russian only in high school, one only for a year. Most speakers (n= 10) had studied English as their first foreign language and

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<sup>2</sup> I am using the term foreign language here, instead of L2 used elsewhere, for the sake of clarity.

Swedish as their second foreign language<sup>3</sup> – as it is common with Finnish students in general. They hence had Russian as their third or fourth foreign language.

Originally, more subjects were recorded in total, but only the 12 were chosen for the analysis of this study for four reasons. First, the fluency evaluation task (see section 2.2) could not exceed c. half an hour, because it is difficult for the listeners to concentrate their attention on evaluating samples for a longer time. Second, some speakers had to be excluded because their voice quality was not suitable for acoustic analysis: some samples involved e.g. much creaky voice or whisper. Third, not all subjects, who participated in the first recording, finally entered in the study abroad program or for other reasons could not participate in all the recording sessions. Fourth, some students were excluded from the analysis because of remarkable differences in language skills: some were bilingual in Finnish and Russian, and some studying Russian as a minor subject. They were not included as subjects in the study because, first, the language skills of the bilinguals were obviously on a different level and, second, minor students' motivation towards learning Russian might have been different from that of the major students.

As it is, the sample can be considered to be fairly representative of the Russian students of the particular university in terms of their reading aloud and pronunciation skills. During two years, all major students of the particular university were given the possibility to participate as subjects in the study. The subjects under scrutiny were recruited on a volunteer basis and motivated by offering them a possibility to get feedback on their pronunciation after all the recordings had been done. According to my subjective evaluation, the students' pronunciation skills varied from very good to fairly weak, so it was not the case that only the best students would have participated. Most students were speaking Russian with a Finnish accent, some having more difficulties than others in reading the text.

All the subjects participated in the same study abroad program during the second year of their university studies, and studied at the same Russian university for 3.5

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<sup>3</sup> In Finland Swedish is called the "second national language" but from the students' point of view it is a foreign language.

months. Prior to their stay in Russia, they had taken one course of Russian phonetics during their first year, where they had been taught the basic segmental and intonational features of the language. Half (6/12) of the students resided with a Russian host family during their stay in Russia, whereas the rest stayed in the foreign-student dormitories. One student moved to the dormitories in the middle of her stay. During their 3.5-month-stay in Russia they had no formal instruction in phonetics, but participated in several Russian linguistic courses for L2 learners. In the Russian classroom the students were often asked to read texts aloud. When interviewing their Russian teachers<sup>4</sup> and observing their lessons, it was noticed that teachers' feedback to the students on pronunciation was different: some teachers corrected mispronunciations, especially word stress, whereas others hardly paid any attention to correcting pronunciation mistakes.

There was no control group in this study because the original aim was not to show statistically significant differences between the students who went abroad and students who stayed at home, but rather to see what changes occurred in students' speech during their stay in Russia. To show the impact of the study abroad experience on the learners' speech production per se, a group of students who did not participate in a similar study in Russia program would have been needed for comparison. However, at the time of the recordings, study exchange in Russia was an integral (and compulsory) part of university studies in all Finnish universities for students majoring in Russian. Hence, it would have been very difficult, if not impossible, to find a control group. Even if it had been possible to find enough students staying at home during the time others were in Russia, their language skills and motivation towards studying Russian may not have been the same. The underlying assumption of this study is that the recording done prior to the stay in Russia represents, at least to a certain extent, the situation of the learners who had not been in Russia. However, it needs to be noted as Hieke (1981) has shown, that fluency can be improved even in a classroom setting if a suitable teaching technique is used.

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<sup>4</sup> the interviews were conducted by the author in autumn 2005 and 2006

### **2.1.2 Background questionnaires**

The students' speaking activity with native Russians and their fluency self-assessment were determined with help of background questionnaires that were filled out in Finnish in connection with each recording session (either on paper or through the web). In the questionnaires, the students were asked various questions (both open and multiple choice) about their language learning background, and self-assessment of their pronunciation skills and development. There were about 35 questions in total, but some of the information obtained through the questionnaires will not be reported here. Only the background information that was used in Studies I and II is discussed here. That is the students' age, the length of studying Russian prior to university studies, their previous visits to Russia, their mother tongue and their residence in Russia (host family vs. foreign-student dormitories) during the study abroad. Other background information of the subjects has been discussed in conference papers (Ullakonoja 2007b; Ullakonoja 2008a). Also, the questions concerning the students' self-assessment and language behaviour in Russia are discussed in Study III. These questions deal with the students' perceptions about their language use in Russia, improvement of their pronunciation skills and approach to learning pronunciation.

### **2.1.3 Texts for the reading task**

In the recordings, the subjects were asked to read written dialogues in pairs (two in Russian and one in Finnish). The Russian dialogues were telephone conversations (dialogues 46 and 100) taken from a Russian as a foreign language teaching material (Shilova & Usmanova 1990). The lexical stress was marked in the original texts as it usually is in Russian L2 materials. To keep the fluency evaluation task to a reasonable duration, only one turn of one Russian dialogue of each student was chosen for the analysis. However, to be able to study fluency, both perceptually and acoustically, a turn as long as possible was needed. The longest continuous sequence of speech in the Russian dialogues consisted of 6 sentences. It was a response to the interlocutor's question *Слушай, а как мы раньше жили без телефона?* (*Slushay, a*

*kak my ran'she zhili bez telefona?)* 'Listen, how could we live without a telephone before?'

The turn chosen for the analysis was:

*Не представляю себе. Ну ладно. А зачём я, собственно, тебе звоню? Ах да, насчёт Анны. Она уезжает не сегодня вечером, а завтра утром. Так что, если хочешь её проводить, приходи к нам утром, часов в девять.*

*Ne predstavlyayu sebe. Nu ladno. A zachem ya, sobstvenno, tebe zvonyu? Ah da, naschet Anny. Ona uezhaet ne segodnya vecherom, a zavtra utrom. Tak chto, esli hochesh' ee provodit', prikhodi k nam utrom, chasov v devyat'.*

'I can't imagine. Oh well. And why am I calling you in the first place? Oh yes, about Anna. She is not leaving tonight, but tomorrow morning. So if you want to see her off, come to our place in the morning at about nine o'clock.'

In Study II, also an extract from the Finnish read-aloud dialogue was analysed for comparison. I wrote the Finnish dialogue myself. The goal was to have a text that would be close to the students' everyday speech and would contain different clause types (because the original purpose was to study intonation) and that would, however, be a dialogue between two people where the overlapping speech could be avoided. The style of the Finnish text differed from the Russian texts. The Finnish text was closer to a spoken dialogue between two young people while the Russian texts are telephone conversations of perhaps middle-aged women. However, the goal was to have texts that would be "easy to read". It was thought that the students would be more comfortable reading a text in Finnish which was written "in the way young people speak" than one written in a more formal style. In Russian, on the contrary, it might have been hard for them to read a text written in the way young people would speak, hence, a text from a teaching material was used, thinking that that would be the style they were more used to reading.

In the Finnish dialogue there was not a single turn that would be as long as the Russian turn under scrutiny. Hence, two turns of each speaker of the Finnish texts were chosen for the analysis of speech and articulation rate reported in Study II. These two turns were selected because they were fairly long and corresponded approximately, as measured in word length, to the Russian turn.

The two turns analysed were:

(Previous turn of the interlocutor was: *Ai nii, olinhan mä. Se oli kyllä tosi helppo!* 'Oh yes, I was too. It was really easy!'.)

*Ai oli vai? Ei musta... Musta tuntu etten mä osannu mitää. Hyvä nyt kysyy jotai ihmeen zoologisia teorioita, joista mä en oo koskaa kuullukaa...*

'You think so? I don't. I think I couldn't answer any question correctly. What's the point in asking about some zoological theories that I've never even heard of?

(Previous turn of the interlocutor was: *No mut kohtaha tulee taas opintotuki, ostasit vaikka sellasen DVD-soittimen, ku niillähä voi soittaa CDtä.* 'Well, but you'll soon receive your monthly study allowance, why don't you buy a DVD player, 'cause they'll play CDs'.)

*No en varmaa osta! Mulla menee se kokonaa elämiseen. Mä lähen nyt kotii. Nähääks huomenna?*

'I surely won't buy that. It'll all go on living costs. I'm going home now. Will we meet tomorrow?'

The Russian turns of each subject were analysed in each recording session. In total, there were 36 Russian turns, making it 11 minutes of the Russian data and 22 turns (3 minutes) of the Finnish data to be analysed.

#### 2.1.4 Recording procedure

In this section I will explain the recording procedure. The subjects (n= 12) were recorded either three or four times: in the beginning of the university studies (only half of the group), before the study in Russia, in the middle of the stay in Russia and after the stay in Russia (see Table 4). During the recordings the students were to read the three dialogues described above (one in Finnish, about 3 minutes, and two in Russian, together about 7 minutes). The same texts were read in all the recording sessions. The subjects were not told that they were to read the same texts each time, nor were they given access to the texts during the intervening time. Some of the subjects mentioned that they did not remember having read the Russian text before, even in the last recording session.

The students were given time to prepare their performance. They could also practise reading the texts as many times as they wished, and ask the researcher for the meaning or the pronunciation of a single word. Also, the time they could use to read the material was not limited: they could read and reread the texts as many times as they wanted until they were satisfied with the result. However, many of them were satisfied with the first recording and did not wish to rerecord. According to Blum & Koskinen (1991) and Golman Eisler (1968, 15), rereading the text and familiarity with its content will increase the reading fluency of the students and decrease the frequency and duration of pauses. Hence, it can be suggested that the students' performance was as good as they were really capable of since they were able to familiarize themselves with the text before the actual recording took place.

The instructions were given to the speakers in Finnish. The students were to concentrate their attention on the phrases and intonation and not to single sounds, and they were asked to pretend to be speaking with a native Russian speaker as naturally as possible. For the purposes of the future intonation analysis, the students were also told that if they mispronounced or hesitated, it would be better to repeat the whole turn/sentence rather than only the word where they struggled. In practice, many of the students did not respect this guideline. All the recordings were done in a similar way in 2005–2007: the pair read the Finnish dialogue first (often without rehearsing), then the first Russian dialogue and, after that, the second Russian dialogue. Only one of the texts was given to the speakers at a time.

A look at Table 4 shows that all the subjects were recorded three times reading the same texts: 1) before the exchange period in Russia (in the end of the first year of their studies), 2) after about one month's stay in Russia (during their second year), and 3) after the exchange. In addition to that, half of the group (those who started their university studies in 2005) were also recorded in the beginning of their university studies. From that recording, only the recordings of their Finnish were used. The remaining recordings will be analysed in future research. The Finnish dialogue was recorded each time, so that the recording context would not change. The Finnish material used in Study II was chosen from the first time the subjects'

read the text (hence, either the recording 1 or 0, depending on the group). The recordings in bold are the ones used in the present study.

In Finland, the recordings were done in the same studio and each time with the same equipment (computer equipped with the program Adobe Audition 1.0 and 2.0, microphones AKG GN30). Both subjects had their own microphones. The recordings done in Russia (in the middle of the stay) were done under different circumstances: with a Sony TCD-D3 DAT-recorder and Edirol by Roland 24-bit Wave/MP3 digital recorder R-09 with a Sony ECM-959A microphone in a hotel room. With the computer and with Edirol by Roland digital recorder the sample rate was 44100 Hz and resolution 16 bit. The two channels were extracted from the stereo sound file with programs Adobe Audition 1.0 and Audacity 1.2.4.

Recording	Stage of university studies	Participants	Task	Recording equipment
0	Beginning of 1 <sup>st</sup> year (September 2005)	half of the students of this study	Reading the <b>Finnish</b> and Russian dialogues with a pair	Computer (program Adobe Audition)
<b>1</b>	<b>End of the 1<sup>st</sup> year (April, May 2005-2006)</b>	<b>all</b>	<b>Reading the Finnish and Russian dialogues with a pair</b>	<b>Computer (program Adobe Audition)</b>
2	While in Russia (October in the 2 <sup>nd</sup> year 2005-2006)	all	Reading the Finnish and Russian dialogues with a pair	DAT-recorder 2005, Edirol by Roland digital recorder 2006
3	After the 3.5-month-stay in Russia (January 2006-2007)	all	Reading the Finnish and Russian dialogues with a pair	Computer (program Adobe Audition)

Table 4. Summary of the recordings.

### 2.1.5 Read-aloud speech as data

Today, in phonetic research spontaneous data is often preferred to read-aloud speech. This seems to be the case also in the field of prosody. However, I decided to study read-aloud speech because I wanted to control the linguistic content in the speech to be able to compare the pronunciation of the text rather than speech planning. Other

fluency studies (Riggenbach 1991; Freed 1995) have shown that fluency ratings are affected also by linguistic choice of the speaker. Furthermore, I wanted to be able to investigate the interspeaker variation as well as to study the speech of the same speakers in different stages of foreign language learning (e.g. before their stay in Russia and after it), and the choice of read-aloud material certainly makes it easier since the data consists of the same textual content, and e.g. the speech of different speakers can be compared in exactly the same utterances that occur in the same context, than if data consists of non-identical sentences. Also, the students' language proficiency was not good enough for them to be able to speak long continuous runs spontaneously in a test situation (see e.g. Kärkkäinen 2008, who recorded spontaneous speech of the same subjects).

The limitations of read-aloud speech itself should, however, be acknowledged. First, the naturalness of speech is limited because the learners are not thinking what they are saying, but rather how they are saying it. Second, the speaking context is not very natural because the speakers are not used to recording their speech in a studio, and they might not use similar expressions or intonational patterns in a real-life situation. However, the speakers were familiarized with the laboratory setting beforehand, and given time to practise reading. As foreign language learners, the Finnish subjects were also used to reading Russian texts aloud.

Third, the Russian oral skills of the learners' are not very developed, e.g. when speaking spontaneously of a given topic they often fail to produce complete sentences or even understandable speech, at least in the early stages of learning. This would make spontaneous data elicitation harder in a laboratory setting. One of the disadvantages of using read-aloud speech is that one can never be sure if the results reflect the fluency of reading or fluency of pronunciation. One rarely needs reading aloud skills when using a language in communication. However, reading aloud texts is a frequently used method in L2 teaching and for this reason, using read-aloud speech as research material can be justified by the familiarity of the students with the task. Also, when speaking spontaneously, different speakers pay attention to different

aspects of their L2: some concentrate on grammar while others focus on finding the right words (Möhle 1984) and hence, their difficulties in speaking fluently are due to different reasons. In read-aloud speech, these factors are not present, but some speakers might be worried about the correct pronunciation.

I have now tried to justify my choice of read-aloud speech as data: the text is the same for all speakers at all recordings, but is it equally hard to read? The text can become easier to read because the students' vocabulary size expands and their language skills improve. It would have been possible, as e.g. Lesgold & Curtis (1981) have done, to use more difficult texts each time as the language skills of the students improve. However, that would not have made it possible to follow the development of prosody, namely, producing intonational patterns of the same clauses which I will report in the doctoral dissertation.

### **2.1.6 Analysis tool – Praat**

For the segmentation and acoustic analysis of pausing and speech rate the computer software for phonetic analysis, Praat (Boersma & Weenik 2007, versions 4.3-5.0), was used. One reason for choosing Praat as an analysis tool was that it is widely used in the experimental phonetic research all around the world. The Praat user group (<http://uk.groups.yahoo.com/group/praat-users/>) alone has about 1 500 members, and at the recent conferences on phonetic sciences, the majority of the researchers and students of phonetics use Praat. Apart from the free availability, its other advantages are easy download and installing, and regular upgrades. It is perhaps not a very user-friendly program, but works very reliably and has been credited e.g. with an efficient F0 analysis algorithm (Boersma 1993). The F0 autocorrelation method (see e.g. Ladefoged 1996, 148-151) will be used in pitch analysis in the future studies reported in the doctoral dissertation.

There are, of course, other efficient programs for speech analysis, most of which have similar functions as Praat. These programs include e.g. Intelligent Speech Analyser™ (ISA) (Toivonen 2007), COLEA: A Matlab Software Tool for Speech

Analysis (Loizou 2008), Speech Filing System (SFS) (UCL 2008), WaveSurfer (Sjölander & Beskow 2006) and EDSW (DSP Center 2007). ISA is a commercial program, the use of which is fairly expensive. COLEA is a freeware program, but requires the use of Matlab computing environment and programming language (Matworks Inc. 2008). SFS works in the Windows environment but there is no support available for using the program. WaveSurfer is a freeware program that could also have been a possible choice for an analysis tool. While EDSW is used by many Russian colleagues and was developed in Russia, its scripting opportunities are not as easy and handy as in Praat.

Praat works well both on Macintosh and Windows operating systems, which was also an important advantage. The authors of the program provide support for its users. Also the previously mentioned Praat user group is an important medium for getting help with any problems that might occur. Furthermore, I have co-operated in using Praat with colleagues from the University of Helsinki (Mietta Lennes and Hanna Anttila). Also, the possibility to use simple text based scripts with Praat was one reason for choosing it for this study. Together with the abovementioned arguments, also the facts that I had used Praat when working on my Master's thesis and that I have been able to take a course on Praat scripting, were reasons for preferring Praat over the other programs.

Figure 2 illustrates a Praat analysis window with both the sound and textgrid-files. The higher part of the screen represents the waveform, the spectrogram is seen in the middle and the lower part shows the annotation of the textgrid (in this case on 7 tiers). On the top of the spectrogram (middle part) the pitch is represented with a blue line and the intensity with a yellow one. With the program one "can analyze, synthesize, and manipulate speech, and create high-quality pictures" (Boersma & Weenik 2007). Only a small part of Praat's features, namely annotation and measuring duration, were used for studies reported in this thesis. The textgrid is a text file containing the labelling and boundaries of each marked interval in the sound file. The purpose of the textgrid is to help the user to find correct places of the sound file easier after he has marked boundaries and added labels relevant to his research.

The textgrid also contains the time scale, so that the time location of each boundary as well and the duration of the interval can be measured from the textgrid only.

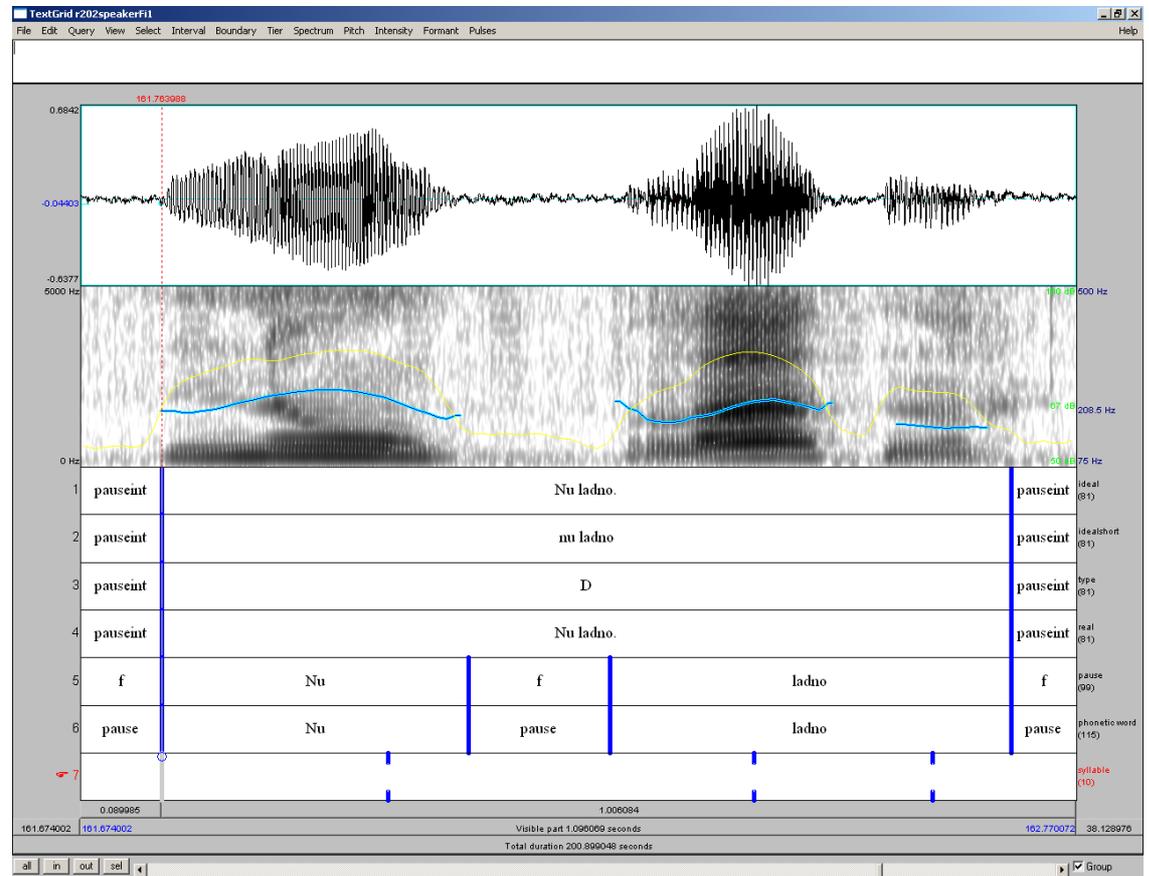


Figure 2. Window of the program Praat representing the sentence *Ну ладно* (*Nu ladno*<sup>5</sup>) in Russian of speaker Fi1.

### 2.1.7 Segmentation of the data and acoustic analysis

Most of the speech data was segmented manually in Praat into the textgrid files. Some segmentation was done first automatically with scripts, and then checked manually. A **script** is a text file that gives commands to the program and thus automates processes that the user would otherwise carry out manually one by one. The user can utilize already existing ready-to-use scripts that are widely available in the Internet (see e.g. Lennes 2007), or modify them or write completely new scripts, for example, with the help of the history-command that saves everything the user does with the program into the text format. Here the script “mark\_pauses.praat” was

<sup>5</sup> In English: Well, ok.

used to annotate intervals longer than 200 ms as pauses. The annotation was verified and corrected manually, but using the script saved time. For some of tiers (i.e. levels of segmentation) it was also possible to label the marked intervals automatically by using a script “label\_from\_textfile.praat”. This particular script requires a text file, where each line of text has the labels for one marked interval in the textgrid. Here, two different text files for each level of segmentation were needed because the subjects were reading the dialogues in pairs, which meant that subject A had read a different turn from subject B first. Of course, while it was not possible to label all the tiers automatically (e.g. pausing, phonetic word and syllables), the automatic labelling helped to create common labelled intervals for all the subjects, which made it easier to e.g. find the turn chosen for analysis.

For Studies I and II, the duration of the pauses and phonetic words were measured automatically with a script in textgrids. The script gives the result in the form of a text file containing the duration and label of each interval. The resulting text file can be exported to Excel or SPSS for further analysis. Some scripts (mark\_pauses.praat, label\_from\_textfile.praat and calculate\_segment\_durations.praat) used in this study have been developed by Lennes (2007). I modified them together with Hanna Anttila from the Department of Speech Sciences at the University of Helsinki to better suit the purposes of this research. We also wrote one script (set\_pauses\_to\_zero.praat) from a scratch for setting sound to zero during pauses (Ullakonoja 2007d).

The annotation process commenced on the basis of the written text. First, the text was divided into sentences (1<sup>st</sup> tier), and clause types were roughly grouped into three categories: Q = question, D = declarative and E = exclamation (3<sup>rd</sup> tier). Also, to be able to automatically (with a script) extract sentences and name the resulting sound files, a shorter annotation for each sentence was needed (2<sup>nd</sup> tier). The abovementioned annotations were the same for each speaker and done on the basis of the original text, not the actual acoustic signal. Thus, the total of seven tiers<sup>6</sup> were annotated in textgrids, 1 – “sentence”, 2 – “sentence short”, 3 – “clause type”, 4 – “real”, 5 – “pause”, 6 – “phonetic word” and 7 – “syllable” (see the horizontal bars in Figure 2, 32). Tiers 5, 6 and 7 are the most relevant for this study. The annotation of

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<sup>6</sup> A tier is a “level of segmentation”

the first three tiers was explained in the beginning of the paragraph. The 4<sup>th</sup> tier was annotated only for some speakers, and for some of the material for a different study (Kärkkäinen et al. 2007) on the basis of perception of the subject's speech. Speech was transcribed only roughly using the Roman alphabet instead of e.g. a phonetic (IPA or WordBet) alphabet.

On the 5<sup>th</sup> tier the turn-internal pauses were classified (following Riggensbach 1991) disfluent or fluent and labelled accordingly. Shorter pauses than 200 ms were detected auditorily: everything that was subjectively perceived as a pause was annotated without using e.g. a threshold value of pause duration. As more precisely defined in subsection 3.1.1, a fluent pause refers here to a pause that occurs at syntactic or phrasal boundaries whereas a disfluent pause is a pause existing elsewhere. Therefore, following Strangert (1990) a pause here is a “perceived pause” rather than an acoustically silent interval. After pause annotation each sound file was edited so that the other speaker's voice was removed from the file. In other words, pauses that were not turn internal were set to zero with a script (`set pauses to zero.praat`). The script checked the annotation tier, and if there was a ‘pause’ in the annotation, it set the sound to zero at that point, leaving a completely silent interval to the sound file. This was done in order to enable the F0 analysis used in other studies of the same material (for example Ullakonoja 2007a) that will be reported in the Doctoral dissertation. Turn-internal pauses were labelled ‘pauseint’ in order for them not to be removed.

On the 6<sup>th</sup> tier phonetic words were annotated. The phonetic words in the Russian material correspond to what is called *фонетическое слово* (*foneticheskoe slovo*) in the Russian research tradition (see e.g. Avanesov 1956, 61). In the western tradition the term “prosodic word” usually refers to a similar unit. A phonetic word usually corresponds to a lexical word, but it may also refer to some two-word combinations where an unstressed particle or a preposition is pronounced together with the main word. For example, in the material the preposition and pronoun *к нам*<sup>7</sup> (*k nam*) are treated as a phonetic word. A phonetic word has one word stress (or lexical stress). In the Finnish sample, it was decided that lexical words always correspond to phonetic

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<sup>7</sup> In English: to us

words in the annotation. This might have affected the results, since sometimes the three word sequence *mä en oo*<sup>8</sup> was pronounced more like [men:o:] and could perhaps also have been treated as one phonetic word. The choice of annotating the lexical words in Finnish was made in order to be more systematic: it would have been impossible to define exactly when the sequence above would be one, two or three phonetic words if the annotation of phonetic words had not been done on the basis of lexical word principle.

On the 7<sup>th</sup> tier (which was a point tier<sup>9</sup>) the syllable nucleus was marked with a point. In other words, the exact syllable boundaries were not determined because it was possible to calculate the speech and articulation rate with the existing data on the duration of the sample and pause duration. The number of syllables (i.e. syllable nuclei<sup>10</sup>) was computed in Praat with a query command in the Object window (selecting the textgrid and querying “get number of points”).

Last, I will explain how the computing of pause and syllable frequencies and speech and articulation rates was done. The frequency of syllable nuclei and phonetic word frequency, as well as the total duration of pauses and total duration of speaking time were obtained by using Praat scripts. The calculation of speech and articulation rate can be expressed with the help of the following equations (see e.g. Grosjean & Deschamps 1975; Grosjean 1980b, 40-41; Towell et al. 1996):

Speech rate (syll/sec) = Number of syllable nuclei/total speaking time

Speech rate (PW/sec) = Number of phonetic words/total speaking time

Articulation rate (syll/sec) = Number of syllable nuclei/(total speaking time - total pause time)

Articulation rate (PW/sec) = Number of phonetic words/(total speaking time - total pause time)

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<sup>8</sup> In English: I'm not

<sup>9</sup> Other six tiers were interval tiers, where the boundaries and the intervals between them were annotated. A point tier is a tier where the boundaries are not marked, but instead a certain place, a point in the acoustic signal is labelled.

<sup>10</sup> Counting syllable nuclei instead of syllables has been used by e.g. Simões (1996).

In the analysis of speech and articulation rate one of the research questions addresses the comparison of L1 and L2 and comparison of the rates of the same student at different stages of stay. This was computed by ranking the students from fastest to slowest and comparing the rankings among the group.

## **2.2 Fluency evaluation task**

The aim of this chapter is to explain the procedure of the fluency evaluation task where the aforementioned sound samples were used. The purpose of the evaluation task was to perceptually evaluate fluency by the total of 30 teachers. In Studies I and II the perceptual evaluations of fluency were compared to the acoustic analysis of the speech samples. In Study III the perceptual fluency evaluations were recalculated (using z-scores normalization) and compared to the students' self-evaluation. First, the procedure of the task is described (see subsection 2.2.1). After that, I will characterise the participants (see subsection 2.2.2) and summarize the conceptions of the judges about fluency (subsection 2.2.3).

### **2.2.1 Procedure**

On the basis of the recorded material (described in subsection 2.1.3), a fluency evaluation task was designed. In the task, the listeners were asked to evaluate the fluency of the speech samples. The participants of the fluency evaluation task were Russian as a foreign language teachers living in Finland (see 2.2.2 for a more detailed description of the participants).

The material for the fluency evaluation task was prepared in Praat in a way that the extracts (on average 19 sec each) were cut out of every student's speech, placed in a separate folder and named starting with random numbers created in SPSS. After that the sound files were concatenated in Praat. The resulting sound file had a number of the stimulus in Russian first, then the stimulus, 7-second pause, and then a sound

marking the start of the next stimulus. The file was then edited in Audacity 1.2.4 program to make all the stimuli similar in loudness and then converted to an mp3-sound file. Before the actual listening task, a test file was presented to the subjects (containing only reading aloud of digits *один (odin) 'one', два (dva) 'two', три (tri) 'three'*), so that the listener could adjust the volume of his headset to a convenient level.

All judges were asked to evaluate the fluency of the samples in a questionnaire (see Appendix 1) in Finnish where the participants were first asked to provide some background information of themselves. The subjects were not given a definition of fluency nor instructions on how to judge fluency. As Derwing et al. (2004) have argued, even untrained listeners seem to attend to similar features of speech when asked to rate the fluency of a speech sample.

Instead of giving a definition of fluency to the teachers, they had to define for themselves what they understood by fluent speech and write down their definitions. Then they were asked to evaluate the fluency of each stimulus on a 1 (not fluent) to 5 (very fluent) Likert scale. The participants were asked to evaluate the stimuli as a foreign language learner's speech. After the listening task the subjects were requested to write down factors they thought as disturbing the fluency of the stimuli. The scale 1-5 was chosen, although also a 1 to 7 scale has been frequently used, at least in accent evaluation studies (Riggenbach 1991; Freed 2000; Derwing et al. 2006). Also a scale from 1 to 9 (see e.g. Derwing et al. 2004; Trofimovich & Baker 2006) or 1 to 10 (see e.g. Cucchiarini et al. 2000; Wennerstrom 2000) have been used by some researchers. However, 0 to 5 scale has been used successfully in a study by Moore et al. (1996) for the purposes of speech therapy and a scale from 0 to 3 by Wennerstrom (2001). My scale is only one degree narrower or wider than those, perhaps simplifying the picture, but also, in my opinion, making the judgement easier.

The listening task was performed in a language lab for three Russian teachers whereas the rest listened to the stimuli and completed the questionnaire on-line. Because it was challenging to find enough Russian teachers who would be willing to

come and participate in a listening task in a language lab in Jyväskylä, an electronic version of the test through Internet was used. The sound file was protected by a password in the web publishing platform called Moniviestin (developed by the Virtual University Project at the University of Jyväskylä), but the questionnaire was available freely on-line. The questionnaire site was created with SPSS Data Entry program (for more information see [http://www.spss.com/Data\\_Entry](http://www.spss.com/Data_Entry)). It is a program that creates a web-survey and enters all the answers directly onto an SPSS data sheet, thus possible mistakes of manual data entering were avoided. The evaluation task was piloted before sending out the request to participate to a wider audience. The questionnaire was tested first on paper by 3 teachers (who listened to the sound files in a language lab) and on-line by one teacher. Because they did not report any problems in completing the task, their responses were included in the experiment.

In August 2007 the link to the questionnaire and a request to participate was sent out to Russian teachers of Finland mailing list (with about 270 members). In addition, the same day the questionnaire was also sent directly to 15 Russian teachers who either lived in the Jyväskylä region or who had graduated from the university recently. By the deadline (in 3 weeks), 17 teachers had filled in the questionnaire. The timing was just before and in the beginning of the school year, and it was thought that the teachers would be more eager to participate and perhaps have a little more time to do it. Because of the small number of answers, the questionnaire was sent again through the same mailing list and the Russian teachers' mailing list of the Ministry of Education (about 200 members, partly the same as on the other list). By the new deadline (a month later), 9 more teachers had answered. Because the response rate was not high (only 10 %), the sample is not necessarily very representative. However, because the purpose of the three studies reported here was not to analyse the fluency evaluations as such, but instead, to use them as a measuring tool for fluency, the low response rate may not be that important.

The on-line data collection enabled the judges to perform the task at the time and place most suitable for them. This also made it very unlikely that the judges could have spoken to each other about the ratings they were giving. The judges were not

informed of the fact that there were multiple samples of each speaker, so they could not know where the research was aiming at.

### 2.2.2 Judges

Here I will shortly describe the participants of the fluency evaluation task. A total of 30 foreign language teachers participated in the fluency evaluation task as expert judges. They were teachers of Russian living in Finland. The justification for choosing Russian as a foreign language teachers who lived in Finland was that I wanted the judges to be used to listening Russian spoken with a Finnish accent in order for them to concentrate their evaluation on fluency, and not other factors e.g. segmental features or foreign accent. The mother tongue of the judges is given in Table 5 below. Most of the teachers (25) were native female speakers of Finnish. When comparing the reliability of the ratings of the teachers with different mother tongues, no noticeable differences were found (Cronbach's alpha for Finnish 0.917, for Finnish and Swedish 0.919, for all 0.918). Because the mother tongue of the judges did not seem to influence the fluency ratings, a decision was made to use all the respondents, also the two native speakers, as judges.

Finnish	Russian	Swedish	No response	Total
25	2	2	1	30

Table 5. Mother tongue of the judges (frequency).

The age of the judges is given in Table 6 below. The majority of the judges (47 %) were between 36 and 49 years old, but some were also under 35 years or over 50 years old. Over 50 years old judges were in the minority.

Under 35 yrs.	36-49 yrs.	over 50 yrs.	Total
9	14	7	30
30 %	47 %	23 %	100 %

Table 6. Age of the judges (frequency).

Table 7 below presents the judges' teaching experience. The teachers' foreign language teaching experience ranged from 1 to over 30 years with an average of 13 years (std. 9.2). Hence, it can be said that they were on average fairly experienced teachers. The participants had a bit less experience in teaching Russian as a foreign

language than teaching foreign languages in general, 11.5 years on average (std. 9.6, ranging from 1 to over 30 years), the younger ones naturally less, and older ones more.

	n	Mean	Std.
Years of teaching any foreign language	30	13.1	9.2
Years of teaching Russian as a foreign language	30	11.5	9.6

Table 7. Teaching experience of the judges (years).

In this study, the participants evaluated the speech samples individually and did not know that there were multiple samples of the same speakers. In contrast, Lennon (1990) has used a panel of 9 judges as fluency evaluators in his study. The judges could speak with each other and knew that they were listening to same speakers before and after their semester abroad. The setting of Cucchiarini et al.'s (2000) study was more similar to mine, but they found that L2 teachers did not attend to temporal phenomena (creating the impression of fluency) of L2 speakers and left them out of the experiment in the end, and used only expert phoneticians and speech therapists as judges.

### 2.2.3 Verbal fluency definitions

In this section I will shortly present what the teachers understood as fluent speech, and, thus, what they were assessing in the fluency evaluation task. As previously mentioned, they were not given any definition of fluency in the task. Their questionnaire answers before and after the evaluation task are summarized here below (see also Study I for a short summary). The number in the brackets indicates how many times each feature was mentioned.

Prior to listening to the samples the teachers said that fluent reading of an L2 learner is characterized by following features:

- a correct pronunciation of sounds (14), especially “s-sounds” (sibilants and affricates) (5)
- an intonation (pattern) close to that of a native speaker (14),
- correct word stress (11),
- **only short pauses, not too frequently and at correct places (10),**

- **a fluent/normal/fast/appropriate speech rate (5)**
- no faltering and proceeds (5)
- empathy/acting (2)
- few hesitations or repairs (2)
- natural (1)
- no need to be nervous for the student (1)
- a general impression of authenticity (1)

After listening the teachers said that the following features of speech had made the sample sound disfluent:

- mispronunciation of sounds (17), especially “s-sounds” (sibilants and affricates) (6) (one teacher mentioned that mistakes in sound production did not matter)
- foreign intonation (17)
- wrong word stress (11)
- monotonous speech (7)
- faltering (5)
- **repairs and restarts (4), (one teacher mentioned that restarts did not disturb fluency)**
- errors caused by the unfamiliarity of the words or text caused errors (4)
- **non-native pausing (2)**
- **hesitations (2)**
- unauthenticity (2)
- **slow rate (1)**
- rhythm (1)
- **disfluency of reading, they should have practised beforehand (1)**
- does not sound like a telephone conversation (1)
- mispronunciation of very common words (1)
- feeling that the tongue just did not twist (1)

From the definitions above it can be clearly seen that there are some features of speech (pronunciation of sounds, intonation and word stress) that the majority of the judges considered to be important for fluent reading aloud. It can be concluded that

teachers claimed that they would pay attention mostly on correct pronunciation of segments, intonation or word stress. The features that I have looked at in Studies I and II, pausing and speech rate (in bold), were not among the most mentioned, but were still brought up several times.

Two teachers said that there were too many stimuli to be able to judge them accurately. Some also said that they were used to listening to elementary level students' speech, which made it hard to judge samples in the beginning. The results suggest that it is indeed difficult to articulate the factors leading to a fluent impression, even though it may be easy to say whether a sample sounds fluent or not.

### **2.3 Statistical methods**

In the previous sections, the data collection methods were described in detail. In addition to that, the methods used for phonetic analysis were described (p. 32). The purpose of this last section of the chapter is to expand the methodological discussion into statistical methods which are, indeed, the methods most often used in the analysis of phonetic data.

For statistical analysis of the data I used programs Microsoft Office Excel 2003 and SPSS 14.0. If a script (see p. 32) was used, Praat gave the data in a text file which could be imported into an Excel or SPSS data sheet. Organizing and categorising the data as well as some calculations of frequencies and building charts were done in Microsoft Excel. SPSS was used mainly for testing the statistical differences and correlations between the variables, but also for descriptive statistics of the data. In this section the common principles of using statistic methods will be described. A more detailed description of the statistical methods used is found in each study (Studies I, II and III).

The statistical analysis in each study commenced with the Kolmogorov-Smirnov test. In SPSS, the Kolmogorov-Smirnov test was run for knowing which test procedure to use for the testing of means. If the Kolmogorov-Smirnov test indicated that the distribution of the variables was not normal, non-parametric tests (e.g. Wilcoxon signed-ranks test) were used for testing the statistical significances between the means. Vice versa, if the Kolmogorov-Smirnov test indicated normally distributed variables, parametric tests, usually the paired samples t-test was used.

Paired samples tests were used when the same speaker's speech was compared at different times. To evaluate interrater reliability, Cronbach's alpha (see e.g. Bryman & Cramer 2001, 62) was determined. Correlation coefficients were used to define the relationship between two variables. The existence of correlation was verified in scatter plot graphs. If there had been more speakers, it would have been possible to compare the host-family group and the dormitories-group for statistically significant differences, but with only 6 students in each group it was not done (see e.g. Heikkilä 2004).

It has to be pointed out that when comparing the mean fluency ratings of each student prior to and following the stay, in Studies I and III, the significance level was set to  $p < 0.005$  to keep the results reliable and not affected by minor differences. However, if the significance level had been  $p < 0.05$ , the results of Study III would have been somewhat different; the mean fluency would have increased for 9/12 students and for 8/12 students when using z-scores.

### **3 READ-ALoud FLUENCY AND ITS DEVELOPMENT**

In both L2 teaching and evaluation of learners' written or oral production fluency is an important goal. In popular discussions, L2 learners often express a wish to become *fluent* in the language they are learning. Furthermore, as previously mentioned, it is generally believed and also shown in some studies that when L2 learners spend some time in the country of the target language, their speech becomes more fluent (Freed 1995; Towell et al. 1996; Freed et al. 2003; Freed, Segalowitz & Dewey 2004; Segalowitz & Freed 2004). Fluency is a term that is both widely used among specialists and researchers and also, in every-day conversations. Its use varies a lot. This chapter will, hence, outline the use of the term *fluency*, discuss its relevance in L2 learning and in study abroad context, define what I understand by it, and, finally in the last section, reflect upon fluency in L2 reading.

### 3.1 Defining fluency and disfluency in speech

There is a large and still growing body of literature that has focused on fluency from different points of view. However, there is no agreement on the definition of **fluency** or **disfluency**, and often rather vague definitions are used (see e.g. Hieke 1985; Hedge 1993; Freed & Ferguson 1995; Moore & Korpijaakko-Huuhka 1996; Cucchiarini et al. 2000; Lauranto 2005 for a review). Scholars have been trying to pin down fluency with a help of different factors: linguistic (phonological & phonetic, syntactic, semantic, lexical, textual), psychological (absence of phonological distortion, pauses and hesitations) and sociolinguistic factors.

This subsection will summarize different definitions of fluency. In most definitions fluency is linked both to primary and secondary temporal variables of speech. Primary variables (speaking and articulation rate, phonation time ratio and length of silent pauses) always exist in speech. Secondary variables (e.g. filled pauses, syllable lengthening, repairs and repetition) are related to hesitation phenomena and occasionally occur in reading aloud. (Grosjean & Deschamps 1975; Grosjean 1980b.) Riggensbach (1991, 439) has pondered upon the difficulty of defining fluency in the following way:

“We might speculate that fluent speakers resemble each other, but there may be a number of ways to identify nonfluent speakers... In order for there to be fluency, then, it appears that many different conditions have to be met – some proficiency in grammar, pronunciation, and vocabulary, to mention a few. [...] Nonfluency, on the other hand, can arise from a deficiency in any one of these areas: the inability to produce a given grammatical structure may be the first link in a chain of disfluencies that may as easily have begun with a comprehension lapse, a pronunciation problem, or a motivation for precision in word choice.”

When speaking about L2 oral skills, the term fluency is often used, however without determining exactly what it means. In the *Common European framework of reference for languages* (Council for Cultural Co-operation. Education Committee, Modern Languages Division, Strasbourg & Council of Europe 2001) the term

*fluency/fluent/fluently* occurs about 50 times, which makes its importance in L2 teaching today clear. In addition, in L2 syllabi fluency is often mentioned as a goal of teaching without defining it. In the Common European framework of reference for languages (2001, 128), *fluency* is defined as "the ability to articulate, to keep going, and to cope when one lands in a dead end".

Lennon (1990, 389-391; 2000, 25-26) distinguishes two uses of the term fluency: in its broad sense it means nearly the same as oral proficiency, whereas the narrow sense is often used to refer only to a part of oral proficiency: correctness and native-like rapidity. According to him, fluency is "the rapid, smooth, accurate, lucid, and efficient translation of thought or communicative intention into language under the temporal constraints of on-line processing" (Lennon 2000, 26). He continues: "In principle, then, performance may be fluent but erroneous. In practice, however, error will often be associated with uncertainty on the speaker's part, which will adversely affect fluency." (Lennon 2000, 40).

Lehtonen's (1981, 331) definition of fluency is a combination of communicative acceptability and smooth continuation of speech. The terms communicative competence and fluency in its broad sense are almost synonymous according to Lehtonen et al. (1977, 22). Fluency is looked at from three different points of view:

1. linguistic acceptability, 2. smooth continuation of speech, 3. communicative acceptability. Lehtonen's definition of fluency involves communicative competence:

"To be fluent in the right way, one has to know how to hesitate, how to be silent, how to self-correct, how to interrupt, and how to complete one's expression. According to this definition of fluency, one must speak in a way that is expected by the linguistic community and that represents normal, acceptable and relaxed linguistic behaviour." (Lehtonen 1981, 331.)

The speaker's fluency depends also on the communicative situation and the (spoken or written) text, not only on the features of his speech (Lehtonen et al. 1977). Hence, speech with only few pauses is not necessarily always perceived as fluent (Lehtonen et al. 1977, 22; Lehtonen 1978; Lennon 2000). In fact, when learner's speech is too

fast and there are only few pauses, it can be incomprehensible (Lehtonen 1979, 35). As stated by Lehtonen (1981, 331), “There is no single “normal” speech rate, nor a “correct” number of pauses typical of fluent speech”. In spontaneous conversation fluency has also been said to be “the ability to fill time with talk” or “the ability to have appropriate things to say in a wide range of contexts” (Fillmore 2000, 51).

The most common parameters that have been used to define and evaluate L2 fluency include calculating and measuring the number of pauses, their place and duration, syllable duration, hesitation phenomena, linking, rhythm, mean length of run<sup>11</sup>, speech rate, articulation rate, phonation/time ratio, phonological grouping and intonational features (Sajavaara & Lehtonen 1980, 69; Hieke 1981; 1984, 352; Riggenbach 1991; Walsh 1994; Moore & Korpijaakko-Huuhka 1996; Perales & Cenoz 1996, 82; Towell et al. 1996; Cucchiarini et al. 2000; Temple 2000; Riggenbach 2001, 253; Cucchiarini et al. 2002; Freed, Segalowitz & Dewey 2004; Segalowitz & Freed 2004; Trofimovich & Baker 2006; Paananen-Porkka 2007). It should be mentioned that intonation has also been seen an important feature of fluency (Anderson 1990; Pennington 1992; Wennerstrom 2000; Lauranto 2004). It evidently does play a crucial role in the intelligibility of L2 speech, perhaps also in its fluency. However, intonational features of L2 speech will not be discussed here, but studies involving the role of intonation in L2 speech will be recapitulated in the future doctoral dissertation.

Hence, from the phonetic point of view (see e.g. Cutler 1983), fluency is all about prosody. For Segalowitz (2007), fluency means reading at an appropriate rate, without too many hesitations or pauses. Similarly, for Raupach (1980), fluency means speaking with a small number of relatively short pauses. All of these measures tell something about the non-struggle with the language. Already in his earlier study Segalowitz (1986, 4) implied that for him, fluency means “rapid and accurate ability to use the vocabulary and syntax of the second language”, being “generally skilled at reading the second language” and doing so with a habitual speech rate.

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<sup>11</sup> Mean length of run is the average duration of a continuous sequence of speech not interrupted by pauses.

What do people then **perceive** as fluent speech? People tend to listen to other factors than only pauses and speech rate when trying to decide whether interlocutor's speech is fluent or not. These factors (that teachers have said to affect their perception of fluency) include e.g. vocabulary size, grammar, accent, speech rhythm, confidence in speaking, voice quality and "tone of voice". (Freed 1995, 143.) The features of speech that were mentioned in my study as disfluent by teachers involve similar criteria (see subsection 2.2.3 p. 40 and Study I). Fluency is related to automatism and ease of articulation. Disfluency, on the contrary, can be characterized by difficulty, slowness and unnaturalness of speech. (Fedyanina 1983, 180.)

Therefore, we might think that each listener has different criteria according to which he judges fluency and that it is not possible to empirically measure fluency nor to say omnisciently whether the speech of a speaker is fluent or not. However, some studies (Cucchiarini et al. 2000; Derwing et al. 2004) have shown that different groups of judges (phoneticians, teachers, untrained listeners and speech therapists) have rated fluency of speech samples fairly similarly and the interjudge reliability of these ratings has been good. On the contrary, an individual does not perceive his or her own speech the same way as the listener or the interlocutor does, which means that s/he can perceive his or her own speech as fluent even when it is not perceived as such by the interlocutors (Lennon 2000). Hence, the fluency judgements of the listener and the speaker might differ. It may be concluded that there must be something common in the way we perceive fluency, but whether we can measure it or not, is a different question.

The abovementioned definitions of fluency have not been limited explicitly to L1 or L2, even though many of the studies summarised here mainly focus on **L2** fluency. Phenomena that have been characterized as disfluent in L2, such as hesitations and pauses, false starts and repairs, can also be found in native speaker performance (Lehtonen et al. 1977, 22). However, as Wiese's (1984) study indicates, hesitation phenomena may be at least twice as frequent in L2 than L1. According to Crystal

(1980, 166-168), L2 disfluency means disturbances in speech timing and rhythmic organization of speech, not (from the point of view of language pathology) necessarily in grammar or vocabulary. Learner's disfluency is often explained by non-automatisation of cognitive processes (Wiese 1984; Temple 1992) or by deficiencies in proceduralisation skills (Towell et al. 1996). Finnish speakers' disfluent English speech is often abundant in the use of glottal boundary markers, which can be perceived as hesitations (Koponen 1992, 181). Becoming fluent in L2 can be slow and require a lot of practice (Schmidt 1992, 376). Taguchi et al. (2006, 10) suggest that L2 fluency development is a long process with much fluctuation: "the pattern of fluency development can be consistent in the long term, but [...] fluency develops quite slowly and its pattern of progress will fluctuate greatly in the short term".

**Self-repairs** are one contributor to increased pause frequency in my studies. According to Levelt (1989, 460-463), speakers monitor themselves while speaking and occasionally use self-repairs to correct errors they perceive. Levelt lists 7 aspects of self-monitoring: message/concept, way of expressing it, register, lexical error, syntactic/morphological error, sound-form error and prosodic precision. When reading aloud in one's L2, I would argue that speakers only monitor their sound-form errors and perhaps also, their prosodic performance, not the content, because they do not plan it themselves. Also Lafford (2004) mentions that even in a classroom context, L2 speakers are likely to monitor and correct their speech because they know that they are being evaluated by their teacher.

As far as fluency is concerned, the development in SA (study abroad) context has been one focus of earlier research. As Freed (1998) points out, there is a general assumption that when an L2 learner goes to the country of the target language for some time, his speech becomes more fluent, and that that is the optimal learning environment for an L2 learner. However, it is challenging to prove that empirically, but several attempts (Freed 1995; Towell et al. 1996; Freed 1998; Freed et al. 2003; Collentine & Freed 2004; Freed, Segalowitz & Dewey 2004; Segalowitz & Freed

2004) have shown that there seems to be a positive relationship between the SA experience and fluency or oral skills development. These studies will be discussed in more detail in section 3.2 *Study abroad context*.

Of course, there are other factors influencing fluency development than merely the residence abroad. For example, the activities of the learner in the host country as well as his ability to acquire a foreign language and the age of onset of learning the L2 in question have been shown to have an effect on fluency development (Flege et al. 1995). Interestingly, Freed et al. (2003) found that SA students developed in oral fluency, but not in written fluency, while abroad. Finally, Freed (1998, 50) outlines language proficiency development during SA as follows: “Those who have been abroad appear to speak with greater ease and confidence, expressed in part by a greater abundance of speech, spoken at a faster rate and characterized by fewer dysfluent-sounding pauses.” This definition is consistent with the concepts of fluency I have adopted in this study, except that my focus is on read-aloud speech rather than spontaneous interaction.

Most of the abovementioned studies have concentrated on fluency in spontaneous speech. In read-aloud speech fluency is a somewhat different phenomenon. It develops over time and is highly complex. (Nuttall 1982, 2-18, 23; Grabe 1991.) Grabe (1991, 378) defines fluent reading as follows: “fluent reading is rapid; the reader needs to maintain the flow of information at a sufficient rate to make connections and inferences vital to comprehension”. He agrees with Nuttall (1982, 2-18) in that fluent reading also has a purpose for reading which provides motivation for the reader. Reading is interaction and interpretation of the text with the help of previous knowledge. An L1 reader expects to comprehend the text, whereas an L2 reader can anticipate not understanding the text to be read (Grabe 1991).

In sum, there are several dimensions to the term fluency. On one hand fluency may refer to the accuracy of grammar or pronunciation or, on the other hand, it may indicate the speed of delivery. Hence, the common features most definitions of

fluency share are the perceived ease of articulation and appropriate rapidity. Many of the definitions also underline the absence or at least scarceness of hesitation phenomena in fluent speech. Even though some scholars (e.g. Stahl & Heubach 2006, 190) define fluent reading both as fast and accurate, I have not taken accuracy into account because my focus is on prosodic characteristics of fluent speech. For example, a person might have problems pronouncing all the segments of the language correctly or using appropriate intonation, but still be perceived as fluent (see e.g. Hammerly 1991). Here fluent speech means reading aloud smoothly and at an appropriate rate and with pauses at correct places (Lennon 1990; Lennon 2000).

Like already e.g. Lehtonen (Lehtonen et al. 1977; Lehtonen 1978; 1979; 1981), I have also attempted to find acoustic correlates of fluency. Differently from Lehtonen, my original aim, however, was not to develop automatic ways of evaluating spoken language tests, but rather to develop ways to improve L2 teaching and learning. My research material consists of read-aloud dialogues, which means that the communicative aspect of fluency is limited to read-aloud speech, not to spontaneous interaction. The choice of read-aloud speech was justified in subsection 2.1.5. In the present study, I am focusing on the development of the Finnish students' Russian fluency when they are staying and studying in Russia. As Cucchiarini et al. (2000; 2002) have shown, a fast speech rate and a low pause frequency are the most important factors for perceiving read-aloud speech as fluent. These features of speech often do not get enough attention in L2 classrooms, and L2 speech typically differs from native speech in this respect. Hence, in this study, pausing and speech rate were chosen as the main acoustic parameters to be investigated in order to see if and how they reflect the perceived fluency of the foreign language learners' speech.

### **3.1.1 Pausing**

As previous discussion shows, pausing is an important element of fluency because fluency can be defined by the number of pauses, their place and duration (Riggenbach 1991; Walsh 1994; Riggenbach 2001, 253-256). I shall now look at

different definitions of a pause as well as factors influencing pausing (pause frequency, pause placement and pause duration). Researchers agree that extensive pausing is typical of non-native speech and that pauses occur in connection with hesitation phenomena such as repetition or repair (see e.g. Raupach 1980; Riggenbach 1991; Cenoz 2000; Guion et al. 2000; Paananen-Porkka 2007). According to Riggenbach (1991, 432), especially the “chunking together” of disfluencies (several disfluencies in a three word sequence) can be an important indicator of fluency. These “clusters of disfluency” have also been mentioned as one of the important correlates of fluency by Freed et al. (2003). In Study I I have called these **disfluency clusters**. There I studied repetitions, repairs and disfluent pauses and counted the number of disfluency clusters, i.e. places where there were at least two of them within a three word sequence.

Again, just as with fluency and disfluency, defining a pause is not simple either. Table 8 below lists the different approaches to pause classification as well as introduces different pause types and terminology. This subsection will describe each of these categorisations in more detail.

Basis of the classification	Pause types
Intensity of airflow	silent pause, low voice pause, filled pause
Reason for pausing	intentional pause, unintentional pause hesitation pause pause for repair or repetition planning pause breathing pause, non-breathing pause emotional pause emphasis pause
Perception/production	speaker relevant pause, communication relevant pause, hearer relevant pause auditory pause, acoustic pause perceived pause, physical pause psychological pause = virtual pause
Place of the pause	intersegmental pause, intrasegmental pause syllable pause, word pause, constituent pause syntactic pause, non-syntactic pause fluent pause, disfluent pause

Table 8. Different approaches to pause classification.

First, a traditional pause categorisation is that of silent and filled pauses. A silent pause is a silent interval in speech whereas filled pauses have been associated with hesitations and involve some sound (elongated vowel, laughter, coughing etc.). Filled pauses are often perceived as gaining time for planning (Watanabe et al. 2008). Ballmer (1980) provides a thorough trifold classification of pauses. First, pauses can be defined by the intensity of airflow into empty (silent) pauses, low voice pauses and filled pauses. Most other researchers do not distinguish between low voice pauses and filled pauses. Second, he classifies pauses according to their controllability into unintentional and intentional pauses. Third, he characterises pauses by the concern of the interlocutors into speaker relevant, communicative and hearer relevant pauses.

Second, I shall discuss the possible reasons for pausing. Why do we have pauses in our speech? Studying L1 and L2 spontaneous English, Paananen-Porkka (2007, 271) found the following reasons for pausing: hesitation, repair, reformulation, gaining time for planning or finding the suitable words. Because one obvious reason for pausing is the need to inhale, also the terms breathing pause (or respiratory pause) and non-breathing pause have been used to categorise pauses (Grosjean 1980a; Vaissière 1983). Zinder (1979, 277), in his summary of different functions of a pause, talks also about the emotional function of a pause: by pausing at a particular place a speaker can express emotions, e.g. surprise. In Russian it is also possible to pause in the middle of a word when the speaker wants to emphasise a certain syllable or articulate very clearly. These pauses are probably relatively rare in read-aloud speech. In read-aloud speech pauses can be used to show syntactic relationships between clause elements, for example, for emphasising (Nikolaeva 1977, 15). In spontaneous speech, hesitation pauses are multifunctional in that they can be about conceptualization, i.e. deciding what to say next (situated often in the middle of a phrase or a clause) or about message formulation, i.e. how to verbalise something the speaker has in mind (situated at phrase or clause boundaries) (Chafe 1980, 178-179). According to Deese (1980, 77), hesitation pauses are due to planning at the local or grammatical level rather than a larger, discourse level.

Pauses can also be looked at either from the acoustic (physical) or auditory (perceptive) point of view. According to Zinder (1979, 277), acoustically a pause is a silence in the sound signal, whereas from the physiological point of view, a pause is a break in the articulation. However, Zinder (1979, 277) points out that when perceiving pauses neither one of these characteristics has to be met: in the Russian research tradition a pause that can be perceived but that is not identifiable acoustically is called a psychological pause, or as Nikolayeva (1970) calls it, a hesitation pause. Volskaya (2002; 2004; 2009) continues that psychological pauses are below 200 ms in duration and are not perceived only by temporal cues, but also with the help of other prosodic (e.g. tonal) means. She also refers to these as zero or **virtual pauses** because there necessarily does not need to be a silent interval in speech but listeners interpret e.g. intonation unit boundaries as pauses. This argumentation corresponds very well with my understanding of a pause. In Study I I have defined a pause mainly based on perception. Perceived pauses in read-aloud speech have also been studied by Strangert (1991). In her data, the proportion of pauses with no silent interval in the acoustic signal was from 7-26% of all the pauses depending on the speaker, hence perceived pause is not at all a minor pause category.

Third, pauses can be defined depending on the place of the pause. For instance, Drommel (1980) states that acoustic pauses can be intrasegmental (e.g. in the middle of a plosive) or intersegmental, only the latter being auditory or audible. Furthermore, Pilon (1981) has identified three pause types according to their place in the sentence: 1) constituent pauses, 2) word pauses and 3) syllable pauses. Constituent pauses are situated at the constituent boundary, word pauses at the word boundary (that is not a constituent boundary), and syllable pauses in the middle of a word at the syllable boundary. Also Herman's (1985) study implicates a similar distinction, as she regards acceptable only pauses at punctuation marks in a text adapted to practise reading and containing fairly short clauses. However, I argue that her pause classification would not be successful in other kinds of texts in all languages.

From the point of view of this study, the most important pause classification is that of **fluent and disfluent pauses** (Riggenbach 1991, 426-427; Kenny 1996; Perales & Cenoz 1996, 79; Segalowitz & Freed 2004) which is also based on the place of the pause. Table 9 recapitulates different pause categorisations that in my opinion support this classification. I shall next introduce each of the definitions in more detail.

Fluent pause	Disfluent pause
fluent sounding pause	disfluent sounding pause
breathing pause	non-breathing pause
planning pause	hesitation pause
juncture pause	non-juncture pause
grammatical pause	non-grammatical pause
syntactic pause	non-syntactic pause
functional pause	hesitation pause

Table 9. Different terms for fluent and disfluent pauses.

Riggenbach (1991, 426-427) uses the terms fluent-sounding pause and disfluent-sounding pause. Fluent-sounding pauses are those that occur at “predictable places” at clause or phrase boundaries and disfluent-sounding those occurring elsewhere. I have called these simply disfluent pauses and fluent pauses. Also Segalowitz & Freed (2004) have used the term disfluent pause. Furthermore, Perales & Cenoz (1996, 79) have used the terms fluent and disfluent pauses defining them in spontaneous speech as follows:

“Fluent pauses correspond to breathing and planning pauses which mainly occur at grammatical junctures and are, therefore, natural and expected. Disfluent pauses are those which are not natural in Basque [here L2] and can be either the result of transfer from the first language [Spanish] or part of the learner’s specific interlanguage.”

Kenny (1996, 36-38) applies the term juncture pauses for fluent pauses meaning pauses that mark syntactic boundaries and term non-juncture pauses for disfluent pauses indicating hesitation and abnormality. The justification for using this classification is that syntactic boundary pauses are perceived as more adequate by native listeners (Butcher 1980). Drommel (1980) uses the terms syntactic (positioned at syntactic/constituent boundaries) or non-syntactic (within noun or verb phrases). Another justification for the categorisation is that syntactically in native speaker’s spontaneous speech 2/3 of the “hesitation” pauses (and 3/4 of pause time) are found

at clause boundaries (Hawkins 1971). Correspondingly Riazantseva (2001) found that most pauses in both L1 English and L1 Russian are situated at constituent boundaries. A majority of pauses have been found at clause or sentence boundaries independent of the reading rate or type of text spoken (Lane & Grosjean 1973; Grosjean 1980b, 44). The same result has been obtained from L1 English and L1 French spontaneous speech where most of the respiration pauses, for example, were situated at clausal boundaries in both languages (Grosjean & Deschamps 1975).

Goldman Eisler (1968, 13-14) defines pause in a similar manner as the abovementioned studies: grammatical pauses are those occurring at grammatical junctures and those that are semantically motivated. Non-grammatical pauses, on the other hand, are pauses occurring e.g. in the phrase medial or final position, before repetition or a false start. However, it has been argued by Butcher (1980, 90) that pausing is not influenced by the syntactic structure itself, but the intonation pattern, which coexists with the syntactic pattern. In Strangert's (1991) study paragraph and sentence boundaries were found to be almost obligatory places for a pause whereas pausing at clause or phrasal boundaries depended on speech rate. Strangert claims that a speaker is more likely to pause at a clause boundary when the clauses are long and complex. Another possibility for pausing at a clause boundary can be semantic: the speaker may be trying not to have too much information in one interpause interval. These findings also support the pause classification adopted in this study. The term disfluent pause coincides with the term non-grammatical pause whereas fluent pause is a grammatical pause and occurs often at clause and sentence boundaries.

Also Deese's (1980, 72-75) categorisation of pauses fits well with the categorisation of fluent and disfluent pauses. Functional pauses (meaning other than hesitation pauses) are defined as pauses with an interpretation and grammatical function. Deese also notes that not all sentence boundaries are marked prosodically or by pauses. However, these cases are rare. Similarly, Paananen-Porkka (2007, 259-274) found that in addition to sentence and clause boundaries, pauses also occur at word

boundaries both in L1 and L2 English speech. As Tannen (1985, 109) puts it: “A pause becomes a silence, and a silence is negatively valued, when it is too long or appears at what seems like the wrong time and the wrong place”. Hence, her definition also supports the fluent-disfluent-pause classification.

Quite often the only criterion for defining a pause has been the specific duration of a silent interval in speech (1-400 ms). Although researchers have used different durational thresholds of silence for defining a pause, a commonly used one has been that of 200-250 ms (Grosjean & Deschamps 1975; Lehtonen 1979; Lennon 1984; Moore 1990; Cenoz 2000; Guion et al. 2000; Volskaya 2002). This definition has been justified because it allows automatic detection of pauses without regarding e.g. the closure phase of plosives and other silent intervals belonging to articulation as pauses. Also longer and shorter pause thresholds than 200-250 ms have been applied. For instance, Raupach (1980) used a cut-off point of 300 ms, while Paananen (1998; Paananen-Porkka 2007), Riazantseva (2001) and Trofimovich et al. (2006) set the limit to 100 ms. Furthermore, Adams (1979) defined a pause threshold to be only 50 ms of silence, because in her study that was the shortest silent pause used by L1 speakers on phrasal boundary. In his dissertation Kendall (2009, 104-105) settled to 60 ms and was still able to measure pauses automatically. As was mentioned above, Strangert (1990; 1991) showed that even very short pauses (1-200 ms) can be perceived as pauses. Riegenbach (1991, 426-427) states that short pauses (less than 400 ms) can be considered as “micropauses” because they can be included in the normal variation in speech, and are not indicators of disfluent speech. Hence, 400 ms has also been used as a pause duration threshold value (Derwing et al. 2004).

Above, I have summarised different durational silence thresholds for defining a pause. I shall now briefly look at studies on **pause duration** itself to understand factors influencing it. One could assume that the most important factor influencing pause duration is speech rate. However, the picture is not that simple. Grosjean & Lane (1974) argue that when a speaker modifies his or her reading rate s/he does that by inserting or deleting pauses at strategic syntactic places, not by changing his

pause duration or articulation rate. Strangert (1991) also states that pauses are more frequent the slower the speech. Hence, in slow speech pauses are not necessarily longer than in fast speech, but the pause frequency is higher. There can be a considerable amount of variation on pausing depending on the speaker (Fant et al. 2003), hence individual differences are great. Furthermore, in L2 a relationship between fluency and pause duration may exist. In read-aloud speech, a preliminary finding by Lehtonen (1981, 322) suggests that on average fluent readers' pause duration was shorter than of others but there was no difference in speech rate.

Campione & Véronis (2002) pursued a large-scale contrastive study on pause duration comparing English, French, German, Italian, and Spanish. They argue that using durational pause thresholds has distorted many previous results about pause duration. In their analysis of c. 6 000 pauses (5.5 hours) they found that pause duration was different across languages. They also found that pauses can be grouped into short (< 200 ms), medium (200-1000 ms) and long (>1000 ms) pauses, because pause duration is multimodal. Only short and medium pauses occurred in read-aloud speech in the five languages.

In native-Russian read-aloud data of 8 speakers the mean pause duration was 173.5 ms (range 153-188 ms) when the duration of all perceived pauses less than 250 ms was measured acoustically (Volskaya 2004). However, Riazantseva (2001) obtained quite different figures for spontaneous Russian. The average values for 30 L1 speakers were 767 ms for topic narrative and 822 ms for cartoon description. However, her data consisted of monologues and she measured all silent intervals between 100 ms and 3000 ms as pauses. In her tasks the mean pause duration in L1 was statistically significantly longer in Russian (L1) than in English (L2). This implies that pause duration might be a language-dependent feature. In contrast, Goldman Eisler (1968, 15) argues that pause duration is very much speaker dependent and determined by communicative context. In addition, Strangert (1991) also found that pause duration varied among speakers in L1 Swedish, but still followed a regular pattern depending on the place of the pause. Pauses at paragraph

boundaries were the longest, while at sentence boundaries they were about 60 % and at clause boundaries on average about 20 % of the mean pause duration at paragraph boundaries.

Furthermore, pause duration can also be affected by sentence length and place of the pause (Fant et al. 2003). As stated by Grosjean (1980a), pauses at the end of sentences are generally longer than at other locations. In Volskaya's (2003) study pauses were longest in read-aloud speech at the end of a paragraph, and most sentence boundaries were marked by a silent pause. It is thus rarer that a silent pause occurs at clause or phrasal boundaries, which are most often marked by virtual (perceived) pauses (see definition above p. 54). Hence, temporal characteristics of a pause are influenced also by its place.

Interestingly, the acoustical duration of a pause does not always correspond to the perceived duration. In an experiment comparing the perceived pause duration and the physical pause duration Deese (1980, 72-75) found quite a high correlation (0.85). However, the position of the pause within the clause (terminal or non-terminal) seems to have an effect on its perceived duration in a way that e.g. the short pauses in the middle of a clause are on average shorter than in the clause terminal position.

There are some studies focusing especially on **pausing in L2**. A commonly obtained result is that pausing of L1 and L2 speakers differs. For instance, in French spontaneous speech L1 speakers and L2 learners were found to be different in their pausing behaviour (Temple 2000). This finding is supported by Hieke (1987, 52-53), who found that non-natives and natives pause differently in English spontaneous speech. Lehtonen (1979; 1981), on the other hand, showed that e.g. in read-aloud speech Finnish students of English paused in a more native-like manner than in spontaneous speech (1979, 47-48). On the other hand, as Guion et al. (2000, 209) point out, the reason for L2 speakers' pausing when reading the text in a recording situation can be that they are unfamiliar with some of its lexical items. Riegenbach (1991) found that non-native fluent speakers had fewer pauses (especially unfilled

pauses) than disfluent speakers, which means that they hesitated less. Riazantseva (2001), on the other hand, implies that as L2 proficiency increases, pausing becomes more native-like.

Cenoz (2000), on the other hand, studied only non-juncture (disfluent) pauses of L2 English learners (whose L1 was Mandarin) and found that 64 % of the pauses were silent and 36 % filled. Also, much individual variation was found. In addition to that, she discovered that advanced learners used more filled pauses than silent ones and less-advanced learners used more silent pauses. The conclusion was that the total pause frequency did not correlate with the L2 proficiency in spontaneous speech. In Temple's (1992, 32) study, on the other hand, L2 speakers spent 38% of their speaking time pausing (this included both silent and filled pauses). She also found that L2 speakers' frequency of filled pauses was statistically significantly higher than that of the L1 speakers.

According to a study by Trofimovich et al. (2006, 17-19), the age of starting to learn L2 has a greater impact on pause frequency and duration (the younger started, the more fluent the speech) than L2 experience (residence in an L2 speaking country). This would mean that for learning the appropriate pausing in L2, the earlier you start learning the L2, the better. However, that is also one thing one cannot change afterwards, but one can always go to stay in the L2 country no matter at what age one started learning the L2.

Olynyk et al. (1987) and Raupach (1980) have found that learners pause similarly in their L1 as in their L2. Thus, the frequency of pauses cannot always be looked at as an indicator of disfluency, but it can also be interpreted as transfer from L1 (see e.g. Lehtonen 1981). Some researchers (e.g. Grosjean 1980b; Paananen 1998; Riazantseva 2001) have suggested that pausing is culturally determined. Perales & Cenoz (1996, 75) suggest that, in every language, pausing behaviour in spontaneous conversation is determined by turn-taking strategies, pause duration and the function of silence in the corresponding culture. Lehtonen and Sajavaara (Lehtonen 1979;

Sajavaara & Lehtonen 1980) found that Finnish learners of English pause more often, for a longer period of time and at different (incorrect) places than Swedish-speaking Finns and Swedes learning English or even native English speakers in spontaneous speech. Perhaps this is due to the fact that, when hesitating, Finnish learners tend to use unfilled pauses, whereas Swedes and Swedish-speaking Finns use filled pauses. This strategy possibly transfers to the language they are learning. (Lehtonen 1981, 325).

In comparison, Riazantseva (2001) found that there was an equal number of pauses in L1 English and L1 Russian. Furthermore, she found that pause duration and pause distribution differ in English and Russian (in informal monologues). She argues that pause duration may well be a language-specific, not a universal phenomenon. She also found that advanced L2 speakers were able to produce native-like pause duration in English. She continues that the pause frequency of L2 speakers was higher than that of L1 speakers. The conclusion drawn is that by teaching students the pausing patterns of L2 they would be perceived as more native-like in their fluency.

Paananen (1998) did not find any significant differences between Finns and native English speakers in pause duration or the percentage of pauses out of speaking time. However, consistent with Lehtonen's (1979) study she found that Finnish pupils pause more often and at different (incorrect) places than native speakers. In her dissertation Paananen-Porkka (2007, 234-239, 246-253) argued that Finnish pupils' difficulties in English speech rhythm were caused by incorrect pausing (pausing too often and at incorrect places) rather than sentence stress. In her study, pauses were longer in L2 English than L1 Finnish but the L1 speakers used longer pauses at sentence boundaries than sentence-internally. Pause duration was not statistically different between L1 and L2 English. However, this was not always the case for her Finnish pupils whether they spoke English (L2) or Finnish (L1). Despite that, as a group, both L1 (n=6) and L2 (n=6) English speakers paused significantly longer at sentence boundaries than sentence-internally.

Consistent with the findings of Paananen-Porkka, Adams (1979, 22) found that L2 speakers paused more and for longer than L1 speakers, and that their pauses also occurred in erroneous places. Learners, for example, failed to respect the constituent structure of the utterance, which resulted in grouping lexical items inappropriately and perturbing the rhythmical pattern of the sentence. In a study by Perales & Cenoz (1996, 81) 28.7% of the disfluent pauses in L2 spontaneous speech were judged to be a consequence of morphological problems and 21.6% of lexical problems.

There are also scholars who argue that a pause has a phonological role: its place is “predictable, rule-governed and derivable in a way similar to that in which the surface, segmental representation is derived” (Marek 1980, 107). According to him, this claim is supported by the fact that L1 speakers know intuitively where to pause and agree on “correct placement of a pause”. Hence, he (Marek 1980, 107) argues that sentence structure is one of the key elements in determining pause position. Strangert (1991) puts it more mildly by concluding that syntax affects the perception and production of pauses. Further, Ballmer (1980) claims that a pause is a grammatical category because it is possible to establish sentence-minimal pairs (with a pause and without) and, of course, for the rhythmic organisation of speech pausing plays a crucial role. It can be concluded that L1 speakers are able to distinguish fluent (or “correct”) places of a pause from disfluent ones, even though they use both in their speech.

My pilot study (Ullakonoja 2007c) on pausing showed that there were less and shorter pauses in native speakers’ speech when compared with Finnish L2 learners of Russian. In the pilot study, three learners’ pausing in read-aloud Russian (two dialogues, about 4.5 min per speaker) was compared to a native speaker of Russian (1 min 15 sec.). The main results were that after the stay in Russia, there were less chunking of disfluencies (all 3 speakers), less disfluent pauses (2/3 speakers) and the pause duration was shorter (2/3 speakers). The study also showed that even native speakers sometimes have disfluent pauses e.g. when hesitating.

To summarise, pauses occur for all sorts of reasons: planning, hesitation, repair, reformulation, breathing, emphasizing etc. However, hesitation is not always realized by pausing, but can also lengthen the function word before the pause (Horne et al. 2003). Pause frequency is affected by the speech rate. Temporal characteristics of a pause were shown to depend on the speaker, text, language and place of the pause. It also became clear that L2 speakers differ from native speakers in their pausing behaviour. There are multiple classifications of a pause, but that of fluent and disfluent pauses best suits my research design.

### 3.1.2 Speech and articulation rate

Apart from pausing, other important acoustic correlates of fluency are speech and articulation rate. In the present study, speech rate and articulation rate are closely related to reading rate because the data analysed here is read-aloud speech. However, the factors affecting reading rate will be treated separately in section 3.3 (see p. 87). In this subsection, I shall define speech and articulation rate, discuss factors influencing them and look at studies focusing on speech and articulation rate in L2 or SA context.

**Speech rate** (tempo) is a term used to indicate the number of units per the total time a speaker is uttering his speech, including pauses, whereas the term **articulation rate** refers to speech rate excluding pauses (Grosjean 1980b; Kenny 1996, 50; Tsao et al. 2006; Paananen-Porkka 2007, 123). Sometimes the term **phonation rate** is used synonymously with articulation rate (see e.g. Moore 1990). Here, I use speech and articulation rate in the context of reading aloud. Both are defined as the “number of output units per unit of time” e.g. sounds/second, syllables/second or words/minute (Kodzasov & Krivnova 2001, 72; Tsao et al. 2006, 1156).

Hence, as was mentioned above, there is a relationship between speech rate and pauses. For example, Goldman Eisler (1968, 24) claims that variations in speakers’ speech rate are more likely to be due to the frequency of hesitation pauses than the

frequency of breathing pauses. Goldman Eisler (1968, 24) defines speech and articulation rate as follows: “The longer and more frequent the pauses, the slower is the total rate of speech production. [...] The articulation rate (AR) on the other hand, plays no significant part in the rate at which speed is produced over a period of time (SR).” According to Ivanova-Lyukyanova (2003, 142-143), speech rate tells us about the rate at which the speaker pronounces words, and it depends greatly on the frequency and type of pauses. One could think that it is the frequency of pauses that most influences speech rate if comparing samples of the same text produced by different speakers. However, as Crystal & House (1990, 106) argue, in addition to the higher frequency of pauses, slow speakers also need more time to utter each syllable.

Even a small variation in speech rate can be important. Quené (2007) showed that listeners notice as small a change as 5% in speech rate. Multiple factors are known to affect speech rate of a speaker (see Trouvain 2004 for a review). Individuals are able to vary their speaking rate in different situations (Goldman Eisler 1968, 19; Trouvain 2004), from time to time (Abercrombie 1967, 96), in different text styles (Grosjean 1980b) or in different parts of the sentence (Deese 1980, 74-76). For example, before a hesitation pause L2 learners have been found to slow down their speech rate, and then fasten it after the pause (Shserbakova 2002, 272). Speech rate is also affected by word length and word frequency (Perfetti 1985, 15). Furthermore, it has been found that clause type influences speech rate so that e.g. declarative questions<sup>12</sup> are spoken more rapidly than corresponding statements (van Heuven & van Zanten 2005), and that the length of an utterance influences speech rate variation (Goldman Eisler 1968, 19-23; Kendall 2009, 149-152). In a conversation, interspeaker variation can be considerable both in speech and articulation rate (Miller et al. 1984). The type of information conveyed by the phrase can also influence speech rate: the parts speaker thinks are more important are spoken at a slower rate than e.g. parts offering some specifying information (Nikolaeva 1977, 15). Furthermore, Paananen-Porkka (2007)

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<sup>12</sup> van Heuven & van Zanten (2005) use the term “declarative question” to refer to questions that fully correspond a statement in their lexical and grammatical form.

and Kendall (2009, 140-142) found evidence on gender influencing speech rate: in their studies women spoke faster than men.

Furthermore, the type or genre of the text is known to affect speech rate so that the more linguistically complex the text, the slower is its reading aloud. For example, jokes are spoken faster than fairy tales. (Sallinen-Kuparinen 1979; Ivanova-Lyukyanova 2003, 146-148.) Individuals have been found to differ in their habitual speaking rate in L1: some are slow speakers on biological basis while some are fast (Tsao et al. 2006). Interestingly, it has also been suggested that the personality and race of a speaker might influence his speech rate (Crown & Feldstein 1985). In fact, Kendall (2009, 143) found statistically significant differences in speech rate of speakers from different regional and ethnic backgrounds. There is also some evidence about the increase of speech rate over centuries so that people in the 20<sup>th</sup> century spoke faster than people in the 19<sup>th</sup> century (Zinder 1979, 276).

Speech rate in native Finnish speech has been under scrutiny in some studies (e.g. Lehtonen 1979; Sallinen-Kuparinen 1979; Iivonen et al. 1995; Moore & Korpijaakko-Huuhka 1996; Suomi 2007). In Russian, the focus has recently been on the difference between read-aloud and spontaneous speech and, on the other hand, pausing and its influence on prosodic phrasing and speech rate (see e.g. Volskaya 2009). The results of these studies will, however, be discussed later in more detail in section 4 (*Summary of the main findings* p. 95).

It is not surprising that a number of studies have shown a tendency for **L2 speakers** to speak at a slower speech rate than native speakers (Riggenbach 1991; Munro 1995; 1998; Cenoz 2000; Guion et al. 2000; Trofimovich & Baker 2006; Paananen-Porkka 2007). Furthermore, the same speakers have been found to speak significantly slower or much slower in their L2 than L1 (Raupach 1980; Möhle 1984). L2 speakers are claimed to also read slowly because they are thought to be focusing on each word of the text for grasping the meaning of the text (Taguchi & Gorsuch 2002).

The speaking rate of L2 speakers can be compared to that in their native language. However, the comparison often is, as Lehtonen (1981) has shown, problematic if there are typological differences between the languages. According to Lehtonen, the speech rate comparison of syllable-timed<sup>13</sup> Finnish and stress-timed English is difficult because if the measuring unit syllables/minute is used, it seems that Finnish is spoken faster than English, but if words/minute is used, English is spoken faster. (Finnish has less complex syllables than English, but longer and more complex words than English because of the morphological differences between the languages.) It is also possible that when speakers become more proficient or fluent in L2, their spontaneous speech becomes in fact slower, because their ability to monitor speech develops (Segalowitz & Freed 2004, 195). It has been shown that L2 speakers transfer also other prosodic characteristics of their L1 to L2:

“When the Finn transfers the habit of pronouncing all of the syllables of each word unreduced and manifesting word boundaries with phonetical juncture segments (instead of linking) the rate of his speech is inevitably slower” (Lehtonen 1981, 331).

As previously mentioned, speech and articulation rate can also be regarded as components of fluency (Riggenbach 1991; Cucchiarini et al. 2000; Temple 2000; Cucchiarini et al. 2002). Moreover, several researchers (Lennon 1990; Riggenbach 1991, 434; Freed 1995, 130; Towell et al. 1996) have associated L2 fluency development with the development in speech and/or articulation rate. It can also be seen as a two-way process, so that faster speech rate offers more possibilities to co-articulation and linking, which helps the speaker automatically improve his fluency and hence speak faster (Pennington 1992, 28). According to Gut et al. (2007, 9), articulation rate is often associated either with fluency or speaker’s L2 proficiency. Steady speech rate has also been seen as a component of fluency because when the tempo becomes interrupted in some way, listeners perceive it as disfluent (Fiksdal

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<sup>13</sup> Today, Finnish is understood as a mora-timed or sometimes even phrasal-timed language (see e.g. O’Dell et al. 2007).

2000, 128). Nevertheless, the learner's fast speech rate can also indicate "a low mastery of the language" (Lehtonen 1981, 328-329).

An L2 speaker often feels that L1 speakers speak very fast (Abercrombie 1967, 96). Native speakers would like L2 users to speak with about 10% faster speech rate than they do (Munro & Derwing 1998; 2001, 464). They also evaluate a fast speech rate of an L2 speaker more positively than a slow one (Paananen-Porkka 2007, 340). When advanced L2 learners are listening to native speech they also prefer a normal native speech rate over a slowed down one (Derwing & Munro 2001, 333). On the other hand, to be intelligible and comprehensible in L2, it might be a good strategy for L2 learners to slow down their speech rather than speed it up (Munro & Derwing 1995). It has also been found that speakers themselves perceive their own speech rate differently from their listeners (Grosjean & Lane 1974). In addition, Tannen (1985) has claimed that listener's expectations of an appropriate speech rate are culturally determined.

When looking at speech and articulation rate from the point of view of L2 and **study abroad context**, several studies have found that L2 learners speak faster after their stay abroad than before it. For example, as was already mentioned above, in Towell et al.'s (1996) study the British learners of French became more fluent during their 6-month-study-abroad period when fluency was measured as speech rate in spontaneous speech. A similar result was obtained in Möhle's (1984), Lennon's (1990) and Segalowitz & Freed's (2004, 195) studies. Möhle (1984) found that German university students who were studying French as an L2 and spent a semester in France increased their speech rate and articulation rate considerably during the stay. In her study, however, L1 French speakers who were studying German and spending a semester in Germany did not show such a great change, only their articulation rate developed a little. Möhle argues that the increase in the speech rate can be due to enlargement of their vocabulary. Lennon (1990), on the other hand, established that as the amount of L2 experience increased, also speech rate fastened. Also in Segalowitz & Freed's (2004, 195) paper the subjects who studied a semester

abroad spoke at a significantly faster rate after their stay than before it (see exact values in Table 11 p. 95). Furthermore, Freed (1995, 137) has found e.g. that “Students who had spent a semester abroad spoke both more and at a significantly faster rate than did those whose learning had been restricted to the language learning classroom at home”. However, in her more recent study it was the students in the immersion context that had increased their speech rate more than their colleagues in the study abroad context (Freed, Segalowitz & Dewey 2004). Finally, Trofimovich & Baker (2006) claim that L2 learners could not achieve a native speech rate no matter how long they stayed in the L2 country.

There are different views about the fluent readers’ typical **reading rate** (in silent reading). The listener’s expectations of a “normal” speech rate depend on the text’s register, abstraction and referential complexity (Lehtonen 1981, 331). According to Jensen (1986), the optimal reading rate for L2 university students of English is 300 words per minute (=WPM). Nuttall (1982, 36), on the other hand, defines that to be the average reading rate of an L1 speaker, with a range from 140 WPM to 800 WPM. Just & Carpenter (1987, 57, 433, 453) defined the reading speed of a skilled adult reader to be 240-250 WPM, whereas a slow adult reader can read at the speed of 150 WPM in L1 and a speed reader as fast as 700 WPM. Perfetti’s (1985, 10) definitions are among the same lines. According to him, the average reading speed of a college student in silent reading in L1 is 250 WPM, and if over that, s/he is defined to be a skilled reader. Perfetti also agrees with Just & Carpenter in that some people only read at a speed of 150 WPM and some reach up to 400 WPM. Higgins & Wallace (1989) on the other hand have set their limit of pleasurable reading to 180 WPM. Reading aloud is much slower than reading silently (Nuttall 1982, 138). Lane & Grosjean (1973) defined an average rate of reading aloud in L1 to be 162-165 WPM.

In Russian read-aloud speech, Ivanova-Lyukyanova (2003, 146-148) measured the following speech rates: 50-60 WPM a slowed down rate, 70-80 WPM an average speech rate, and 90-120 WPM a fastened rate. She points out that the listener does not, however, perceive absolute speech rate values but instead relies on relative

values e.g. when the speaker fastens or slows down his speech. In addition to that, she insists on the effect of text style on the speech rate saying that, for example, in mass media, the commentators use a fast speech rate and their pauses are short. In unprepared spontaneous speech, on the other hand, there is great variation in speech rate.

In studies of L2 speech, there are also different findings of average speech rate. Taguchi and colleagues (2004) used two different techniques (repeated reading and extensive reading) to enhance the reading speech of their Japanese EFL (=English as a Foreign Language) students (n=20) who then achieved in the post-test an average silent reading rate of 115 WPM and 108 WPM. Their studies (Taguchi et al. 2004; Gorsuch & Taguchi 2008) suggest that repeated reading does indeed increase the fluency and speech rate of the speakers (when repeated reading is a learning method and the text is read multiple times and with the help of audio material). Similar measures of average speech rate were obtained by Bell (2001) whose Yemen EFL students reached 93 WPM and 128 WPM in the post-test. However, in a study by Gorsuch & Taguchi (2008), Vietnamese EFL students reached as high as 352 WPM when reading silently in the post-test. In Lennon's (1984) study, the fastest L2 speakers reached 168 WPM in spontaneous speech. In Temple's (1992, 32) study L2 speakers' speech rates ranged from 1.52 to 3.32 syllables/second (mean being 2.34 syll/s), which was about half of the native speaker's speech rate.

Some results (Favreau & Segalowitz 1982) imply that practice in reading in L2 is linked to speech rate: fluent bilinguals who had been educated longer in their L2 decoded faster than their counterparts who had been educated less, and hence differed in practice in reading in L2. Speech rate in L2 spontaneous speech has also been shown to correlate with the grade obtained in that language at school and also, with language use outside school (Paananen-Porkka 2007, 333). Speech rate and articulation rate in L2 can also be analysed from the point of view of proceduralization. For example, Towell et al. (1996, 112-113) concluded that once advanced L2 speakers have reached a certain speech and articulation rate, their

fluency development is shown in other than quantitative measures, for example in the length and complexity of linguistic units the learners are producing.

To sum up, it seems difficult to compare speech and articulation rates in different languages, in different speech styles and different texts. Furthermore, they seem to somewhat depend on personal and speaker specific variables that are all not possible to be controlled. However, it is clear that speech and articulation rate play a crucial role in L2 fluency and that they often become faster as a result of studying abroad.

### **3.2 Study abroad context**

Few studies have examined L2 fluency acquisition and its relationship to study abroad context. This section summarizes those studies, as well as studies concerning the study abroad context and the development of linguistic or reading skills. The research covers different countries as a study abroad context, but sometimes a similar context can be created in the home country, for example, when L1 English students are studying in the French-speaking Canada. Many related studies, however, have examined subjects who have migrated to the country of the target language and have been interested in the impact of the age of arrival (AOA) on their L2 speech (e.g. Guion et al. 2000). That kind of a research setting is somewhat different to the one in this study, because obviously the amount of L2 input and the motivation (or the need) to learn L2 are different from those of the L2 students here, who are only residing in the L2 country temporarily. Of these studies, only those concerning fluency development or pronunciation development are looked at here.

In their extensive studies, Coleman (1998) and Freed (1995; 1998; 2004) have encapsulated the research of the study abroad context done during and before the 2000's. The research has expanded into various areas including sociology,

psychology, educational sciences as well as linguistics. In linguistics, study abroad has been found to have positive effects on most areas of L2 competence: listening comprehension, vocabulary recognition skills, vocabulary production skills, oral communication skills, sociolinguistic competence and communicative competence in general (Harjula & Manninen 1994; Huhta 1994; Marriott 1995; Reagan 1995; Lennon 2000; Harley & Hart 2002; Isabelli-García 2003; Segalowitz et al. 2004). Also studies (e.g. Walsh 1994) measuring language proficiency and comparing study abroad and at home students have found that students sojourning abroad are prone to attain higher levels of L2 proficiency than those staying at home.

The largest contribution focusing on Russia as a study abroad context is without doubt that of Brecht and colleagues (Brecht & Robinson 1995; Brecht et al. 1995). It is the most comprehensive of all studies concerning linguistic development during study abroad: a total of 658 subjects were tested before and after their 4-month-stay either in St. Petersburg (Leningrad) or Moscow. The data was collected during 6 years (1984-1990) and the subjects were all major students of Russian at an American university. The great number of participants makes reliable statistical analysis possible, whereas the large-scale questionnaires are interesting from the qualitative point of view. The tests done before and after the stay in Russia consisted of speaking, listening, reading, personal data and learning variables. Brecht and other American researchers (e.g. Freed, Segalowitz & Dewey et al. 2004; Lafford 2004; Trofimovich & Baker 2006), who have studied language development in study abroad context, have based their studies on OPI<sup>14</sup> (Oral Proficiency Interview) results or data collected in OPI.

The main results of Brecht et al. (Brecht & Robinson 1995; Brecht et al. 1995) can be summarized as follows. The higher the pre-test score in listening and reading, the less the gain, i.e. the most advanced students were not able to benefit as much from the study abroad context. However, reading proficiency before SA was strongly

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<sup>14</sup> OPI is a standardised test used in the USA to evaluate the overall speaking proficiency of the speaker (Language Testing International 2004) that is available on many languages.

related with the improvement of listening skills during SA. Also, the advanced students may benefit from grammar instruction in early years because this seemed to be related to their gains in speaking and listening skills. In the OPI test about 13% of the students got “advanced” in the pre-test whereas almost 40% did so in the post-test. This was seen as an indicator of improvement of their functional level of competence. Brecht et al. (Brecht & Robinson 1995; Brecht et al. 1995) established that in the SA context men improved their listening skills more than women, younger speakers more than older, students who had learnt other L2s more than those who had not, and people who had been to the L2 country before more than those who had not. However, a result that was perhaps somewhat surprising was that the students who had learnt Russian already in high school gained less than those who had not. On the basis of these studies, it can be concluded that Russia can be an excellent SA context for learning different L2 skills.

When looking at the language skills development of L1 English-speaking secondary school students ( $n=27$ ) when spending 3 months with a French-speaking host family, Harley et al. (2002) found that all students developed statistically significantly in listening and vocabulary skills (when comparing the results from pre- and post-tests). In the students’ questionnaires, they said they used French (L2) in various contexts, the most important of which was talking with friends. The students also said that especially their comprehension skills improved during the exchange. However, no correlation was found between the students’ self-evaluated progress and progress seen in the pre- and post-tests.

There are only few studies focusing on the L2 phonological development during study abroad. For instance, Días-Campos (2004) found that the amount of formal L2 instruction had a strong effect on pronunciation: students who had learnt Spanish for more than 7 years pronounced consonants in a more native like manner than others. In her study both groups, at home (AH) and SA students, developed in consonantal production during the stay, but AH-group was slightly better in the post-test. The differences between the two groups were not statistically significant, and the AH

students may have studied L2 longer than the SA-group. The relationship of pausing and SA as well as that of speech and articulation rate and SA have already been discussed in the previous section 3.1 *Defining fluency and disfluency in speech*.

As was already mentioned, it has been found in several studies (Walsh 1994; Freed 1995; Simões 1996; Towell et al. 1996; Freed et al. 2003; Freed, Segalowitz & Dewey 2004; Lafford 2004; Segalowitz & Freed 2004; Trofimovich & Baker 2006) that a good way to improve fluency, sometimes significantly, in L2 is to spend some time in the country where L2 is spoken. For example, the results of Segalowitz & Freed (2004) showed that it was the students who studied abroad that improved their fluency more on several measures than the students who stayed at home. Segalowitz & Freed (2004) studied English adults learning Spanish in at home and SA contexts and found that the latter seems to help the learners to improve their oral fluency in spontaneous speech significantly. This was found in particular in the speech rate, mean length of run without filled pauses, and longest speech run without silent and filled pauses. They found no proof of a host family influence in the oral performance of the students. They argue that the possible reasons for this might be e.g. the kind of communication in the family (there might be only short, banal and repetitive exchanges). To conclude, they claim that despite the many communication possibilities during the study abroad semester, all learners did not always improve their oral performance. (Segalowitz & Freed 2004.)

However, there are some controversial studies, suggesting that study abroad would not be the most beneficial learning context to all learners. For example, Simões (1996) and Segalowitz & Freed (2004) found that even though the study abroad context helps the learners in general to improve their fluency significantly, there are great interspeaker differences in using and benefiting from the opportunities of the study abroad. This makes showing the differences in learning context complex. Also Freed (1995, 135) found that weaker students ameliorated their fluency during a semester abroad, but students that were already quite fluent before going abroad did not improve significantly. Also Wilkinson (1998a; 1998b) has argued that not all students can benefit from the L2 study context as much as one would think a priori.

For different reasons, they do not use all the opportunities available to them to use the target language, and they are in a way left out of the target language speech community. Segalowitz and colleagues' (2004) conclusions are similar: they conclude that the qualitative aspects of the L2 learning context should be looked at in order to understand the nature of learning to communicate in that context.

Furthermore, as Freed, Segalowitz & Dewey (2004) have shown, it is not always the SA context that is best for the learner's fluency development. In their study, which compared English students of French in three different contexts (at home, immersion and SA), it was found that the students in intensive domestic immersion gained most in terms of fluency (when fluency was understood as smooth, fast and continuous speech). Furthermore, the research indicates that the students in the study abroad context reported using less out-of-class time on foreign language than those in the domestic immersion. However, it has to be pointed out that also the students who studied abroad improved their oral fluency (in a spontaneous speaking task) compared to the regular at home group. Freed, Dewey, Segalowitz & Halter (2004, 349) developed a language contact profile (LCP) "to assess second language contact for students entering and completing language study programs in various contexts of learning". They have applied LCP to their studies because it is a very comprehensive questionnaire trying to capture the type and amount of language contact students have during SA. It certainly helps and has helped the researchers to estimate the amount of input the students are getting. However, the quality of input (e.g. how involved the student is in the conversation, reading activity or watching TV) is hard to define only on the basis of LCP.

In sum, most previous studies about fluency in the study abroad context have found an increase in the students' fluency during the time spent in an L2 country. As previously mentioned, another somewhat similar learning context is that of immigrants to countries where their L1 (first language) is not spoken. For example, in the immigration context to English speaking Canada, it has been found that beginner learners of English differ in their fluency development over time depending on their L1: the fluency of L1 Mandarin speakers did not increase, whereas the

fluency of Slavic speakers improved (Derwing et al. 2006). The possible reasons Derwing et al. (2006) offer for this is that, firstly, there is a ceiling effect: perhaps the more fluent Mandarin speakers in the beginning could not improve any more. Secondly, it was found that the Slavic students interacted more with native English speakers and that improved their fluency.

A few SA studies (Lapkin et al. 1995; Kline 1998; Dewey 2004; Taillefer 2005) have focused only on **L2 reading skills**. Most of them have measured some other characteristics as well. For example, when studying English-speaking secondary school students (n=104) who spent 3 months in a French-speaking host family, Lapkin et al. (1995) found a “threshold effect” in reading skills: the students scoring very low or very high in the pre-test did not improve as much as the students who were in the “middle range”. They concluded that most of the learning seems to happen outside the classroom, when the students are interacting with their French-speaking peers or host family. Also Kline (1998) found that the American students’ (n=21) curriculum in France made them read texts that their French peers or families would never read, but towards the end of the year students were finding different and more appropriate texts to read. The study, however, suffers from the fact that Kline does not relate the reading habits with the possible reading development. Furthermore, Taillefer (2005) attempted to explain how students (n=177) from different literacy and sociolinguistics backgrounds differ in reading skills and strategies in the L2 in an academic SA context. His study, however, included testing of reading skills only in the beginning of the SA stay, and his purpose was to compare academic performance and readings skills of students from different countries. His results revealed, however, a relationship between L2 proficiency and L2 reading skills: low level of L2 competence seems to lead to weak L2 reading skills.

Dewey (2004) on the other hand compared SA context to intensive domestic immersion (IM) in reading comprehension skills of 30 American students of Japanese (SA n=15, IM n=15). The only difference he identified between the two

contexts was self-assessment: SA students evaluated themselves as more confident in reading than IM students. The analysis of reading processes revealed, however, that the SA students are monitoring their understanding more than their IM counterparts but the IM students were taking the content of the text more emotionally or affectively. The better monitoring of understanding in the SA group is explained by the overall linguistic gain during SA as well as by the surrounding Japanese: they were accustomed to read Japanese signs, adds etc. and were confident in that. At the outset of SA, students suddenly become less literate than at home, where they are used to being able to read and understand everything around them (Kline 1998). Certainly, study abroad context differs from a classroom setting in the home institution in a number of ways. The learners are exposed to the L2 in their everyday lives in addition to classroom instruction through media, running errands and communication with the native speakers. Not all students profit from this extensive exposure, but some can feel “overwhelmed by the amount, delivery rate, and complexity of the language that surrounds them” (Segalowitz & Freed 2004, 174).

Despite some contradictory findings, Segalowitz (2007) claims that it is only through a lot of language practice in a natural communicative setting when a student can achieve good lexical access fluidity and attention control. They are, according to the study, the most important measures of cognitive fluency, which means the cognitive processes that are involved in fluent oral production. Hence, I also argue that fluency development can be very efficient in a study abroad context. To recapitulate, previous research suggests that SA results in a) significant linguistic gains, b) fluency development, c) more native like oral skills in general. Despite some contradictory findings, there is a sufficient amount of evidence of the great impact of a SA setting in L2 learning. It has become clear that during SA, L2 learners show change, not only in their fluency skills but in other domains also. The abovementioned studies showed that individual differences in gains (whether linguistic or other) are noticeable. It is possible to conclude, however, that as a group, SA students become more confident L2 users and speak it easier than before SA. Nonetheless, there is still

relatively little understanding of the learning processes during SA or the linguistic changes in the L2 of the individuals.

### **3.3 Reading aloud in L2**

When reading aloud a speaker does not structure the utterance, nor plan the content, but merely decodes what is written and articulates it. In contrast, in spontaneous speech there are several stages before actual articulation of speech sounds, e.g. constructing an utterance on the basis of the communicative intention with the help of semantic and syntactic information the speakers have (Levelt 1989). There is a growing body of literature on psychological or cognitive processes of reading that focuses on the ways in which readers process information from the written text to articulation. I will only focus on the few studies that are the most relevant to my research.

As Weber (1991) points out, in an academic context L2 learners are often learning, or at least expected to learn, by reading in the L2. Also Taillefer (2005, 521) suggests that academic reading skills in L2 are essential in coping in the SA academic context. However, according to my own experience, the materials used in a Finnish class (whether at school or university) pay hardly any attention to teaching how to read in L2, and seem to be based on the assumption that it is similar to reading in L1. Reading aloud, in my opinion, is something we often do in an L2 classroom context and fairly rarely outside it. In L2 classrooms reading aloud is used especially to practise pronunciation, either solo or in chorus. While reading aloud may not necessarily be the best method for understanding the content of the text or motivating the students, it can be useful for learning how to divide text into phrases (Nuttall 1982, 138-139). There are some countries however, where reading silently is used more than reading aloud in L2 classrooms (see e.g. Kailani 1998).

Reading can be seen either as a cognitive process (what happens in the brain when an individual reads a text) or as a social process (what happens culturally and socially when an individual reads a text). When reading in the L2, the reader rarely has the cultural and social knowledge equal to an L1 speaker to be able to fully understand the text in its context, but instead is “trapped” in the linguistic meaning of the text. (Bernhardt 1991, 5-14.)

Although Levelt’s (1989) speech production model illustrates spontaneous speech, he describes the reading task aptly when contrasting it to spontaneous speech (1989, 259):

“In reading, the speaker can rely heavily on the printed materials. Lexical retrieval and the building of syntactic constituents can be based largely on parsing of the visual input. Reading aloud is primarily a perceptual, phonological, and articulatory task.”

In other words, Levelt means that reading aloud consists of the processes of 1) perception of the text, 2) phonological encoding of it, and 3) articulation. If one is interested in studying articulation of speech sounds, using read-aloud speech as data would make it less complicated in the sense that there are fewer processes involved than in spontaneous interaction, where the speaker needs to plan the lexical, semantic and grammatical content of his message before phonological encoding and articulation. According to Daneman (1991), we can add to the definition above the importance of vision (or eye movement) and comprehension processes.

Reading in L2 differs from reading in L1 (for a review on L2 reading research see Grabe 1991; Grabe 2004). It can be a more complicated task as Anderson (2003, 2) puts it:

“For the student, learning to read in a second or foreign language is a process that involves learning skills, learning new vocabulary and collocative patterns, and cultivating the ability to transfer these skills from the classroom to the real world”.

Anderson (2003) also suggests that L2 learners make use of reading strategies differently from L1 speakers of the language. In his study, the difference was the same between L1 and L2 both in second language (L2 learnt in a country where it is the language of the majority) and foreign language (L2 learnt in a country where it is not the language of the majority of the population) contexts. Valtanen’s (1994) case

study on L2 reading showed that an L2 reader was pausing frequently when reading aloud (61 pauses in a text of 512 words). Most of the pauses occurred when repeating words or parts of words while the unfamiliarity with the lexical items of the text seemed to be the second most reason for pausing.

In this chapter, I have applied and modified Berthardt's (1991) classification of variables affecting L2 reading. Berthardt divides these factors into linguistic, literacy and knowledge variables. In addition, I will discuss the influence of alphabetic factors in L2 reading. Bernhardt (1991, 41) also proposes a theoretical model of factors affecting L2 reading where language proficiency clearly plays a crucial role (Figure 3). As language proficiency increases, the error rate in word recognition and phonemes-graphemes decreases. Syntax plays a different role: as language proficiency develops, syntactic errors become more common and in time slowly decrease. The number of errors based on knowledge (background knowledge and intra-textual perceptions) also decreases as language proficiency develops. (Bernhardt 1991, 169-170.) However, Bernhardt & Kamil (2006) conclude that L2 reading is such a complex process that it is problematical for any existing model to capture it.

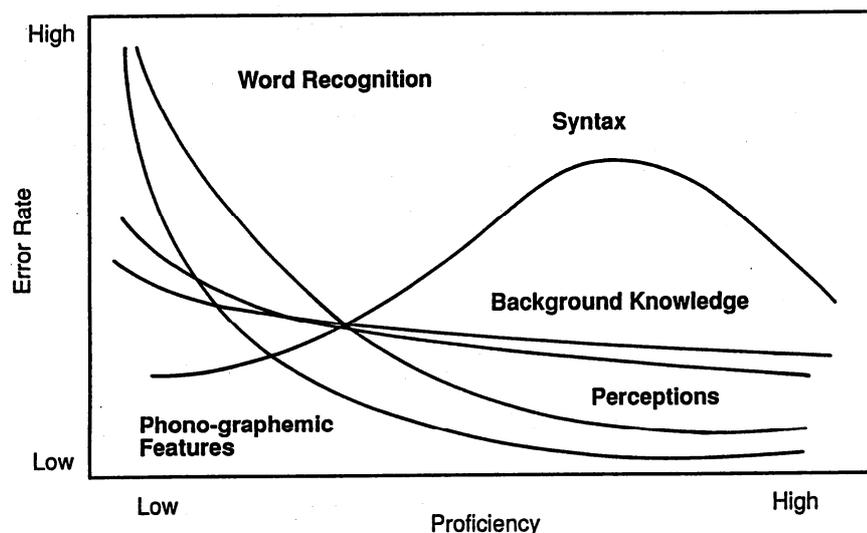


Figure 3. Theoretical distribution of reading factors (Bernhardt 1991b, 169).

I will first look at the **linguistic variables** of Bernhardt's (1991b) model. By linguistic factors affecting the L2 reading she means factors involving the linguistic knowledge of the speaker. Linguistic knowledge here means knowledge of lexicon, grammar and semantics. The vocabulary size of the student is usually somewhat limited when starting to read in L2, whereas when reading in L1, the size of one's lexicon is usually fairly large (Grabe 1991). Both in L1 and L2, a larger vocabulary makes a person more skilful as a reader (Perfetti 1985, 220-226; Just & Carpenter 1987, 462). However, a beginning L2 reader already has wider world knowledge than an L1 beginner reader (Grabe 1991). Furthermore, different resources (background knowledge and working memory capacity) of the person can affect the speed at which s/he reads (Just & Carpenter 1987, 471-473).

Native speakers are found to take statistically significantly longer to read aloud exception words and exception pseudowords (words that do not conform to the common symbol-sound rules of the language) than regular words and regular pseudowords (Baron & Strawson 1976; Glushko 1979; Just & Carpenter 1987). Akamatsu reports in several studies (1999; 2002; 2005) a similar tendency for L2 learners: the reaction times were longer on reading aloud low-frequency words than high-frequency words in L2, and similarly longer reaction times were found on exception words than regular words. It is also implied that for proficient L2 users, the amount of experience in reading in L2 improves their L2 word-recognition skills.

Similar results have been obtained in other studies as well. Adams (1979, 131) and Koponen (1992, 134-136) argue that reasons for disfluencies in learner's speech can be the reader's unfamiliarity with the language's lexical items, typically with long and low-frequency words. Koponen (1992, 136) adds that the difficulties experienced with the lexical items depend on the speaker's language proficiency. Lehtonen & Heikkinen (1981, 329-336) agree that disfluency in reading aloud in one's L1 can be caused by a single lexical item (e.g. foreign word), and the readers tend to have increased pause duration in a text containing multiple foreign words in

comparison with other assumedly more familiar texts. They also found that the longer the word, the more disfluencies it created.

According to Perfetti (1985, 220-226), there is a relationship between phonetic knowledge and learning to read in L1, which again applied to L2 learning would mean that the students' knowledge of L2 phonetics affects his reading aloud skills. But, Perfetti (2003, 16-18) adds that learning to read involves much more than merely learning "how one's writing system encodes one's language", for example how "the graphs correspond to spoken language units". Hence, also the word's phonological form can affect the reading rate. It has been found that when reading a single word, words from dense neighbourhoods (a high number of words can be created by substituting a single letter of the word at a time) were read aloud faster than words from sparse neighbourhoods (Mulatti et al. 2006). In my opinion, these results together with the aforementioned studies confirm that there exists a certain difficulty in reading aloud low-frequency and exception words in L2. Also, the difficulties are likely to be manifested by the reading rate.

Next, I will look at the **literacy factors** of Bernhardt's (1991b) model and consider the studies focusing on L2 literacy. Alderson & Urquhart (1984) aptly formulates two essential questions on studying reading in L2: first, are L2 proficiency and L2 reading skills linked and, second, what is the link between L1 reading skills and L2 reading ability? Many researchers refer to Nuttall's "vicious circle". Slow reading is discouraging for the L2 reader, because s/he cannot, according to Nuttall (1982, 167), enjoy reading as it takes up a lot of time. If s/he can be taught to read faster, s/he may start reading more, enjoy it, and hence develop his or her reading skills. That again will increase the amount of input he will get in the target language, which will develop his or her language skills. The importance of L1 when reading in L2 is manifested in a study by Upton & Lee-Thompson (2001) using a think-aloud protocol<sup>15</sup>. L2 proficiency was affected by the amount of L1 the university students

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<sup>15</sup> i.e. they asked the students to think aloud either in L1 or L2 while completing the task.

used in a L2 reading task, in fact, L1 played a significant role in performing the task. There also seems to be transfer from L1 in reading skills: poor L1 readers are also poor readers in L2, whereas good L1 readers are found to be good readers in L2 as well (Verhoeven 1991).

The last variables in Bernhardt's (1991b) model are **knowledge variables**. In a read-aloud task, it is difficult to say if the readers are really concentrating on the content of the text, or are they only uttering what they see on the paper? The text itself can affect the reading rate of native speakers: texts that are narrative are read faster than expository texts. Also the familiarity with the topic of the text makes it possible to read it faster than a text with an unfamiliar topic. (Graesser et al. 1980.) The finding is supported by a study of Akamatsu (2003), where the difficulty of the L2 text to be read silently was found to affect the reading speed so that easier texts were read faster than moderate ones, which were read faster than difficult ones (the differences in the reading rate were statistically significant).

Next, I will summarize **factors involving the writing system and orthography** that influence reading. For example, Perfetti (2003) claims that reading involves cooperation of two systems: a language and a writing system that encodes it. The verbal processes present in a reading task are "general symbol activation and retrieval, letter recognition, word decoding and semantic access" (Perfetti 1985, 169). If we now consider the reading task in this research (native Finnish students reading a Russian text), we can see that the first two processes are affected by the Cyrillic alphabet that differs from the Latin alphabet they have been used to in L1 and other L2s. It is evident that this feature of the text has an effect on its reading and, hence, on pronunciation and perhaps also on speaking rate. It can be speculated that reading a L2 with a Roman alphabet would be easier as a reading process for the Finnish students than reading a Cyrillic text (see e.g. Perfetti 1985, 88-90 for the importance of knowing the orthographic rules of the language being read). However, compared with e.g. the Chinese writing system Cyrillic and Roman alphabets work

on the same alphabetic principle: written symbols refer to phonemes (Perfetti 1985, 208).

When reading in L2, some transfer from L1 can be expected as at least two, maybe even more, languages (L1 and several L2s) are present simultaneously (see e.g. Upton & Lee-Thompson 2001; Koda 2005; 2007), but researchers do not agree on how it is manifested. Since no studies seem to exist that would investigate the effect of different alphabets of L1 and L2 on reading, I will summarize studies that have focused on different orthographies of L1 and L2. In cross-linguistic studies on reading processes there are contradictory findings concerning the significance of L1 orthographic features in L2 reading. These studies compare readers with different L1 orthographies reading L2 English either silently or aloud. Orthographies are usually grouped either by what they represent by their symbols (alphabetic, syllabic or logographic orthographies), or their regularity in spelling-to-sound correspondence i.e. depth (deep and shallow orthographies) (see e.g. Hung & Tzeng 1981; Perfetti 2003; Hamada & Koda 2008).

Akamatsu (1999; 2003) states that differences of L1 and L2 orthography lead to difficulties in L2 word-recognition. Studies by Akamatsu (1999; 2003) prove that L1 orthography affects reading in L2: the speakers whose L1's orthography is alphabet-based read faster in L2 English (also having an alphabet based orthography). There is however, a controversial study (Akamatsu 2002) claiming that the L1 orthography does not play a role in L2 reading. As Koda (2005) argues, these studies seem to suggest that L2 speakers are likely to use their existing L1 reading skills when learning to read in L2. Also, studies considering word recognition in reading are of interest, because "fluent reading requires rapid and effortless access to word meanings" (Koda 2007, 4) and "fluent readers can read faster than they can talk" (Hung & Tzeng 1981, 395). Word recognition is often mentioned as a key component of reading fluency (e.g. Perfetti 1985, 20; Segalowitz 2000; Gorsuch & Taguchi 2008). However, in L2 reading it is not only about recognizing words, but

also about understanding their meaning, and understanding the syntax and the structure of the text (Bernhardt 1991b, 78-86).

In Akamatsu's (1999) study a correspondence between the orthography of L1 and reading ability of L2 was established. L2 learners of English, who were native speakers of Persian, performed better in a case alternated word recognition task<sup>16</sup> than equally proficient native Chinese or Japanese learners. The explanation offered by Akamatsu (1999) was that Persian and English share the same orthographic (alphabetic) principle whereas Chinese and Japanese orthographies are not alphabet based (Chinese being logographic and Japanese syllabic). However, in a later study Akamatsu (2002) found that the relationship between L1 orthographic background and L2 reading ability was not as clear. In fact, Chinese, Japanese and Persian speakers all performed equally well in an L2 English word repetition task despite the differently based orthographies of their L1s. This is explained partly by the high L2 proficiency of the speakers as they were living and doing university studies in the L2 country. The different result could also be explained by the different task the learners were facing.

Also Koda (1999) did not find any proof of different L1 orthography affecting the L2 reading and word-recognition processing (L1s in the study were Korean and Chinese). In a more recent study Akamatsu (2003) studied the same groups of speakers when reading a text (in the earlier tasks they were only reading one-syllable-words), and found in a case alternation task that the Persian speakers' reading rate was faster than that of the Chinese or Japanese speakers. The result is again explained by the difference of orthographies of their L1, confirming the result obtained earlier (Akamatsu 1999). Akamatsu (2003, 222) concludes: "The underlying processes through which graphemes are transformed into their appropriate phonological forms vary according to the nature of the orthography". Furthermore, Hamada & Koda (2008) showed that adult Koreans (L2 learners of

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<sup>16</sup> stimulus words were written this way: cAsE aLtErNaTiOn

English) whose L1 orthography is alphabetic can read alphabetic pseudowords faster than their Chinese counterparts. In a study where silent reading of an isolated word in Mandarin (L1) and English (L2) was tested, slower reaction times were measured for L2 (Scholfield & Shu-Mei Chwo 2005).

Writing systems of languages differ in their graphemes and in the way they represent the spoken form of the language (Just & Carpenter 1987, 287). Also, the way symbol-sound correspondences work in the languages in question affects the way they are read aloud. Reading processes are different in languages that have simple and unchanging symbol-sound correspondences (a transparent or shallow orthography) from languages that have complex correspondences between orthography and pronunciation (a deep orthography) (Katz & Feldman 1981; Akamatsu 2002; Ktori & Pitchford 2008). Finnish has been called a phonetic language with a regular one-to-one correspondence between letters and sounds (VISK § 7), which phoneticians do not seem to entirely agree with (see e.g. Suomi et al. 2006, 254-255). Nevertheless, the correspondences between spelling and pronunciation are fairly regular and simple in Finnish if we do not consider the differences between spoken colloquial Finnish and written Finnish. Russian, on the other hand, is more complex in this sense and does not have as high a correspondence between orthography and pronunciation. In Russian, word stress affects vowel articulation so that unstressed vowels are reduced in quality and quantity<sup>17</sup>, hence the Russian orthography can be called morpho-phonemic (see e.g. Kasatkin 2003, 210-216). Also, consonant articulation is affected by the regressive voicing assimilation of consonants, which means that the consonant becomes voiced if the following consonant is voiced and vice versa: consonant is devoiced if the following consonant is voiceless (with the exception of some consonants) (see e.g. Burton & Robblee 1997; Bondarko 1998, 119-122). These are examples of phonotactic rules in Russian that are not visible in the orthography. Thus, the

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<sup>17</sup> Often in text books and learning materials of Russian for foreigners the word stress is marked, but in other Russian texts it is not.

differences between Finnish and Russian orthographies present a challenge for Finnish L2 learners of Russian.

Adult L1 speakers of different languages read at a very similar speed in their L1, which means that the writing system itself does not affect the reading rate once one masters it (Gray 1956, cit. by Just & Carpenter 1987, 290). However, the number of characters in the writing systems as well as similarities between characters (for example *p*, *b*, *d*) can influence the beginner reader (Just & Carpenter 1987, 290). This can also influence L2 readers (see e.g. Varyushenkova & Lyubimova 1986). For example in my study, the students were reading in Russian and were of course familiar with the Cyrillic alphabet, but may have been distracted by the similarities between Roman and Cyrillic alphabets. For example graphemes *p*, *y* and *c* are the same in both alphabets in most fonts, but correspond to different sounds in Russian and in Finnish. The Finnish alphabet has 29 graphemes (Pääkkönen 1990, 7-8) whereas the Russian alphabet has 33 letters (see e.g. Kasatkin 2003, 201). Some graphemes of the two alphabets are alike and represent similar sounds (for example *a*, *o*), other graphemes are alike but represent different sounds (for example *p*, *y*, *c*) and some graphemes in the two languages are completely different (for example *ä*, *ö* – *я*, *з*). Both languages represent alphabetic orthography<sup>18</sup>.

In a study by Pichette et al. (2003), L1 Serbo-Croatian adult speakers were measured for reading skill in French, their L2. I assume they were in fact native speakers of Croatian<sup>19</sup>, because Pichette et al. used a Croatian newspaper text in the L1 experiment where the possible transfer of L1 reading skills to L2 was investigated in a longitudinal study by using e.g. cloze tests. Pichette et al. (2003) saw reading skills as reading comprehension skills, not e.g. reading aloud and pronunciation skills. They found that L2 knowledge was a significant factor in predicting L2 reading skills, and also, when L2 knowledge increased there was a relationship between L1

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<sup>18</sup> About different orthographies see p. 83.

<sup>19</sup> Today, Serbian and Croatian are regarded to be two different languages: Croatian uses the Roman alphabet whereas Serbian uses the Cyrillic one.

and L2 reading skills. The results also suggest that reading much in L1 when living in an L2 environment helped to improve L2 reading skills. Similar results have been obtained by Huebner (1995), who concludes that the L2 environment offers many possibilities to learn to read a foreign script, which again helps the learner to improve his reading skills. He adds that being in the study abroad context emphasizes the need to be literate in L2, which promotes reading skills of the study abroad group.

All the abovementioned factors that affect reading are likely to influence **reading rate** as well. The connection between speech rate when reading aloud and reading skills has been defined by Just & Carpenter (1987, 455) as follows: “the speed with which a reader can pronounce written words is correlated with his reading skill”. L1 reading speed depends on the frequency of the word and the word length: less frequent words are read slower than more frequent ones, and longer words slower than short ones (Just & Carpenter 1987, 46-47). Also structural features of the text can slow down the reading rate (Just & Carpenter 1987, 443-444). When reading aloud, a speaker can vary his reading rate on the basis of what s/he wants to emphasize and what s/he does not want to emphasize in the text (Gut et al. 2007, 10). Segalowitz and colleagues argued in several studies (Favreau & Segalowitz 1982; Segalowitz 1986; Segalowitz et al. 1991; Segalowitz 2000) that even highly proficient bilinguals read slower in their L2 than L1, which may result from reduced automaticity of word recognition, deficient activation of semantic representations of a single word and insufficient use of phonological information in memory. When reading rates in L1 were about 320 WPM, reading rates of the same adult bilinguals in L2 were about 30% slower (Segalowitz et al. 1991). Also the perception skills are weaker in L2: proficient bilinguals were found to understand faster speech in their L1 than L2 (Favreau & Segalowitz 1982). Hence, it is not according to Segalowitz (1986) the reading modality itself that causes difficulties, but speakers’ general functioning in L2. As was mentioned earlier (section 3.1 on fluency), Segalowitz implies that skilled reading in L2 is a component of fluency.

People differ in their reading skill: individuals read at different rates, can interpret the meaning of a text in various ways, have dissimilar reading aloud abilities and can read unfamiliar words differently from each other (Baron & Strawson 1976; Graesser et al. 1980; Perfetti & Roth 1981; Perfetti 1985, 15; Daneman 1991). Individual differences in reading rates result from differences in word recognition, word encoding and lexical access skills (Just & Carpenter 1987, 454-455). Less skilful readers are slower than skilled ones, make more errors when reading and are more sensitive to context (Lesgold & Curtis 1981; Perfetti & Roth 1981). As Segalowitz et al. (1991) argue, the difference between skilled and less skilled L1 readers is similar to the difference between L1 and L2 reading. Reading rate differences are claimed to reflect the lexical and syntactic knowledge of the speaker rather than e.g. semantic or conceptual understanding of the text (Graesser et al. 1980). However, reading the same text several times (repeated reading) and hearing an L1 speaker read the text is shown to help L2 learners improve their reading rate (Taguchi & Gorsuch 2002; Taguchi et al. 2004; Gorsuch & Taguchi 2008).

When comparing L1 and L2 speakers, Akamatsu (1999) obtained quite a predictable result, that L1 English speakers were both faster and more accurate performers in repetition task than L2 speakers. Akamatsu (2005) also found that more proficient L2 speakers performed quicker and more accurately than less proficient L2 speakers. L2 reading skills of a learner can affect his/her motivation to read independently out of class. As previously mentioned, slow readers are less likely to engage themselves in a reading activity in L2 in their spare time, because they find it laborious and not enjoyable. (Nuttall 1982, 167.) Therefore, skilled and fast readers, on the other hand, would be more likely to read independently. In my study, all students were offered approximately the same time to read aloud in class, but reading in their spare time could not, of course, be controlled.

Different teaching methods can be used to increase the reading speed of the L2 learner (see Grabe 2004 for a review). These methods include repeated reading and extensive reading. Both methods have been found to increase the reading speed of

the L2 learner (see e.g. Grabe 1991; Mason & Krashen 1997; Bell 2001; Taguchi et al. 2004; Gorsuch & Taguchi 2008). When training L2 speakers to read faster, most attention should be paid on lower levels of processing, i.e. word recognition (Segalowitz et al. 1991). L2 speakers can attain high levels of cognitive fluency through repetition (but when e.g. repeating words after a native speaker model, the learner should also know the meaning of these words) (Segalowitz 2000).

In sum, the aforementioned studies on reading, to date, have yielded a number of implications directly relevant to my research design as well as to the way the results are interpreted. Reading in the L2 is a complex process, complicated yet by the different orthographies or alphabets of L1 and L2. Similarity of the orthographic backgrounds of L1 and L2 can facilitate reading in the L2 (Hamada & Koda 2008). The text can be “hard to read” if it e.g. contains a great number of foreign, loan or low-frequency words, has unusual syntax, or if it is not coherent (see e.g. Glushko 1981; Lehtonen & Heikkinen 1981, 328-329; Akamatsu 2005). Function words are read faster than content words, and also the print quality of the text affects reading speed (Just & Carpenter 1987, 437, 458). In my own pilot study (Ullakonoja 2007c), hesitation and repairs were found even in the native speaker’s material. It can be concluded that hesitations and repairs are natural and that the task is not simple for native speakers either. The reading process itself affects some of the parameters I have measured, e.g. pausing resulting from hesitation, speech rate and fluency. However, it is necessary to remember that all my subjects underwent the same reading task, belonged to the same age group, and all had the same L1 and L2.

In summary, the literature review in this chapter revealed several tendencies relevant to the analysis of L2 reading aloud fluency. Phonetic analysis provides explanations regarding the acoustic features of speech that make it sound fluent or disfluent. L2 acquisition studies indicate that factors such as the length of stay and age of acquisition can be predictors of language skills’ improvement. Psycholinguistic approaches show, on the other hand, how to explain the processes of reading in L2 and the factors that influence reading rate.

## **4 SUMMARY OF THE MAIN FINDINGS**

This chapter will reflect and summarize the results of the three studies presented here. The studies all focused on the topic of L2 fluency. First, it needs to be emphasised that fluency has been defined as fluent reading aloud (see section 3.1). Therefore, the results cannot be directly applied to spontaneous conversation, because it involves other processes than simply transforming text into oral production. The research questions were presented above (p. 17-18). In a nutshell, the aim of the studies was to find out, firstly, if (and how) L2 fluency of the students develops during their stay in Russia and, secondly, whether pausing and speech rate can be said to be correlates of fluency.

As mentioned above, the definition of the term fluency was discussed in subsection 3.1 in more detail. In this study it can be reformulated as follows: read-aloud speech is considered fluent if it is spoken at a regular rate and if it has pauses mostly at (phrasal, clause, sentence or paragraph) boundaries. Fluent speech does not contain excessive amounts of pauses, and the reading rate can sometimes slow down and fasten again, but the listener perceives it as having a somewhat regular rhythm. The study did not define fluency in terms of grammatical accuracy or lexical skills of the

learner, because it dealt with read-aloud material. Pronunciation accuracy was not taken into the account either. Nevertheless, the potential influence of SA on speech needs to be pointed out: SA has possibly made the students speak faster and with less pauses, but also with less pronunciation accuracy. For example, Walsh (1994, 51-52) has proposed that SA makes students speak faster but also with more errors in grammar, syntax, vocabulary and even pronunciation.

In the studies reported here, I investigated the fluency improvement of L2 learners and attempted to show that pausing and speech and articulation rate can be used to characterise fluency of a speech sample. Study I consisted of two sub-studies: teachers' evaluation of fluency, and acoustic analysis of pausing. It also discussed the relationship between the two. Study II examined speech and articulation rate which were measured both in phonetic words per second and syllables per second. Furthermore, it studied their relationship with the fluency ratings obtained in Study I. It also addressed the question of whether speech and articulation rate were speaker specific and/or language specific. Study III recalculated the fluency ratings of Study I using normalisation, as well as investigated the students' self-assessment in relation with the fluency ratings.

## **4.1 Pausing**

The results on pausing were discussed in Study I on the basis of the fluent-disfluent-pause classification (p. 55). First, Study I showed that fluent speakers had in total less pauses in their speech than speakers who were evaluated as disfluent. The total mean pause frequency of the speakers as a group decreased as the amount of experience increased. Speakers had on average 12.8 pauses before the stay, 11.7 in the middle of the stay, and 11.0 pauses after the stay. Disfluent pause frequency decreased more than that of the fluent ones, by over 50% during the stay. The

majority of the speakers (9/12) had less disfluent pauses after the stay in Russia than before it (Table 1, Study I). Also inter-speaker differences in pause frequency were found, which supports the findings of e.g. Fant et al. (2003).

Figure 4 below illustrates the relationship between the frequency of fluent pauses and disfluent pauses of each speaker at each recording session compared with the mean fluency rating. Each mark represents one speech sample, in other words, there are three dots per speaker (one per each recording session). The figure confirms that there was a correlation between the frequency of both pause types and fluency ratings (the values of the correlation coefficients and statistical significances are reported in Study I). To look at the results on the individual level (Figure 1 & Table 1, Study I), the least fluent speakers (Fi2, Fi10 and Fi12) prior to the stay also had the most (6) disfluent pauses. Interestingly, the total absence of disfluent pauses did not, on the other hand, result in remarkably high fluency ratings. For example, speaker Fi6 had no disfluent pauses before the stay, but was still rated average in fluency (fluency rating = 2.9). Similarly, speaker Fi11 in the middle of the stay (fluency rating = 3.2) and speaker Fi7 following the stay (fluency rating = 3.1) did not stand out as having very high fluency ratings. However, other speakers with no disfluent pauses have received a fairly high fluency rating.

Second, the analysis of pause duration showed that on average the speakers had shorter pauses following the stay than before it. When the results on pause duration of Study I were compared to Volskaya's (2004) results of L1 speakers, the students' pauses appeared to be longer. This can be due to a slower speech rate of L2 speakers, but also to the fact that in Volskaya's (2004) study only pauses that were shorter than 250 ms were measured. In Paananen-Porkka's (2007, 240) study students' ratio of pausing time in spontaneous speech varied a lot between speakers: from 26% to 57% in L2 English. To compare, my results of read-aloud speech in Study I (Table 2) showed that my students spent a lot less time in pausing (range from 6% to 34%). The results are not entirely comparable, however, as I have made a distinction between fluent and disfluent pauses, which Paananen-Porkka has not.

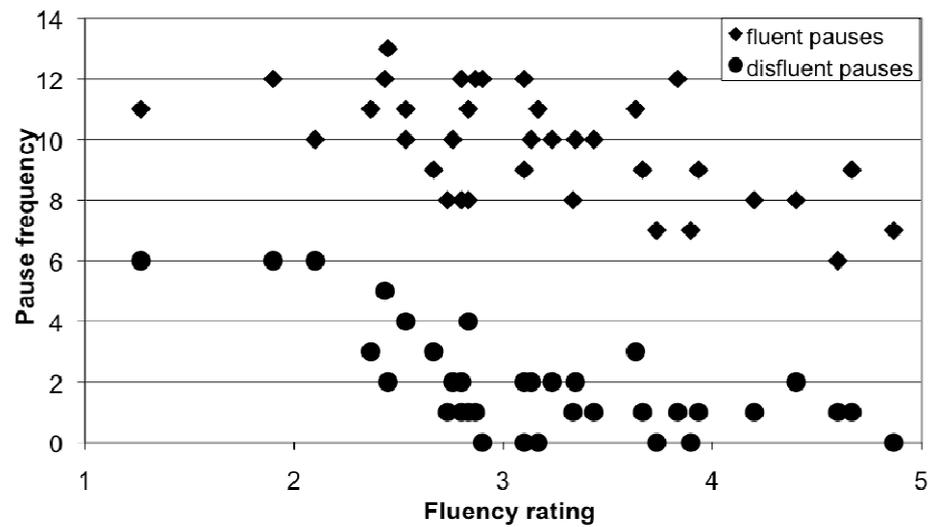


Figure 4. The relationship between the pause frequency and mean fluency rating of the samples.

When the two pause categories were compared for duration, a relationship between the pause type and duration was found: if learners' fluent pauses were long, disfluent pauses tended to be long as well and vice versa. It should be underlined that the pause classification adopted here was based on perceived pauses, hence, even very short disfluent pauses were easily detected causing an interruption of the speech flow (e.g. in the middle of a sentence) whereas very short fluent pauses may have gone unnoticed. On one hand, it is logical that a speaker would have a similar pause duration irrespective of the pause type as pause duration is somewhat related to speech rate. The majority of the speakers had the smallest relative pause duration in the recordings done in the middle of the stay. This may be due to e.g. a faster speech rate, which they have become used to using when in Russia.

Apart from pauses, Study I also focused briefly on other disfluency features than pauses. First, I studied pause placement<sup>20</sup>, and was able to define the typical places for a disfluent pause. Interestingly, there were three places where disfluent pauses occurred frequently (see Study I, table 3). However, the reasons for pausing at these

<sup>20</sup> I use the term pause placement, by which I mean the positions of the pauses in the utterance (also the term pause distribution has been used).

places remained unclear. These constructions did not contain rare, long lexical items that would have been difficult to articulate (these were seen in previous studies to be possible reasons for disfluencies). There was no line feed either in the original texts at these places, which could have explained the pausing. The last place (C, Table 3, Study I) is the most surprising one because it is just before the end of the turn in a very commonly used construction *chasov* (pause) *v devyat'*,<sup>21</sup>. In addition, I calculated the frequency of repairs and repetitions in order to find the possible “disfluency clusters” (as also Riggenbach 2001 has shown) that gave an impression of disfluency. In each recording session at least the two least fluent subjects had the most “disfluency clusters”.

## 4.2 Speech and articulation rate

When analysing speech and articulation rate in Study II, the main finding was that the majority of the students increased their L2 speech and articulation rates during the 3.5-month-stay in Russia statistically significantly. At the same time their perceived fluency increased. This clearly shows that the students benefited from their stay in Russia in that their L2 reading aloud became faster and more fluent.

My results of speech and articulation rate (Study II) can be compared to those of other researchers. As can be seen from Table 10 below, the speech and articulation rates in L2 were higher in my Study II than in Raupach’s (1980) and Paananen-Porkka’s (2007, 280) studies. However, the results are not entirely comparable as the others studied spontaneous speech without the SA context, and had a smaller sample size. Paananen-Porkka’s values presented in the Table 10 have been recalculated on the basis of the values from each speaker in her study.

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<sup>21</sup> In English: nine o’clock.

Speaker	Speech rate		Articulation rate	
Raupach: L1= French L2= German (n=5)	95.4 syll/min = 1.59 syll/sec		2.26 syll/sec	
Raupach: L1= German L2= French (n=5)	99.7 syll/min = 1.66 syll/sec		2.98 syll/sec	
Paananen-Porkka: L1=Finnish, L2=English (n=6)	2.86 syll/sec		3.85 syll/sec	
<b>Ullakonoja: L1= Finnish L2=Russian (n=12)</b>	<b>Before the stay: 3.46 syll/s</b>	<b>After the stay: 3.93 syll/s</b>	<b>Before the stay: 4.58 syll/s</b>	<b>After the stay: 5.00 syll/s</b>

Table 10. Comparison of mean L2 speech and articulation rates of Paananen-Porkka's (2007) and Raupach's (1980) studies with results from Study II in syllables/second.

Table 11 presents the experimental data on L2 speech and articulation rates in SA context from different studies (Möhle 1984, 30; Lennon 1990, 404; Towell et al. 1996, 98; Freed, Segalowitz & Dewey 2004; Segalowitz & Freed 2004, 195).

Speaker	Speech rate before the stay	Speech rate after the stay	Articulation rate before the stay	Articulation rate after the stay
Freed: L1=English L2=French (n=8)	106.78 WPM = 1.78 words/sec	113.33 WPM = 1.89 words/sec	-	-
Lennon: L1=German L2=English (n=4)	84 WPM = 1.4 words/sec	97 WPM = 1.62 words/sec	96 WPM = 1.6 words/sec	110 WPM = 1.83 words/sec
Möhle: L1=French L2=German (n=3)	120.36 syll/min = 2.01 syll/sec	120.18 syll/min = 2.0 syll/sec	3.22 syll/s	3.78 syll/s
Möhle: L1=German L2=French (n=3)	175.18 syll/min = 2.92 syll/sec	201.26 syll/min = 3.35 syll/sec	4.50 syll/sec	4.85 syll/sec
Segalowitz: L1=English L2=Spanish (SA group) (n=22)	55.63 WPM = 0.93 words/sec	80.63 WPM = 1.34 words/sec	-	-
Segalowitz: L1=English L2=Spanish (at home group) (n=18)	51.07 WPM = 0.85 words/sec	52.51 WPM = 0.88 words/sec	-	-
Towell et al.: L1=English, L2=French (n=12)	136.61 syll/min = 2.28 syll/sec	156.88 syll/min = 2.61 syll/sec	3.85 syll/sec	4.17 syll/sec
<b>Ullakonoja: L1= Finnish L2=Russian n=12)</b>	<b>3.46 syll/sec 1.61 PW/sec</b>	<b>3.93 syll/sec 1.79 PW/sec</b>	<b>4.58 syll/sec 2.12 PW/sec</b>	<b>5.00 syll/sec 2.28 PW/sec</b>

Table 11. Comparison of mean L2 speech rates and articulation rates in SA context of Freed, Segalowitz & Dewey's (2004), Lennon's (1990), Möhle's (1984), Segalowitz & Freed's (2004) and Towell et al.'s (1996) studies with results from Study II in syllables/second and phonetic words/second.

The comparison needs to be interpreted with some caution, since the other studies are on spontaneous speech which is likely to be slower. Lennon's values presented in the table have been calculated on the basis of the mean values of each speaker he has given. My results have been presented without making the difference between the two groups discussed in Study II (host-family group and dormitories group). The data in Table 11 shows that either speech or articulation rate, or both, were faster following the stay than prior to it. In Study II both were on average faster after the stay. Also, in the individual level, the majority (8/12) of the students had a faster speech and articulation rate following the stay than prior to it.

Möhle (1984) argues, that an increase in the students' speech rate during a semester abroad could be a result of the broadening of their lexical knowledge, which also offers a possible explanation to the fastening speech rate of my students during their study abroad. If the vocabulary size of the students had expanded during the semester, they would have recognised more words in the texts of the reading task and hence, they would have read the familiar words faster than unfamiliar ones. If we compare my L2 results with the results obtained by Volskaya (2009, 137) from Russian L1 speakers, my students were, not surprisingly, a lot slower than native speakers. In native Russian speech, the speech rate was 6.5 syllables/sec in read-aloud speech and 6.2 syllables/sec in spontaneous speech.

Next, Table 12 below presents an overview of the results of speech and articulation rate in L1 Finnish speech.

	Speech rate	Articulation rate
Paananen-Porkka: L1=Finnish, spontaneous speech (n=6) monologue	5.11 syll/sec	6.21 syll/sec
Sallinen-Kuparinen: L1=Finnish, vocational school students', read-aloud speech (n=30 <sup>22?</sup> ) monologue	289 syll/min = 4.82 syll/sec	5.9 syll/sec
Sallinen-Kuparinen: L1=Finnish, high school students' read-aloud speech (n=30 <sup>20?</sup> ) monologue	319 syll/min = 5.32 syll/sec	6.7 syll/sec
Moore: L1=Finnish, TV broadcasters' spontaneous speech (n=1), monologue	3.64 syll/sec	5.20 syll/sec
Moore: L1=Finnish, Radio announcer's spontaneous speech (n=1), monologue	5.63 syll/sec	6.48 syll/sec
Lehtonen: L1=Finnish, read-aloud speech (n=5) monologue	330 syll/min = 5.5 syll/s	400 syll/min = 6.67 syll/sec
Lehtonen: L1=Finnish, spontaneous speech (n=5) monologue	196 syll/min = 3.27 syll/sec	317 syll/min = 5.28 syll/sec
<b>Ullakonoja: L1=Finnish, read-aloud speech (n=12) dialogue</b>	<b>5.77 syll/sec</b>	<b>6.63 syll/sec</b>

Table 12. Comparison of mean speech rates and articulation rates in L1 Finnish of Lehtonen's (1978), Moore's (1990) (Mo), Paananen-Porkka's (2007) and Sallinen-Kuparinen's study (1979) with results from Study II in syllables/second.

As shown in Table 12, the results of different studies on speech rates in L1 Finnish speech are quite different. This inconsistency may be due to rather different data of the studies and, on the other hand, on a small number of informants in some. In read-aloud speech the rates from previous studies are less than 1 syllable/s slower than mine. My study is the only one with a dialogue setting, which may have influenced the speech rate so that the speaker had time to pause and inhale while the other speaker was speaking. In a monologue read-aloud or spontaneous setting, a speaker needs to pause for physiological reasons more than in a dialogue. When looking at articulation rates there is less variation. One could conclude that a typical articulation rate for Finnish is a bit over 6 syllables/second. When comparing the results from

<sup>22</sup> Sallinen-Kuparinen's total number of students was 60, but she does not give information about how many students were in each group.

Study II with Lehtonen's (1978) figures, it was found that the L1 Finnish reading rate was similar when measured in syllables/s, but faster in my study when measured in phonetic words/s.

Finally, Study II also addressed the question of whether speech and articulation rate are language or speaker specific. Consistently with Towell et al. (1996, 96), strong evidence was found that the speech and articulation rates in L1 Finnish of each speaker were related to their speech and articulation rates in L2 Russian. Therefore, it can be concluded that speech and articulation rate were speaker specific in this sample (n=12). In other words, speakers who spoke slowly in L1 were likely to speak slowly in L2, too. On the basis of earlier research (e.g. Paananen-Porkka 2007), an anticipated finding was that L1 was spoken faster than L2.

### **4.3 Fluency**

As could be hypothesized, it was found in Studies I and III that the majority of the speakers improved their perceived reading fluency during their SA experience. Figure 1 in Study I shows this clearly. However, the development was not as systematic as in Freed et. al.'s (1995) study in which the weaker students developed in their fluency more than the better ones. One slightly unanticipated finding in Study I was that there were two students (Fi1, Fi4) whose reading fluency declined progressively during SA (Study I, Figure 1). One possible reason for this is that they had become more aware of their pronunciation (and thus started monitoring it). As a result they possibly made more self-corrections. Thus, their speech would have had more repairs and more disfluent pauses (after the stay more students had repairs in their speech than before the stay). Hence, it can be argued that an intensive focus on correct pronunciation may result in more disfluencies (such as self-repairs and hesitations), and thus in lower fluency ratings.

In Study I it was found that speech containing a high number of pauses was perceived as less fluent than speech with few pauses. Particularly a high number of disfluent pauses (that often occurred together with repairs, repetitions and other hesitation phenomena) was perceived less fluent. Interestingly though, as already mentioned, there were 5 samples with no disfluent pauses that did not, however, receive a very high fluency rating. Therefore, it cannot be said that speech with no disfluent pauses would always be perceived as fluent. This indicates that pause frequency is not the only feature contributing to the perception of speech as fluent. Furthermore, it was found that the more fluent the speaker was estimated, the shorter her disfluent pause duration was (both in absolute and relative values).

Consistently with Towell et al. (1996, 103), the increased speech rate was found to be more significant than articulation rate in determining L2 fluency of the speakers in Study II. It was concluded that faster L2 speech and articulation rate are evaluated more fluent than slower. It was also pointed out in the literature review that native speakers generally react to a faster L2 speech rate more positively (Munro & Derwing 1998; 2001, 464; Paananen-Porkka 2007, 340), which supports the idea that L2 speakers should aim to speak faster.

In Study III the results concerning the teachers' ratings of the students' fluency obtained in Study I were recalculated using z-scores normalisation because that made the judges' ratings more comparable with each other. The recalculation confirmed the earlier findings: the majority of the students were estimated as significantly more fluent readers following the stay than prior to it. However, unlike in Study I, only one student showed a significant ( $p=0.0001$ ) improvement in teacher-rated fluency after her stay than in the middle of it. Otherwise, the fluency results were consistent with those of Study I. Study III also examined the students' self-assessments comparing them with their fluency ratings. The main finding was that the students who said that their pronunciation had improved and who showed interest in learning and practising were judged on average as more fluent readers.

To sum up the results of Studies I and III on fluency, the interesting finding was that all the students evaluated themselves to be more fluent after their stay than prior to it (Studies I & III). It implies that the students themselves felt SA as a way of improving their fluency. As also the teachers' ratings showed a significant improvement in fluency for the majority of the students, the studies corroborate the earlier findings that there indeed is a relationship between L2 fluency and SA.

I agree with Pellegrino (1998) that it is perhaps impossible to generalize students' self-perceptions as they reflect individual experiences. Self-evaluations should be interpreted with some caution because it has often been found that students are likely to evaluate their language development positively being content with the improvement of their language skills during their stay abroad (Huhta 1994; Pellegrino 1998). However, learners' self-perceptions can also be guided by the classroom-based idea of grammatical correctness (rather than e.g. communicative competence). Hence, they can perceive themselves as unsuccessful language users in the study abroad context. This may lead to benefiting less and less from opportunities to use the L2. (Pellegrino 1998.) However, the inter-individual differences may be summarized in what Segalowitz et al. (2004, 14) conclude "The more the adult learner is able to communicate in the target language the more he or she will do so. As a result, the very act of communicating will further enhance learning, leading to more communication, which should promote further learning".

#### **4.4 Host family vs. dormitories**

In Studies I and II the students were compared also according to their living conditions. The students who lived in the dormitories for foreign students were compared to those who had been living with a Russian host family. In Study I it was found that the fluency ratings of the host family group were not better than those of

the dormitories group. The finding is consistent with a study by Segalowitz & Freed (2004). However, I did not compare pausing behaviour between the two groups.

When studying speech and articulation rate, the comparison of the students who stayed with a host family and students who resided in the dormitories showed that the dormitories group was already faster prior to the stay. Still, the results in Study II showed that in fact the students in the dormitories increased their speech and articulation rates more than the students living with host families. When the two groups were compared for their Russian speech and articulation rate in general (without taking into the account the stage of stay), it was found that the dormitories group was statistically significantly faster in speech and articulation rate both in phonetic words and syllables per second ( $p < 0.05$ ). However, because of the small sample size, it can also be a coincidence that the slower students resided with the host families.

To prove that the place of residence has some impact on the fluency skills of the speakers, more subjects would be needed. Still, my results can be compared to those achieved by Segalowitz & Freed (2004) who compared the learning of L2 Spanish oral skills in two contexts: at home and study abroad. They found that SA context helped to develop oral fluency significantly. Consistently with my Study I, they found no proof of host family influence on the oral performance of the students. They speculated that possible reasons for this might be e.g. that the communication of the students with the family was not very extensive.

## 5 DISCUSSION

To summarise, I will compare the results of Study I and II with the fluency ratings. Lennon (1990, 414) argues that inter-speaker differences are mainly shown in the differences in pausing rather than differences in articulation rate. He proposes that for acquiring fluency it is the pause placement, pause duration and frequency of the pauses that play a crucial role. The results of Study II can be seen as partly supportive of this finding as it was shown that speech rate (that includes pauses) was more important than articulation rate in determining the fluency of the speech samples. As Table 13 shows it was, however, pause frequency that flagged highest correlations with the fluency rating (Ullakonoja 2008b). The difference between the correlation of pause frequency with fluency rating and that of speech rate with fluency rating is nevertheless very small.

In Russia the students have the possibility of getting a wide variety of native speaker input in L2. However, most students might still be getting most of their L2 input from teachers (this would be the case of a student living together with other Finns and not watching TV etc.). Teachers are, of course, native speaker models, but as has been suggested by Hatch (1983, 154-159), native speakers tend to speak to foreigners

at a slower rate, and using more pauses, more intonational variation and greater intensity than they would when speaking to another native speaker. It is possible that this is also the case with teachers who also often slow down their speech rate and make longer pauses when addressing L2 students.

		Mean perceived fluency rating		
		Pearson Correlation	p	n
Pause frequency		-0.742	0.001	36
Articulation rate	Phonetic words/s.	0.484	0.003	36
	Syllables/s.	0.416	0.012	36
Speech rate	Phonetic words/s.	0.722	<0.0001	36
	Syllables/s.	0.697	<0.0001	36

Table 13 Correlation of pause frequency, articulation rate and speech rate with the perceived fluency rating (Ullakonoja 2008b).

My findings strongly support the claims that pausing as well as speech and articulation rates are important in determining whether L2 learners' speech is perceived as fluent or not. The results contradict Lehtonen's (1978, 56) findings in the experiment where "a faster rate of speech or a smaller number of pauses was not felt to be more fluent" and in which pausing in fluent speech (in L1 Finnish or L1 English) did not follow a certain pattern. Lehtonen (1978) argued that fluency is such a complex concept – involving also the linguistic content and communicative context – that it is not possible to define it merely by experimental phonetic means. However, as my results seem to suggest, phonetic factors are an important element of how fluency is perceived and evaluated. It is possible to measure prosodic factors, and they seem important in defining fluency, even if other factors (lexical, grammatical, social etc.) are ignored. For example, as previously mentioned, Lehtonen (1981) implied that pause duration might be an indicator of fluency because it was shorter in fluent readers' read-aloud speech. My results confirm this finding (see Table 13).

As was suggested in section 3.3, people may read words that are unfamiliar to them slower than words that are familiar and also, L2 knowledge seems to predict L2 reading skills (here the question was not about reading aloud). Bearing this in mind, it may be possible that the speech rate of a learner over a longer stretch of speech reflects also the size of his lexicon. Would then the slower speakers of my study also be those whose Russian vocabulary is not as large as that of the faster speakers? If so, would that also imply that their Russian skills are poorer, if the size of the vocabulary is one measure of language skills in general? If so, is what I ended up measuring as fluency, still, some way affected by the language proficiency of a student, which I did not measure here?

In a contrastive study that Grosjean & Deschamps (1975) carried out with L1 speakers of English and French, the speech rates and articulation rates of the two languages were found to be very similar in a spontaneous interview setting. However, the two languages differed in pausing: in English the pauses were shorter but more frequent than in French resulting in similar total pausing time. The authors concluded that the reason for this was in the different syntactic and morphological structure of the two languages. This is the reason that makes my cross-language comparison of L1 Finnish and L2 Russian difficult. Finnish and Russian being typologically so different, is it possible to say what the differences found really reflect: differences between the languages, speakers, language learning, L1 or L2 transfer?

To summarise, the overall findings (Studies I, II & III) showed that the study abroad context provides a learning context that is beneficial in many ways to adult L2 learners. When they are surrounded by the L2, I believe that they become more confident in using it (see also Segalowitz et al. 2004, 14) and, hence, also more fluent. In the studies reported here, the measurement of prosodic characteristics (namely pausing and speech rate) showed that fluency increased during the study abroad. It was also found that the students themselves felt that they increased their

fluency during the study abroad. Also the teachers' perceptions confirmed this finding when they evaluated samples of students' speech.

## **5.1 Strengths, limitations and possibilities of future research**

The limitations of the study are similar to those in experimental phonetic research in general: can the results obtained in a laboratory setting be applied into "real life" and do they really reflect "real" phenomena present in "real" speech outside the laboratory? Speech performance can be affected by multiple factors, such as tension or unfamiliarity with the recording situation. It is possible, also, that especially non-native participants monitor their speech in such a situation, and this might make their speech too controlled and thus, disfluent. (Lehtonen 1981, 331; Levelt 1989, 460-463.) The advantages of the research setting are, however, that the students were not graded for the task and it was not a part of any course. As I myself did the recordings, there should not have been any elements of student-teacher interaction in the task.

A potential limitation of the study is that only the author (a non-native speaker) conducted the perceptual pause detection and segmentation of phonetic words. The perceptual analysis, however, was verified acoustically. As described in Chapter 2 *Experimental design, material and methods*, the perceptual pause detection and acoustic analysis were completed prior to the fluency ratings and, therefore, could not affect the perceptual pause classification. Furthermore, the similarity in the fluency ratings of the teachers shows that there are indeed some common features in what is perceived as fluent reading aloud. To sum up, all this seems to indicate that the measurements for fluency can be justified.

In the fluency evaluation task, the samples were presented to the listeners in the same randomized order. This was done to prevent the impact of the order of the stimuli on the ratings. However, it is possible that there was some learning or accustoming effect, so that the teachers might have rated the last speakers differently from the first ones. It is also possible that they did not dare to give too good ratings in the beginning of the task because they could not know a priori the range of the speakers' fluency, and perhaps were more likely to "save their best rates" for later. Hence, it could have been possible to improve the reliability of the fluency evaluations by giving the teachers some very fluent and very disfluent samples to listen to prior to listening to the samples to be evaluated, as e.g. Cucchiarini (2002) has done. This would have given the judges an idea of the general fluency level and the range of the speech samples. As the listeners were not given any definition of fluency, they may have used different criteria for what is 'fluent'. On the other hand, if relying on Freed et al.'s results (2003) who established a correlation of speech rate, pausing, disfluency clusters and fluent speech runs with the raters' perceptions of oral fluency, it is safe to assume that the judges used similar enough criteria in their evaluation.

Next, I will briefly discuss the reliability of the fluency ratings. Firstly, there were some missing values, since three teachers had not rated all the stimuli (had missed out only one or two stimuli). As many as 23 of 30 judges had used the full evaluation scale (1–5). Table 14 below shows the mean ratings of the judges (the "strictness" of their ratings), and the standard deviation that shows the variation of each judge's ratings. The interjudge reliability was evaluated by determining the reliability coefficient (the value of Cronbach's alpha), which yielded 0.92. Hence, the reliability of the judgements is high, being over 0.8 (see e.g. Bryman & Cramer 2001, 62; Cucchiarini et al. 2002). It is hence possible to conclude that the fluency evaluation task was a reliable instrument in measuring L2 read-aloud fluency. Each judge was asked to rate the stimuli only once. However, a better reliability still could have been attained by asking the judges to do the ratings twice (with some time in between) and then comparing the ratings of each judge.

	Mean	Std. Deviation
Judge 001	3.6	0.9
Judge 002	2.9	1.0
Judge 003	3.0	1.0
Judge 004	2.9	0.9
Judge 005	3.0	1.2
Judge 006	2.8	1.1
Judge 007	3.2	1.3
Judge 008	3.5	0.8
Judge 009	3.4	1.2
Judge 010	4.2	0.8
Judge 011	3.3	0.8
Judge 012	2.9	0.9
Judge 013	3.4	1.2
Judge 014	3.1	1.2
Judge 015	2.8	1.0
Judge 016	3.8	0.9
Judge 017	3.0	1.2
Judge 018	2.9	1.2
Judge 019	3.1	1.0
Judge 020	3.4	0.8
Judge 021	3.4	1.2
Judge 022	3.4	1.0
Judge 023	3.4	0.8
Judge 024	3.1	0.9
Judge 025	2.8	1.2
Judge 026	3.2	1.0
Judge 027	3.6	0.8
Judge 028	3.1	1.1
Judge 029	2.6	1.2
Judge 030	2.7	1.0

Table 14. The mean ratings of each judge (scale 1–5: 1=disfluent. 5=very fluent).

In previous studies higher and lower values of Cronbach's alpha of judges' ratings have been found. According to Derwing et al. (2004), the interjudge agreement can be quite high (Cronbach's alpha = 0.95) also for untrained listeners. In contrast, Cucchiari et al. (2002), who studied the oral fluency of L2 Dutch speech that was rated on a 1–10 scale, found that phoneticians' judgements were very reliable (Cronbach's alpha = 0.96), but less trained listeners did not achieve as high reliability ratings (Cronbach's alpha from 0.82 to 0.88). As pointed out by Derwing et al. (2004, 658), the reliability comparison of the studies by Lennon (1990), Freed (1995) and Riggenbach (1991) with Cucchiari et al.'s (2002) is difficult because they do not specify the value of Cronbach's alpha, but have estimated the reliability in different ways (e.g. by counting inter-rater correlations). Given that the ratings of the judges for each sample were fairly similar, it can be concluded that the fluency evaluation task was quite an efficient way of measuring the perceived fluency of the samples.

The SA context itself involves various social and cultural factors that could not be explored here (Wilkinson 1998a; 1998b; Freed, Segalowitz & Dewey 2004). All students went to the same town in Russia at the same stage of their university studies, and a half of them stayed at a host family whereas the rest lived in foreign student dormitories. Obviously, it is impossible to claim that the learning environment or the amount of the L2 input in Russia would have been exactly the same for all participants. However, this study did not aim at covering the actual amount of spoken input of students while abroad. In future, it might be possible to look at written input the students are exposed to (e.g. teaching materials, reading for pleasure) and how it might influence the fluency development. Also the students' activities during the SA could be mapped e.g. by asking them how many hours per day they spend listening to spoken Russian on radio or TV, as e.g. Derwing et al. (2004; 2006) have done, and compare that to the fluency ratings.

Finally, it is also quite likely that the students' performance developed not only because they stayed abroad, but also because of other factors such as e.g. improvement on L2 proficiency, increased self-confidence, increased motivation or familiarisation with Cyrillic text. There is also a possibility that their performance was affected by learning to read the texts in question: after all, they got more practice in reading the texts each time they were recorded. There were about 5 months between the recordings done before the stay and during it, whereas the interval between the last two recordings was only 3 months. Herman's (1985) study could be seen as partly supportive of this claim as she suggests that repeated readings help the students to become more fluent because their reading rate increases.

In previous studies, besides pausing and speech and articulation rate, also intonational features have been mentioned as important qualities of fluent speech (see e.g. Anderson 1990; Wennerstrom 2000; Lauranto 2004). Furthermore, as in Finnish (L1) one can rarely distinguish a statement and a question only by changing its intonation pattern (see e.g. Iivonen 1979), whereas in Russian (L2) this is very common, my next step will be investigating the ways in which Finns produce pitch

patterns in questions in Russian (L2) (see Table 1, p. 9). It would be interesting, also, to compare the fluency ratings obtained in these studies to the performance of intonational patterns of the students. In addition, because Strangert & Gustafson (2008) have found that F0 measurements correlate highly with the listener evaluations of a “good speaker”, the measurements of e.g. F0 range, min, max in my data (Study IV in Table 1, p. 9) could be compared with the fluency ratings.

I agree with Hieke (1984) and Adams (1979) in that the phenomenon of linking can be problematic to L2 learners of Russian as well. In my opinion it is closely related to pausing in that when learners pause at inappropriate places they also fail to link together words that form a structural entity such as a phonetic word, a noun phrase or a verb phrase. For example, as was mentioned previously, a quite popular way in my data of saying *часов в девять* (*chasov v devyat'*<sup>23</sup>) was to pause between the words *часов* and *девять*, even though the words are clearly structurally and semantically related. Hence, I think that especially in read-aloud speech (when we are dealing with pre-planned content), the question is how L2 speakers structure the text they are reading. Do they see it as consisting of separate words (in which case they are also failing to link the words in a way a native speaker would do) or of phrases or a combination of words? This would be one possible direction of the future research.

Other possible directions of further research would be studying other prosodic features such as rhythm, word stress (which is closely related to vowel articulation in Russian), and voicing/unvoicing of consonants, and compare them with the fluency ratings (see e.g. Meister & Meister 2007 for an example of error-analysis of Russian L2 learners of Estonian). As it has been found that natives often characterize non-natives more negatively because of the accent (Anderson 1990, 103), one possible direction of future research would be to investigate how to reduce the foreign accent of the L2 speakers.

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<sup>23</sup> In English: nine o'clock

## 5.2 Implications and conclusions

The implications of my studies to L2 learning are that firstly, we should encourage our students to spend some time in the country where the target language is spoken. Secondly, it seems obvious, that in teaching more attention ought to be paid to pause placement in order to improve the students' fluency. When students are reading a text aloud they are often focusing only on segmental pronunciation, but could simultaneously be developing their pausing skills. I believe that paying attention to pausing would help the students to learn to structure the text better, and hence to understand better what they are reading. The research results will help to develop the teaching of Russian phonetics in Finland, and could enable to create computer-based learning programmes, where the student himself can acquire the target pausing patterns through repetition and practice.

The results of this study can be applied to L2 learners of any language up to a certain extent. However, one should remember that native speakers of Finnish (or a Finno-Ugric language) who are learning Russian (or any Indo-European language), face a different task than learners whose L1 is typologically related to the language they are learning (see e.g. Ringbom 1987, 80; Koda 2007). Without going deeper into the questions of transfer from L1, I agree with for example Ringbom (1987, 112-113) that transfer can also occur from another L2 (most of my subjects have studied 1-2 L2s before Russian), and in this case where the L1 is very different from their L2, perhaps the transfer is even more likely from another L2 than their L1.

Furthermore, in line with the views presented by Anderson (1994, 185), in teaching more attention should be paid to increasing the reading rate of the L2, not at the expense of reading comprehension, but, perhaps, focusing occasionally on the reading rate rather than e.g. reading accuracy (on efficient ways of teaching to improve the reading rate see e.g. Nuttall 1982, 38-41; Jensen 1986; Mahon 1986).

Also, students might also become more fluent when listening to someone read aloud fluently as e.g. Rasinski (2003, 38-40) suggests of L1 learners.

This study is a contribution into examining L2 fluency and its prosodic characteristics. I wish that it can serve as a start of a series of further studies in Russian as the L2 prosody of Finnish students. The three studies presented here hopefully provide some valuable knowledge of reading aloud fluency that I will concisely summarize now with the help of the research questions presented in section 1.3 above.

**Question 1. How do the Finnish FL speakers of Russian develop in read-aloud fluency during the study abroad period? Does the amount of experience (1.5 months vs. 3.5 months) have a significant influence on the development? (Studies I and III)**

Most students were more fluent after the stay than before it. The fluency development was not always linear so that all the students would have developed equally much on the same fluency rating scale. The fluency ratings were different in the middle of the stay and after it. 8/12 students were judged more fluent after the stay than in the middle of it, which seems to indicate that the amount of experience matters.

**Question 2. Do temporal/acoustic variables (such as speech and articulation rate and pausing) correspond with the fluency ratings? (Studies I and II)**

It was found that speech rate, articulation rate, pause frequency and pause duration correlate with the fluency ratings (Table 13, p. 103). Hence, they can all be regarded as correlates of read-aloud fluency perception.

**Question 3. Are speakers thought to be more fluent in their L2 if they have less and shorter pauses and at syntactically appropriate locations? (Study I)**

According to the teachers' evaluations of the students' fluency, the samples with a smaller pause frequency, with shorter pauses and with pauses at syntactical

boundaries were rated more fluent than those with many pauses, long pauses and with pauses that were situated elsewhere than at syntactical boundaries. The results were similar for relative and absolute pause durations.

**Question 4. Are speakers evaluated to be more fluent in their L2 if their speech and/or articulation rate is faster? (Study II)**

The students whose speech and articulation rates (as measured both in phonetic words/second and syllables/second) were faster were rated more fluent than the students with slower rates.

**Question 5. Are speech and/or articulation rate speaker and/or language dependent? (Study II)**

No great inter-speaker differences were found when looking at the development during study abroad. In fact, most speakers were ranked similarly among the group at all three stages of recording. Hence, in this study speech and articulation rate were speaker dependent.

**Question 6. Is there a relationship between speaker's self-assessment and language behaviour in Russia and their fluency rating? (Study III)**

It was found that there is a relationship in a way that the students who paid more attention to pronunciation and tried to get in contact with native speakers were judged by the teachers as more fluent. Furthermore, the students' self-evaluations of their language skills were good: for example those who said that their pronunciation had improved were also judged as more fluent by the teachers.

To sum up the results of the three studies, the results were in line with the expectations and mostly confirmed the results of the earlier studies. It is a cliché to say that more research on L2 prosodic production is needed at the moment. However, I have tried to draw attention to the fact that there is not enough research done, particularly using acoustic methods in SA contexts.

It is very common nowadays for L2 learners to take advantage of the possibilities of SA at some stage of their studies. In fact, from the year 2000 onwards, 20% more Finnish students enter in study abroad programmes each year making it in total over 8,000 students per year (Korkala 2008, 6, 8). In year 2007 only 249 of these students chose to study in Russia, whereas the most popular countries were in Central Europe. Because of its popularity, it is necessary for both L2 learners and their teachers to understand the processes involved in SA better so that students can profit from the opportunity as much as possible.

Hence, the obvious implication of the research presented here is that study in Russia can be strongly recommended to Finnish university students of Russian. Therefore, I would like to end with a quote that summarizes how SA in Russia is a unique opportunity.

“Not only is study in Russia an opportunity to utilize and hone one’s language skills and to immerse oneself in the local culture, but it is also an opportunity to be at the center of a laboratory of political, social, economic, and cultural change. Moreover, the opportunities for foreign students in Russia are greater than ever. Travel within Russia, once highly restricted, is now much more open. Student internships, virtually impossible in the Soviet era, provide yet another opportunity to experience the country more fully than ever before.” (Bova 2000, 149.)

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# APPENDIX 1 – FLUENCY EVALUATION QUESTIONNAIRE

The screenshot shows a Windows Internet Explorer browser window displaying the 'Kuuntelu' (Listening) page on the 'Moniviestin' website. The browser's address bar shows the URL: <http://moniviestin.jyu.fi/ohjelmat/hum/kielet/fonetiikka/kuuntelu>. The website header features the 'Moniviestin' logo and the University of Jyväskylä logo. A navigation menu includes 'Pääsivu', 'Ohjelmat', 'Kokoelmat', 'Info', and 'Palaute'. The main content area is titled 'Fonetiikka' and 'Kuuntelu'. It includes a media player with a progress bar and a 'Testiaani' (Test audio) button. Below the player, there is a section for 'Arviointiaani' (My evaluation). The instructions for the listening exercise are as follows:

**1. Kuuntele ensin "testiaani" klikkaamalla viereistä ruutua ja sitten klikkaamalla kerran kohdasta "testiaani". Sinun pitäisi kuulla один, два, три. Säädä samalla tietokoneesi äänenvoimakkuus sopivalle. Säätö onnistuu ensisijaisesti vasemmalla puolella olevasta kaiuttimen kohdasta hiirellä raahaamalla. Jos tämä ei auta, voit säätää äänet yleensä ohjauspaneelista, valikosta äänet ja äänilaitteet. 2. Kuuntele sen jälkeen "arviointiaani" samalla tavalla. Mene takaisin (toisella selainikkunalla) osoitteeseen <http://survey.cc.jyu.fi/hum/ullakonoja/> ja merkitse arviosi lomakkeelle. Muista painaa lopuksi "send" nappulaa.**

Below the instructions, there is a note about the Flash Player plugin and a 'Historia' (History) link. The browser's status bar at the bottom shows 'Paikallinen intranet' and '100%' zoom level.

## APPENDIX 2 – STUDY I

Ullakonoja, Riikka. 2008. Pausing as an indicator of fluency in the Russian of Finnish learners. In Barbosa, Plínio A. & Madureira, Sandra & Reis, César (eds.) *Proceedings of the Speech Prosody 2008 Conference. Campinas, Brazil*. São Paulo: Editora RG/CNPq. 339-342.

<http://aune.lpl.univ-aix.fr/~sprosig/sp2008/papers/id050.pdf>

# Pausing as an Indicator of Fluency in the Russian of Finnish Learners

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## Abstract

Previous research shows that pausing and disfluencies are common in non-native speech. The aim of this study was to investigate the relationship between fluency and pausing in Russian read-aloud speech of 12 Finnish university students and examine their fluency development during a 3.5-month study-period in Russia. To assess fluency, 30 Russian teachers rated the students' speech samples (on a 1–5 scale). The samples were then analysed perceptually and acoustically for pause frequency, duration and placement. Results show that pausing can be an indicator of foreign language fluency and that most students develop considerably in their Russian read-aloud fluency during their stay in Russia. Hence, when teaching students to read aloud in a foreign language, pausing should be emphasized as a way to become a fluent reader.

## 1. Introduction

Fluency is often mentioned as an aim of foreign language (FL) teaching. It has also been shown in few studies [5], [13] that when FL learners spend some time in the country where the target language is spoken, their speech becomes more fluent. Fluency has been defined in many ways e.g. by the number of pauses, their place and duration; speech rate, rhythm and hesitation [3], [11], [14]. The features of speech that make it fluent are situation and text dependent, and hence, speech with few pauses is not necessarily always perceived as fluent [7], [8]. In this study, fluency is used to refer to the fast, smooth reading aloud. As pause frequency and speech rate have been found to be the most important temporal correlates for read-aloud speech fluency perception [3], pausing is investigated here and speech rate will be discussed in a parallel study [15]. This is a follow-up study that concentrates on learner's speech production, which is not a very common approach in the field of FL prosody.

As shown by a number of previous studies (see e.g. [10], [2], [9]) extensive pausing is typical for non-native speech. Pauses occur together with hesitation, repetition or repair. According to Riggensbach [10] the "chunking together" of disfluencies (several disfluencies in a three word sequence) can be an important indicator of fluency. Pause duration is affected e.g. by the sentence length and pause placement [4].

The purpose of the study was to find out whether speakers are thought to be more fluent in their FL if they have a more native-like pause duration and placement. This article concentrates on the place, duration and frequency of pauses in the learner's speech. The main hypotheses were 1) learners' fluency improves during study abroad experience 2) learners with less pauses and/or shorter pauses are rated to be more fluent in Russian.

## 2. Material

The 12 subjects were 19–24 year-old female undergraduate major students of Russian. They were native Finnish speakers who reported having no hearing or speaking disabilities. Most of them had studied Russian as their 3rd or 4th FL (in Finland it is common to study 3–4 FLs). Half of the students stayed with a Russian host family during their stay in Russia (all of them participated in the same study abroad program) whereas the rest resided in foreign-student dormitories. A student moved from the host family to the dormitories in the middle of her stay. Each student was recorded three times reading the same dialogue with another student: before, during and after the 3.5-month-stay in Russia. Only the longest (and a difficult) turn of the dialogue (6 sentences) was chosen for the analysis. The total duration of analysed read-aloud speech was c. 12 mins. Students' speaking activity with native Russians and fluency self-evaluation was determined with the help of questionnaires.

## 3. Methods

The pauses were segmented in Praat [1] according to the auditory analysis. The perceived pauses were labelled as fluent (juncture) or disfluent (non-juncture) pauses [10], [6]. Pauses occurring at the sentence or phrasal boundary were fluent, whereas others were often disfluent sounding. The traditional classification of silent and filled pauses was not respected here because the latter were scarce in the material and because it was not considered useful in measuring fluency. The common minimum pause duration of 200 ms. was not used either. The pause duration was automatically measured in textgrids with a script. The quantitative analysis and graphical representation of the results was conducted in Excel and the statistical analysis in SPSS. Students' speech was compared with each others in different recording sessions and with the fluency rating each sample received in the fluency evaluation task.

Expert judges, 30 Finnish teachers of Russian as a FL, rated the fluency of the students' speech samples by perception. Teachers were from different age groups and had different amounts of experience in teaching Russian as a FL. They heard the stimuli ( $n = 36$ , each student in each recording session) once in a randomized order and rated the fluency of each sample on a 1–5 scale (1 = very disfluent, 5 = very fluent). Most teachers participated in the experiment by filling out a web-based questionnaire and listening to the sound file on their PC. The rest did the evaluation in a language lab. Teachers were also asked to give a definition of fluency and, after listening, determine the factors hindering fluency.

Thus, each sample received an average fluency measure, which was later compared to the acoustic analysis. The

interjudge reliability was evaluated by determining the reliability coefficient (the value of Cronbach's alpha) which yielded 0.92. Hence, the reliability of the ratings was high and most judges had a similar idea of what is fluent speech. The average rating for all the judges and all the speakers was 3.17 (std = 1.05) which indicates that the judges used more or less the whole scale in their fluency evaluations.

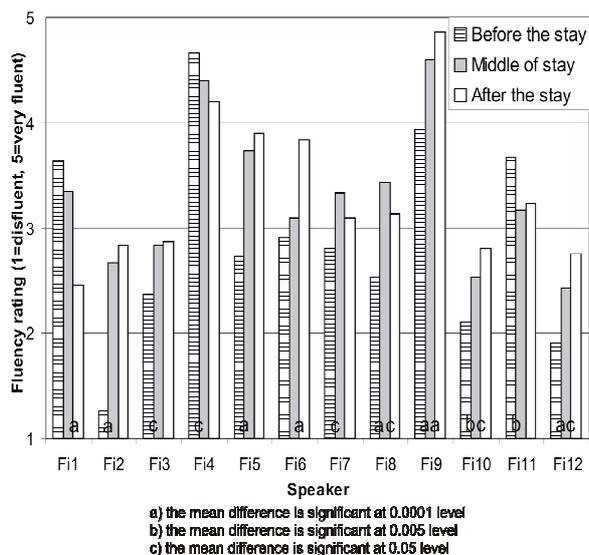
## 4. Results

### 4.1. Fluency perception

In the open questions prior to listening, the teachers defined fluent reading in a FL as speech that has a native-like pronunciation of segments, intonation, word stress and short pauses at correct places (over 10 mentions each). In addition, after listening they mentioned that monotonous speech and faltering made the samples sound disfluent.

As Figure 1 shows, the learners' fluency develops during their stay in Russia. 9/12 learners received a lower fluency rating before their stay in Russia than in the middle of it and 7 of them even improved their rating at the recording after their stay. 9/12 learners had a better fluency rating following their stay in Russia than prior to it.

Figure 1: Fluency of the speakers at different stages of learning



Most (16/24) mean differences were statistically significant at least at the 0.05 level (Figure 1). This means that 8/12 learners improved their fluency significantly by the middle of their stay and 3 of them even improved their fluency significantly after that. When comparing only the fluency ratings before the stay and after it, it was found that the majority (8/12) of the learners received a statistically significantly better fluency rating after their stay than before it ( $p < 0.005$  for all).

### 4.2. Students' self-evaluation and exposure to Russian

When asking the subjects following their stay in Russia whether they could speak and read Russian more fluently now than before their stay, all responded affirmatively. Half of

them (6/12) said that their pronunciation had developed noticeably. Some (5/12) said that they still had trouble producing the intonation in the way they wished. The students had different amounts of contact with Russians during their stay. Half of the students stayed with a host family where naturally they had possibilities to practice oral skills. The majority (11/12) of the students also spoke at least a little with their teachers outside the classroom. Four students said that they did not know any Russians they could talk to in the town in which they were staying. Only 4 students said that they tried actively to get in contact with native speakers. The students who lived with a host family did not get significantly better fluency ratings than those residing in the dormitories. In fact, students living in the dormitories were more fluent in each recording session and they improved as much as those living with a host family.

### 4.3. Pausing

#### 4.3.1. Pause frequency

Firstly, the frequency distribution of the two pause types (fluent and disfluent pauses) was studied. The total number of pauses varied, because sometimes the speakers did not pause e.g. at the phrase boundary (as might traditionally be expected) but indicated the boundary by other prosodic means. Individual differences in pause frequency were found, but on average, the frequency of the fluent pauses remained the same and the frequency of the disfluent pauses decreased as the amount of experience increased (Table 1). 7/12 speakers had less disfluent pauses in the middle of their stay than before it. 8/12 speakers had less disfluent pauses after their stay than in the middle of it. The majority of the learners (9/12) had less disfluent pauses following the stay than prior to it. The distribution of fluent and disfluent pauses in different stages of stay did not differ statistically significantly between the speakers (Pearson's Chi-Square for fluent pauses  $\chi^2(22) = 2.358$ ,  $p = 1.00$ , for disfluent pauses  $\chi^2(22) = 13.901$ ,  $p = 0.905$ ).

Table 1: Frequency of different pause types (fl. = fluent pauses, disfl. = disfluent pauses).

Speaker	Before the stay		Middle of the stay		After the stay	
	fl.	disfl.	fl.	disfl.	fl.	disfl.
Fi1	11	3	10	2	13	2
Fi2	11	6	9	3	8	1
Fi3	11	3	11	4	12	1
Fi4	9	1	8	2	8	1
Fi5	8	1	7	0	7	0
Fi6	12	0	12	2	12	1
Fi7	8	1	8	1	9	0
Fi8	10	4	10	1	10	2
Fi9	9	1	6	1	7	0
Fi10	10	6	11	4	12	2
Fi11	9	1	11	0	10	2
Fi12	12	6	12	5	10	2
Mean	10.0	2.8	9.6	2.1	9.8	1.2

There was a relationship between the frequency of different pause types and fluency ratings. A statistically significant negative linear correlation was found between the

mean fluency rating and frequency of fluent pauses (Pearson's Correlation = -0.586,  $p < 0.001$ ). The correlation existed also between the mean fluency rating and the frequency of disfluent pauses (Spearman's Correlation = -0.657,  $p < 0.001$ ) and between the mean fluency rating and the total frequency of pauses (Pearson's Correlation = -0.742,  $p < 0.001$ ).

#### 4.3.2. Pause duration

Secondly, pause duration (absolute and relative durations) was measured in the two pause types and compared to fluency ratings. Absolute durations of disfluent pauses were in average shorter than fluent pauses (Table 2). A correlation was found between the mean absolute durations of different pause types (Pearson's correlation = 0.426,  $p < 0.05$ ).

The relative durations were calculated by proportioning the duration of each pause with the total duration of the sample. Thus, the number indicates the percentage of pausing in total utterance duration and allows the interspeaker comparison (Table 2). The majority of the speakers have the smallest relative duration of fluent pauses (9/12 speakers) and disfluent pauses (8/12 speakers) in the middle of the stay.

Table 2: Mean duration of different pause types (fl. = fluent pauses, disfl. = disfluent pauses): absolute duration in ms. and relative duration in % of the utterance duration.

Speaker	Before the stay		Middle of the stay		After the stay	
	fl.	disfl.	fl.	disfl.	fl.	disfl.
Fi1 (ms.)	619	364	442	110	467	432
Fi1 (%)	27	16	24	6	21	19
Fi2 (ms.)	416	888	273	118	374	225
Fi2 (%)	16	33	16	7	23	14
Fi3 (ms.)	457	347	318	156	335	192
Fi3 (%)	23	18	18	9	20	11
Fi4 (ms.)	240	211	209	234	296	95
Fi4 (%)	15	13	14	16	20	6
Fi5 (ms.)	420	323	454		453	
Fi5 (%)	23	18	28		30	
Fi6 (ms.)	400		343	138	283	165
Fi6 (%)	21		19	8	17	10
Fi7 (ms.)	346	577	290	113	335	
Fi7 (%)	20	34	18	7	22	
Fi8 (ms.)	333	123	211	161	313	566
Fi8 (%)	18	7	13	10	16	29
Fi9 (ms.)	261	133	292	73	240	
Fi9 (%)	17	9	21	5	17	
Fi10 (ms.)	443	527	355	351	408	183
Fi10 (%)	17	20	19	18	21	9
Fi11 (ms.)	426	455	291		409	677
Fi11 (%)	20	21	15		17	28
Fi12 (ms.)	405	231	318	352	342	266
Fi12 (%)	19	11	16	17	17	14
Mean(ms.)	402	430	317	218	358	352
Mean (%)	20	18	18	12	20	17

When the mean pause durations were compared to the fluency ratings, it was found that the most fluent speakers (Fi4 and Fi9) had a fairly short mean relative disfluent pause duration. Mean absolute durations of both fluent and disfluent

pauses indicated significant negative correlations with the fluency rating (for fluent pauses Pearson's Correlation = -0.393,  $p < 0.05$ ; for disfluent pauses Pearson's Correlation = -0.478,  $p < 0.01$ ). Mean relative durations of disfluent pauses showed a similar relationship (Pearson's Correlation = -0.372,  $p < 0.05$ ), but the fluent pauses did not (Pearson's Correlation = 0.072).

#### 4.3.3. Pause placement

Fluent pauses occurred at phrasal and sentence boundaries whereas disfluent pauses were situated in the middle of the word (when there was hesitation, repetition or repair), in the middle of the noun phrase, or between the verb and its complement.

Table 3: Frequency of disfluent pauses at most common places of the utterance (for all speakers).

Phrase	Before the stay	Middle of the stay	After the stay	Total
A. ona uyezhaet (pause) ni segodnya ...	4	6	0	10
B. yesli khochesh (pause) eyë provodit...	3	1	3	7
C. chasov (pause) v devyat	3	4	1	8

Disfluent pause placement was very much speaker dependent, however there were three places that were common (more than three occurrences) for disfluent pauses (Table 3). It is interesting that in phrases A and C there was considerably fewer disfluent pauses after the stay than before or middle of it. Perhaps this indicates that students had (either through experience or repetition of the same text) learnt not to pause in the middle of these constructions. Overall, there were repairs or repetitions in the speech of 3-4 subjects before the stay and in the middle of it. After the stay however, 7/12 students used repairs. It was found that before the stay it was the 3 least fluent subjects (Fi2, Fi12 and Fi10), in the middle of the stay the two least fluent (Fi12 and Fi10) and after the stay the three least fluent (Fi1, Fi12 and Fi10) that had "disfluency clusters" (several disfluencies in a three word sequence).

## 5. Discussion and Conclusions

As previous studies [5], [13] have shown and as it was hypothesized in this study, the learners' fluency improves during their study abroad experience. As the amount of experience increases, the fluency also improves. There was no systematic development in the way, as Freed [5] has found that weaker students would develop in their fluency more significantly than better ones. Certainly students who were already quite fluent prior to their stay in Russia (Fi4 and Fi9) could not improve as much as the weaker students on this scale, which evaluated all students' fluency. The student who improved her fluency the most was a student (Fi2) who received a very low rating before her stay. Some students (Fi4 and Fi11) achieved lower fluency ratings following their stay than prior to it. The explanations for this decline can be that they have become more conscious of their pronunciation, and hence, are trying to self-correct more, which causes more

repairs and disfluent pauses (after the stay more students used repairs in their speech than before the stay). The other explanation for fluency decline can also be the limited duration of the speech samples. The students may have spoken more fluently in general, but by chance had more disfluencies in this particular sample. The finding that students residing with a host family did not improve their fluency more/were not more fluent than the group living in the dormitories, is consistent with another study [12].

The other hypothesis was that FL speakers using less and/or shorter pauses are rated to be more fluent in Russian. The study showed that the speakers' fluency developed during their study abroad experience, hence they used less disfluent pauses after their stay. Speakers' pause frequency distributions were in fact rather similar, which could have been predicted due to the fact that the subjects were reading the same text. Therefore, speech with multiple pauses was perceived as less fluent than speech with few pauses. Particularly the high number of disfluent pauses (that often occurred together with repairs, repetitions and other hesitation phenomena) created a less fluent impression. Interestingly though, there were 5 samples with no disfluent pauses that did not, however, receive a very high fluency rating (2.9–3.9). Therefore, it cannot be said that speech with no disfluent pauses would always be perceived as very fluent. This indicates that the pause frequency is not the only feature contributing to the perception of speech as fluent.

There was individual variation in pausing (see also e.g. [4]). When comparing the duration results to native speakers, whose mean pause duration was in Volskaya's study [16] 173.5 ms. (range 153–188 ms.), we can see that students' pauses are longer, perhaps because of their slower speech rate. If learners' fluent pauses are short, disfluent pauses tend to be short also and vice versa. It should be noted that even very short disfluent pauses were easily detected in the auditory analysis because they caused interruption of the speech flow (e.g. in the middle of the sentence) whereas very short fluent pauses may go unnoticed. The majority of the speakers had the smallest relative pause duration in the middle of the stay. This may be due to e.g. a faster speech rate, which they have become used to using in Russia. Furthermore, it was found that the more fluent the speaker, the shorter her disfluent pause duration is (both in absolute and relative values).

For pause placement, it can be concluded that it is indeed the "disfluency clusters" (as also Riggenbach [10] has shown) that give an impression of disfluency. This was proven because in each recording session at least the two least fluent subjects had the most "disfluency clusters".

The study can be criticised for only having the author (a non-native speaker) to conduct the perceptual pause detection. The perceptual analysis however, was verified acoustically. The perceptual pause detection and acoustic analysis were completed prior to the fluency ratings and therefore could not affect the perceptual pause classification.

The implications of this study to FL learning are that firstly, we should encourage our students to spend some time in the country where the target language is spoken. Secondly, in teaching more attention ought to be paid to pause placement in order to improve fluency. When students are reading a text aloud they are often focusing on pronunciation and could simultaneously be developing their pausing skills.

In conclusion, this study has shown that fluency improves during the study abroad experience and that pausing is an

indicator of fluency. Further research should consider other prosodic factors, e.g. speech rate and intonation, which potentially influence the fluency evaluations.

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## APPENDIX 3 – STUDY II

Ullakonoja, Riikka. 2009. Speech rate as an indicator of fluency in the Russian of Finnish learners. In O'Dell, Michael & Nieminen, Tommi (eds.) *Fonetiikan päivät 2008 – The Phonetics Symposium 2008*. Tampere Studies in Language, Translation and Culture, Series B. 97-109. <http://tampub.uta.fi/tup/978-951-44-7580-1.pdf>

# Speech rate as an indicator of fluency in the Russian of Finnish learners

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## Abstract

This study focuses on the speech rate development of 12 Finnish university students of Russian during their 3.5-month-study abroad experience. Speech and articulation rates are measured in phonetic words per second and syllables per second in the Russian read-aloud speech of the subjects. This is done at three recordings: prior to, during and following their stay in Russia. The results are compared to their read-aloud Finnish speech. The students are also compared depending on the residence (host-family vs. dormitories) in Russia. The study shows that speech and articulation rates correlate with the evaluated fluency of the speech samples. It was found that speech rate is a better indicator of fluency than articulation rate in non-native read-aloud speech. The results also show that articulation rate in mother tongue (Finnish) and foreign language (Russian) correlate with each other more than speech rate.

**Keywords:** speech rate, fluency, Finnish (L1), Russian (L2)

## 1 Introduction

When asking foreign language learners what aspects they consider important in learning the new language, their answers might include a desire to become fluent in that language. Also in the words of their teacher, in the syllabus and in also the Common European framework of reference for languages (Council for Cultural Co-operation. Education Committee, Modern Languages Division, Strasbourg and Council of Europe 2001) the term fluency and its derivations occur frequently. However, when teaching oral skills, it is perhaps not the fluent features of speech that are in the focus of attention, but instead the grammatical and lexical features or the pronunciation of segments. The purpose of the study is to follow the fluency development of 12 Finnish students of Russian during their 3.5-month-stay in Russia by studying their speech and articulation rates and comparing them to fluency evaluations of teachers.

Fluency can be defined in a number of ways, e.g. by studying pausing (pause frequency, duration and placement), hesitations or tempo (see e.g. Cucchiari *et al.* 2002,

Lauranto 2005, for a review). In this study speech rate is regarded as an important factor of fluency. Cucchiaroni *et al.* (2002) have shown that speech rate and pause frequency are the most important factors in read-aloud speech fluency perception. Also Riggenbach (1991) concluded that the central elements of foreign language (L2) fluency are pausing, speech rate and repairs. Moreover, several researchers (Riggenbach 1991, Freed 1995, Towell *et al.* 1996) have found that as L2 fluency increases, the speech rate increases also. My previous study (Ullakonoja 2008) focused on pausing and its relationship to foreign language fluency. In this paper, the same data is studied, but speech and articulation rates are regarded as acoustic correlates of fluency.

The speech rate (tempo) indicates the total time of a speaker uttering his speech, including pauses whereas the term articulation rate is commonly used to refer to the speech rate without pauses. In this study speech rate refers to reading rate. There are multiple factors affecting the habitual speech rate of individual speakers, and speakers can also vary their speaking rate in different situations (see Trouvain 2003 for a review). In this study the speaking context and content are the same for all speakers at all recording sessions. The speech and articulation rates of a L2 learner are often shown to be slower than these of a native speaker (e.g. Riggenbach 1991, Cenoz 2000, Paananen-Porkka 2007). In addition, learners possibly transfer the prosodic characteristics (e.g. stress) of their mother tongue to the language they are learning:

When the Finn transfers the habit of pronouncing all of the syllables of each word unreduced and manifesting word boundaries with phonetical juncture segments (instead of linking) the rate of his speech is inevitably slower (Lehtonen 1981, p. 331).

A foreign language learner often has the impression that native speakers of the language speak very fast (Abercrombie 1967, p. 96). Also, when native speakers are listening to L2 speech, they would often prefer about 10 % faster speech rate than what the learner is producing (Munro & Derwing 2001, p. 464).

It has been found in several studies (Simoes 1996, Freed *et al.* 2004, Lafford 2004, Trofimovich & Baker 2006) that a good way to improve fluency in L2 is to spend some time in the country where L2 is spoken. For example Segalowitz & Freed (2004) established that the students who studied abroad improved their fluency more (on several measures including speech rate) than the students who stayed at home. Trofimovich & Baker (2006) found that L2 learners could not achieve a native speech rate no matter how long they stayed in the country of the L2 language. On the contrary, a study by Freed *et al.* (2004) suggests that the study abroad did not result in better fluency than an “intensive domestic immersion” context. In their study it was in fact the immersion context that turned out to be the most effective in fluency learning. To summarize, all the studies show the positive influence of L2 context to the fluency development.

There have been a few studies (e.g. Lehtonen 1979, Iivonen *et al.* 1995, Moore & Korpijaakko-Huuhka 1996, Suomi 2007) about speech rate in native Finnish speech. In Russian, pausing and its influence on prosodic phrasing and speech rate have been researched also in spontaneous speech (e.g. Shtern 1988, Volskaya forthcoming). To my knowledge the current paper is the first study investigating non-native speech rate in Russian and comparing it to the speakers' native language, Finnish, and contrasting different stages of learning. The aim of this study was to find out, firstly, whether speakers who are considered fluent speak/read aloud faster than disfluent speakers (both in terms of speech and articulation rates). In other words, speakers with faster speech or/and articulation rates are evaluated more fluent than slower speakers. Secondly, the speech and articulation rates in Finnish (mother tongue, L1) were compared to speech and articulation rate in Russian (L2) to find any similarities between the two.

## 2 Material

12 native Finnish students of Russian read two Russian and one Finnish dialogue in pairs. The reading was recorded in different stages of their university studies: prior to, in the middle of and following their stay in Russia. Only the longest turn of the Russian dialogues and two turns of the Finnish dialogue were analyzed of each student. The Russian material, hence, includes the reading of the same text three times (c. 11 minutes in total), whereas the Finnish material is from the first recording session (c. 3 minutes in total). The students are undergraduate major students of Russian who have studied Russian for 1–10 years prior to university studies. At the beginning of their 2nd year of university studies they participated in a 3.5-month-study-abroad-program. Half of the students (subjects Fi3, Fi4, Fi5, Fi7, Fi9 and Fi10) resided in the dormitories for foreign students during their stay in Russia with the remaining (subjects Fi1, Fi2, Fi6, Fi8, Fi11 and Fi12) living with a host family. The two groups were compared for speech and articulation rates development where applicable.

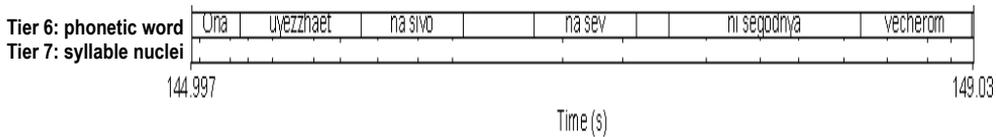
## 3 Methods

For evaluating the perceptual fluency of the speech samples, 30 Russian as a foreign language teachers in Finland were asked to determine the fluency of each sample on 1–5 scale (1 = not fluent, 5 = very fluent). Teachers listened to the samples in a random order without knowing that multiple samples of the same speaker were included. The reliability of the fluency ratings was good (Cronbach's alpha = 0.92). The procedure of the fluency evaluation task is more thoroughly reported in a parallel study (Ullakonoja 2008).

Segmentation and acoustic analysis of the samples were completed in Praat (Boersma & Weenink 2008). The segmentation consisted of annotation of phonetic words and syllables. The term ‘phonetic word’ comes from the Russian research tradition (e.g. Avanesov 1956, p. 61), and usually corresponds to a lexical word, but also to some two word combinations, where e.g. a preposition is pronounced together with the main word and where there is only one lexical stress. For example, in this data the preposition and pronoun *k nam* [knam] (‘to us’) are treated as a phonetic word. The term prosodic word has sometimes been used to describe the same phenomena in Finnish (see e.g. Aho & Yli-Luukko 2005). In Finnish, I decided that lexical words always correspond phonetic words in the annotation. The syllables were determined according to auditory analysis, hence the syllable means a realized syllable. Syllable nuclei were determined and proportioned with time (counting syllable nuclei instead of syllables has been used e.g. by Simoes 1996). In Russian the number of syllables corresponded the number of vowels in the utterance. In Finnish, single vowels were treated similarly as in Russian, as a syllable nucleus. Vowels in the vowel combinations in Finnish were mostly pronounced very closely together and consequently, they were also regarded as one syllable. Sometimes the syllabification in Finnish did not respect the traditional (or textual) syllabification, if e.g. the word *teorioita* (‘theories (partitive case)’) was pronounced [teoriotɑ], it was considered trisyllabic: teo-rio-ta (speaker Fi7). Similarly also the phrase *mä en oo* (‘I’m not’) was pronounced mostly as [mæeno], [mæeo] or [men:o:] and in all cases it only had two syllables. Syllable omission was quite frequent in Finnish, e.g. *no en* [non] (‘well no’, Fi7), *huomenna* [huomen] (‘tomorrow’, Fi7).

The duration of phonetic words was measured with a script in Praat. Phonetic words per second and syllables per second were used for measuring speech and articulation rates (i.e. speech rate without pause time). Both measures were used in order to find out the differences, if any, between them and to make the language comparison as thorough as possible. Based on earlier results of a comparative study of English and Finnish speech rate (Lehtonen 1981), it was expected that the comparison of syllable-timed Finnish and stress-timed Russian would yield different results depending on the measure chosen. Syllables per second would show the influence of hesitation better, since hesitation is often not only one or two syllables but one phonetic word. Also syllables per second as a measure would show mispronunciations (e.g. omission of a syllable, see examples above) better than phonetic words per second. For example, following her stay in Russia speaker Fi12 has much hesitation in her speech and the segmentation gives quite different results depending on the measure chosen (Figure 1). The sentence has 6 phonetic words and 18 syllable nuclei, when the original text only had 5 phonetic words and 13 syllable nuclei.

Microsoft Excel was used for calculating speech rate and articulation rate as well as for the graphical representation of the results. SPSS was used to determine the correlations in the data and their statistical significances. The existence of linear



**Figure 1:** An example of the segmentation of the corpus *Ona uyezhaet ne segodnya vecherom* ‘She will leave not today at night’ into phonetic words.

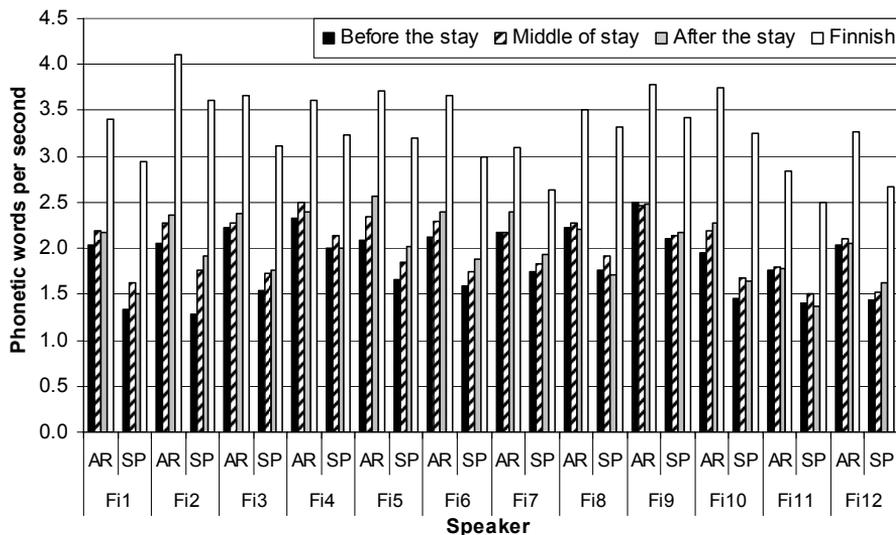
correlation was verified in scatterplot graphs. Paired samples *t*-test was used to find out the differences between different stages of learning. Speech and articulation rates of each sample were compared to its average fluency rating in order to determine the connection between speech and/or articulation rates and fluency. When comparing Finnish (L1) with Russian (L2) the individual variations in speech and articulation rates were minimized by comparing the within group ranking of each student in both languages (i.e. seeing whether the 2nd fastest student in Russian was also the 2nd fastest in Finnish etc.).

## 4 Results

In a previous study (Ullakonoja 2008), it was found that the majority of the speakers (9/12) developed in terms of their read-aloud fluency during the first half of their stay in Russia, and slightly over a half of them (7/12) further increased their perceived fluency during the rest of their stay. Furthermore, the study showed that pausing was closely related to read-aloud fluency in a foreign language.

### 4.1 Speech and articulation rates development during study abroad

In all subjects’ speech the *speech rate* increased during the first half of their 3.5-month stay in Russia (0.2 phonetic words per second or 0.5 syllables per second on average) (Figures 2, 3; SR). Also, the majority of the subjects had a faster speech rate following their stay than before it (0.2 phonetic words per second or 0.5 syllables per second on average). Hence, the speech rate increases as the amount of experience increases. The development in speech rate is statistically significant ( $p < 0.05$ ) when comparing before the stay results with middle of stay and before the stay results with after the stay in both phonetic words and syllables per second. However, the speech rate of some students (4/12 students when measuring phonetic words per second, 6/12 students when measuring syllables per second) decreased slightly between the recordings done in the middle and after their stay. This decline is possibly due to the



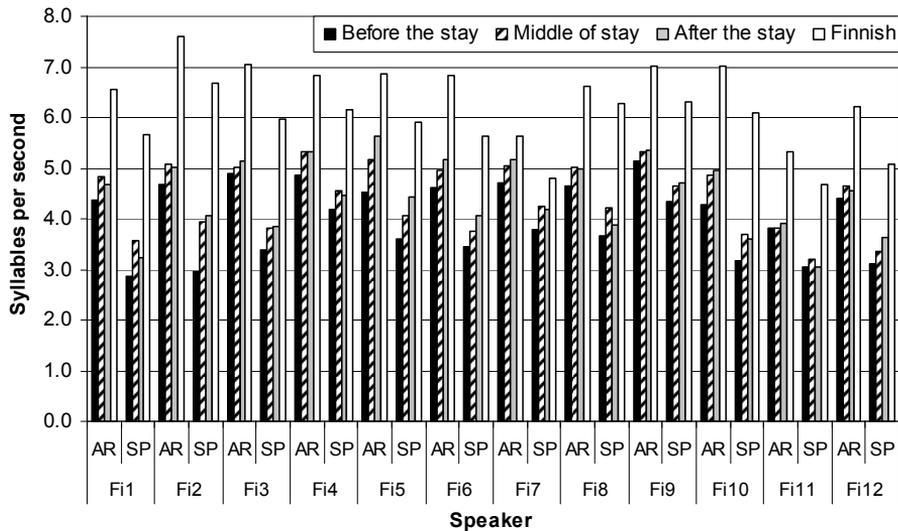
**Figure 2:** Articulation rate (AR) and speech rate (SR) in phonetic words per second in Finnish (L1) and in Russian (L2) at different stages of learning.

fact that their Russian reading was more “activated” while in the Russian speaking context than in the recording done following their stay.<sup>1</sup>

The measurement of *articulation rate* indicated a tendency similar to speech rate (Figures 2, 3; AR). Articulation rate also increased (0.1 phonetic words per second or 0.3 syllables per second on average) during the first half of the stay in the speech of most students (9/12). Between the 2nd and 3rd recordings, the articulation rate further increased for the majority (7/12) of the students (0.1 phonetic words per second on average), but also decreased or remained the same for some subjects. When comparing only the recordings done prior to and following the stay in Russia, it can be seen that the majority (9/12) of the students had a faster articulation rate after their stay than before it (0.2 phonetic words per second on average). The increase in articulation rate was statistically significant ( $p < 0.05$ ) between before the stay and middle of stay results and between before the stay and after the stay results in both phonetic words and syllables per second.

The students were also divided into two groups according to their *residence* in Russia (host family vs. dormitories). The groups were neither balanced nor equal in their speech rate before their stay in Russia. When measuring phonetic words, students residing with a host family did not increase their speech rate on average

<sup>1</sup>The last recording was completed approximately one month after the students returned to Finland from Russia. It is possible that they had somewhat “forgotten” their Russian during that month, because some students had not used Russian at all after returning to Finland.



**Figure 3:** Articulation rate (AR) and speech rate (SR) in syllables per second in Finnish (L1) and in Russian (L2) at different stages of learning.

more than students living in the dormitories (Table 1). Contrary to what might have been expected, in syllables per second the dormitories group increased their speech rate more than the host-family group both during the first half and the whole length of their stay. In fact, the students residing with a host family had on average a slower speech rate at all recording sessions but as they also had a slower rate in Finnish, it seems that this is a random result. Similarly as in speech rate, the results of the articulation rate do not indicate that residence in the host family would make students speak faster during their stay in Russia. As a matter of fact, students residing in the dormitories increased their articulation rate more during the second half of their stay and during their entire stay in Russia (Table 1). The dormitories group might have had a better Russian competence and motivation already before the stay, which might have also been reflected in their speech rate.

## 4.2 Speech and articulation rates and fluency

What then is the relationship between speech or articulation rates and L2 fluency? The comparison of speech and articulation rates with perceived mean fluency rating flagged significant correlations (Table 2). The correlation was stronger between the speech rate and fluency rather than articulation rate and fluency. This indicates that pausing (hesitations and total pause time) also affects the fluency perception. The samples were also studied at the individual level where it was also noted that speech

**Table 1:** Mean speech and articulation rate of the students living with a host family and in the dormitories.

Residence	Before the stay	Middle of stay	After the stay	Finnish
Speech rate: Phonetic words per second				
Host-family	1.47	1.68	1.67	3.01
Dormitories	1.75	1.89	1.92	3.14
Speech rate: Syllables per second				
Host-family	3.18	3.68	3.65	5.66
Dormitories	3.74	4.17	4.20	5.87
Articulation rate: Phonetic words per second				
Host-family	2.04	2.16	2.16	3.47
Dormitories	2.21	2.33	2.41	3.60
Articulation rate: Syllables per second				
Host-family	4.42	4.72	4.72	6.52
Dormitories	4.73	5.12	5.27	6.73

rate correlates more reliably with the perceived fluency rating. For example, it was found that the least fluent (evaluated fluency = 1.3) sample was the speaker Fi2 prior to the stay. She was also the slowest of all speakers when measuring speech rate in phonetic words (Figure 2) and the second slowest when measuring speech rate in syllables (Figure 3). However, her articulation rate was not the slowest; in fact it was just below the average (Figures 2, 3). Correspondingly, the speaker who was evaluated the most fluent was Fi9 following their stay in Russia, who was also found to be the fastest of all speakers in speech rate and among the two fastest in articulation rate (Figures 2, 3).

### 4.3 Speech and articulation rates in Russian (L2) and Finnish (L1)

Next, speech and articulation rates in Finnish (L1) and Russian (L2) were compared. It was found that speech rate in Finnish correlates with the speech rate in Russian (Table 3). The correlation is however stronger between the articulation rate than speech rate in L1 and L2. This suggests that it is the amount of pause time that differs in L1 and L2, because the articulation rate indicates the speed of “uttering sounds,” whereas speech rate includes pauses. As mentioned above, when comparing the in-

**Table 2:** Pearson correlations ( $R$ ) between mean perceived fluency rating and speech and articulation rate.

	N cases	Correlation ( $R$ )	Significance ( $p$ )
Mean perceived fluency rating and articulation rate:			
Phonetic words/s	36	0.484	0.003
Syllables/s	36	0.416	0.012
Mean perceived fluency rating and speech rate:			
Phonetic words/s	36	0.722	< 0.001
Syllables/s	36	0.697	< 0.001

terspeaker performance, the speakers were ranked by speech rate and articulation rate from slowest to fastest in Finnish and at each recording session in Russian in order to be able to normalize the effect of differences in the structure of the two languages.

In Finnish (L1) the differences were small between syllables per second and phonetic words per second in articulation rate and speech rate. An individual speaker almost always received the same ranking position among the speakers in L1. In speech rate, 6/12 speakers received a similar (maximum difference between ratings being 2) rating on average in Russian and in Finnish. In articulation rate 8/12 speakers (when measuring phonetic words) and 7/12 speakers (when measuring syllables) were ranked similarly in Finnish and Russian. This also indicates, that articulation and speech rates in L1 and L2 are related. Hence, speech rate seems to be a speaker-specific rather than a language-specific phenomenon.

## 5 Discussion and Conclusions

Overall, the majority of the students increased their L2 speech and articulation rates during their 3.5-month-stay in Russia statistically significantly as their perceived fluency increased also. This clearly shows that students seem to benefit from their stay in Russia so that they become faster and more fluent in Russian. Consistently with Towell *et al.* (1996, p. 103) the increased speech rate was found to be more significant than articulation rate in determining the L2 fluency of the speakers. When comparing the results with Lehtonen's (1978) study, it was found that the L1 Finnish reading rate was faster in this study when measuring phonetic words, but speech rates in syllables were similar in both studies.

The comparison of the students who stayed with a host family and students who resided in the dormitories was not very yielding as it turned out that the dormitories

**Table 3:** Pearson correlations for articulation rate (AR) and speech rate (SR) in phonetic words/s (pw) and syllables/s (syll) in Russian (L2) and Finnish (L1).

	Russian				Finnish		
	AR pw	AR syll	SR pw	SR syll	AR pw	AR syll	SR pw
Russian							
AR pw	1	0.966**	0.868**	0.861**	0.579**	0.556**	0.577**
AR syll	0.966**	1	0.811**	0.848**	0.586**	0.557**	0.574**
SR pw	0.868**	0.811**	1	0.985**	0.333*	0.282	0.424**
SR syll	0.861**	0.848**	0.985**	1	0.335*	0.279	0.423*
Finnish							
AR pw	0.579**	0.586**	0.333*	0.335*	1	0.985**	0.931**
AR syll	0.556**	0.557**	0.282	0.279	0.985**	1	0.913**
SR pw	0.577**	0.574**	0.424**	0.423*	0.931**	0.913**	1
SR syll	0.559**	0.552**	0.381*	0.376*	0.922**	0.929**	0.989**
N	36	36	36	36	36	36	36

\*\*  $p < 0.001$ , \*  $p < 0.05$

group was already faster prior to the stay. Still, the results showed that in fact the students in the dormitories increased their speech and articulation rates more than the students living with host families. It can also be concluded that the speech and articulation rates in L1 are related to the speech and articulation rates in L2, consistently with Towell *et al.*'s study (1996, p. 96), where a strong correlation in L1 and L2 speech rate was established. Not surprisingly, the results also show that L1 is spoken faster than L2 (see e.g. Paananen-Porkka 2007).

The rhythmical features of speech were not taken into the account in this study. However, it is possible that the speech rate varies across the speech sample in the way as e.g. Deese (1980, pp. 74–76) has found that the majority of the faster sequences of speech occur either at sentence initial or terminal position. This study included recordings in Finnish only at the beginning and it was assumed that speech and articulation rates do not change significantly over time in one's L1 in the same reading task.

It has to be acknowledged that, naturally, there are other factors influencing speech and articulation rates and perceived fluency than the study abroad. Firstly, there is much individual variation in reading rate (even in L1). Also, in a reading task the subject might read very fast without comprehending everything being read (Lehtonen 1981, pp. 328–329; Perfetti 1985, p. 10) The student's motivation and interest are essential in L2 learning, therefore in this study also e.g. the motivation of the student towards Russian oral skills in general might have increased during the

stay in Russia. Furthermore, the findings concern only read-aloud speech in a laboratory setting and the analysis of spontaneous speech in a real communicative situation might have yielded different results.

It can be concluded that faster L2 speech (either in measures of speech or articulation rate) is perceived more fluent than slower L2 speech and that speech and articulation rates come closer to L1 speech and articulation rates as experience with L2 increases. Because native speakers of a language have been found to evaluate fast speech rate in non-native speech more positively than a slower speech rate (Munro & Derwing 1998; 2001, Paananen-Porkka 2007, p. 340), L2 teaching should pay more attention to practising appropriate speech rate in order to improve the communicative competence of the learners.

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## **APPENDIX 4 – STUDY III**

Ullakonoja, Riikka & Dufva, Hannele. 2008. Perception of L2 fluency in study abroad context. *Academic Exchange Quarterly*, Fall 2008 (12) 3. 62-66.

# Perception of L2 Fluency in Study Abroad Context

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## Abstract

This article discusses the results of an on-going study investigating twelve Finnish university students' fluency in three Russian L2 reading aloud tasks administered before, during and after their period of study abroad. Here, we discuss the students' self-evaluated fluency and their responses to questions concerning the development of their pronunciation skills, comparing these with the fluency ratings given to them by Finnish teachers of Russian.

## Introduction

This article deals with perceptions of Finnish university students' fluency in Russian - their foreign language (L2) - and the potential influence on their fluency of a period of study abroad. Aside from being a topic of research, L2 fluency is an explicit goal in foreign language education (e.g. CEF; Common European Framework of Reference for Languages, Council of Europe 2001). Teachers frequently use the term fluency to refer to their students' spoken or read-aloud production. It is also often mentioned in everyday life contexts and non-native speakers are commonly evaluated on the basis their spoken performance, e.g. the degree of foreign accent. The aim of this study is to investigate the possible relationship between evaluations of students' read-aloud fluency by teachers and students' own evaluations. An experimental phonetic analysis of fluency in students' read-aloud speech was previously conducted by the first author (Ullakonoja 2008a).

Here, L2 fluency is defined as perceived ease and fluidity of reading aloud. This would include such factors as an 'appropriate' speech rate, 'smooth' performance and the ability to pause at syntactically correct locations (Riggenbach 1991; Lennon 2000). We discuss perceived fluency both in terms of students' self-evaluations and teachers' ratings. Factors such as the students' language proficiency, linguistic accuracy, production of segmental or prosodic features or their overall oral performance are not discussed. Research seems to support the claim that study abroad increases learners' L2 fluency, sometimes significantly (e.g. Freed 1995; Towell et al. 1996; Freed et al. 2004; Lafford 2004; Trofimovich & Baker 2006). However, there are also studies suggesting that not all learners may equally benefit from it. As Simoes (1996) and Segalowitz & Freed (2004) argue, differences between speakers can be considerable. Further, Freed et al. (2004) showed that students in intensive domestic immersion gained most in terms of fluency when three contexts (at home, immersion and study abroad) were compared.

To sum up, the existing research seems to indicate that although study abroad may not be a sufficient condition for the development of L2 fluency, in most cases it is beneficial, particularly in that it offers the kinds of learning opportunities that may not exist at home or in the conventional domestic classroom setting. Abroad, learners are exposed to L2 in their everyday activities in various institutional, casual and media settings, and are bound to engage in interactions with native speakers. However, the

extensive exposure and the scope of potential communicative situations may not be beneficial to all. Some students may simply feel “overwhelmed by the amount, delivery rate, and complexity of the language that surrounds them” (Segalowitz & Freed 2004: 174).

### **Material and methods**

Twelve Finnish female university students majoring in Russian who participated in the same 3.5 months’ programme of study abroad during their second year of university studies participated in the study. Before university they had studied Russian as a foreign language from one to ten years. During their stay in Russia, they studied Russian for foreigners at Tver State University. Half of the students resided with a host family while the rest were accommodated in dormitories for foreign students. Their oral performance in Russian was recorded three times: prior to, during and following their stay in Russia. The task was to read aloud two dialogues in pairs. The longest continuous turn, consisting of six sentences from each student, from each recording session was chosen as a sample to be rated for fluency by 30 Finnish teachers of Russian. The teachers heard the stimuli (n=36) once in a randomized order, without knowing they contained multiple samples from the same speaker, and rated each sample. The sample size was limited, both because of the size of the student group participating in the exchange programme and because of the length of the listening task, which was around 20 min. This was considered optimal for the participants’ concentration on the task and the reliability of their ratings.

On the basis of the teachers’ evaluations, a mean fluency rating was obtained for each student for each recording session. In analysing the material, Ullakonoja (2008a) found that the students’ L2 fluency, as evaluated by the teachers, increased during the 3.5 months’ study abroad. For 8 out of 12 students, the increase was statistically significant (the difference between the ratings of each student prior to and following the stay were compared by the Wilcoxon Signed Ranks test,  $p < 0.005$ ). In the teachers’ evaluation form used by Ullakonoja (2008a), the scale ran from one (‘not fluent’) to five (‘very fluent’) with no verbal descriptions given for the values between one and five. To see whether the potential variation in the use of the scale influenced the results and to normalize the ratings of each teacher, we have here performed a recalculation using z-scores where mean and standard deviation values are calculated across all the ratings given by teacher *t* ( $z$  equals mean subtracted from *x* multiplied by standard deviation, where *x* is a rating by teacher *t*).

Further, in this report we explore the students’ self-evaluations of their L2 fluency development, using the responses to a questionnaire that they completed during the recording sessions. On a three-point scale of yes/no/don’t know, they were asked to respond to statements concerning their views on the development pronunciation and the role of teaching and native speaker contacts therein. To analyse the responses, the students were divided into two groups according to the development of their fluency (as estimated by teachers). Group 1 (G1) consisted of students (n=8) whose teacher ratings of their L2 fluency were statistically significantly better after the stay in Russia than prior to it. Group 2 (G2) comprised the rest (n=4). For comparison of the mean fluency ratings of the students and their responses, the ‘no’ and ‘don’t know’ answers were treated as one category. The reasoning behind this was that an affirmative answer indicated that the student had been attentive to the development of her oral skills and

aware of the possible changes while this was not necessarily implied by 'no' or 'don't know'. Thus we took the distinction to reflect - to a degree - self-awareness on the part of the student. Below, we compare the students' self-evaluations with the teachers' fluency ratings to determine whether a relationship exists between the two. Each subject's response to the statements (Q1-Q8) in the questionnaire is compared with their average teacher-rated fluency after the stay (both the mean and z-score mean) as well as with the difference between the fluency ratings prior to the stay and following it.

## Results

First, we recalculated the results obtained by Ullakonoja (2008a) concerning the teachers' ratings of the students' fluency. When the statistical reanalysis (difference between means of each student in Paired Samples t-test) using the z-scores was performed, the results confirmed the earlier findings: 8/12 students had a higher mean fluency rating in the middle of the stay than prior to it and 9/12 students received a higher rating following their stay than prior to it. Also, for 7/12 students the teachers' rating was significantly higher following the stay than prior to it ( $p < 0.005$ ). Thus, most students were judged as more fluent after than before their stay abroad. Also, 8/12 were significantly more fluent readers in the middle of the stay than prior to it ( $p \leq 0.005$ ); however unlike in the earlier study, only one student showed a significant ( $p = 0.0001$ ) improvement in teacher-rated fluency after her stay. These results are consistent with those of the earlier study (Ibid.).

Second, we analysed the students' responses to the questionnaire and compared these to the teachers' evaluations of their performance. In Q1 (I have paid attention to practising my intonation and/or pronunciation outside the classroom), seven out of twelve students said they had practiced by themselves. No difference in the responses to Q1 was observed between G1 and G2. No association was found between the answers to Q1 and mean teacher-rated fluency after the stay. In answers to Q2 (I have noticed that my pronunciation improved noticeably during my stay in Russia), half of the students reported improvement. Again, groups G1 and G2 did not differ. However, mean teacher-rated fluency was higher (mean=3.5) for those who had noticed an improvement than for those who had not (mean=3.2) (Q2). All the students felt that their fluency had improved during their stay (Q3, I can now read and speak Russian more fluently than before my stay).

In Q4 (I actively tried to get into contact with Russians during my stay), 4/12 students reported they had attempted getting into contact with the local people whereas 4/12 had not and 4/12 answered 'don't know'. Only one student in G2 reported being active in seeking contact compared to three in G1. Interestingly, those who did not report seeking contacts with native speakers of Russian, had a higher mean fluency rating (mean=3.4) than those who did (mean=3.2). When asked about the role of their teachers (Q5, I would have wished that my Russian teachers would have paid more attention to teaching pronunciation and correcting my mispronunciations), most students (8/12) stated they would have wished more support from their teachers. The students who responded positively had a higher mean fluency rating (3.5) than those who responded negatively (3.1). Again, more students (75 percent) in G1 than in G2 (50 percent) answered affirmatively. In Q6 (I still have problems with producing intonation in the way I wish), some students (5/12), most from G2, felt that they still had not achieved their target intonation. Mean teacher-rated fluency was higher (mean=3.4) for those who did not report problems than for those who did (mean=3.2).

When asked about whether they had attempted to make their pronunciation better on their own (Q7, I tried independently to improve my pronunciation), most students (7/12) said that they had not. Here, half of G2 responded affirmatively as against only 25 percent of G1. However, mean teacher-rated fluency was higher (mean=3.5) for those who answered affirmatively than for those who did not (mean=3.3). In the final question, Q8 (I paid attention to practising correct pronunciation), only two students, both from G1, reported that they had tried to practise. They also had a clearly higher mean fluency rating (mean=3.9) than the rest (mean=3.2). To sum up, there were some differences between those who significantly improved their read-aloud fluency and those who did not. However, when all the questionnaire answers were compared with the student's teacher-rated fluency after her stay, no statistically significant relationships were found (Independent Samples t-test). When the two groups (G1 and G2) were compared using Pearson's Chi Square test for each question, no statistically significant differences were found. However, this may also be due to a sample size not large enough to establish statistical significance.

The students who had significantly improved their teacher-rated fluency in the reading aloud tasks (in G1) responded more or less as expected in four questions. Positive responses to questions Q5 and Q8 perhaps reflect students' awareness of and interest in developing their pronunciation skills whereas positive responses to Q4 and negative to Q6 may reveal more about their "self-esteem" and confidence as language users. Not surprisingly, the results suggest that improvement may be connected both with an interest in learning oral skills and in seeking native-speaker contacts. However, half of the students in G2 claimed they had tried to develop their pronunciation independently. Nevertheless, their ratings did not improve significantly. Although the possible reasons for this cannot be examined in detail here, it may be suggested that an intensive focus on correct pronunciation may also result in disfluencies such as self-repairs and thus in lower fluency ratings.

The comparison between the teacher-rated mean fluency of the students and their answers to each question showed that the self-evaluations did correspond - to a degree - to the fluency evaluations of the teachers: those who said that their pronunciation had improved and who claimed to have no problems in producing intonation also received higher mean fluency ratings (Q2 & Q4). Further, those who showed interest in learning and practising - and wanted their teachers to correct them - were judged on average as more fluent readers (Q5, Q7 & Q8).

## **Conclusion**

The fact that all the students saw themselves as more fluent readers after their stay suggests that staying abroad is experienced as an important factor in improving fluency. Also in the teachers' ratings the majority of the students significantly improved their fluency. These results further support the findings of previous studies that suggest a relationship between studying abroad and L2 fluency. Also, a relationship between the students' self-evaluations and teachers' evaluations was found: the students who were judged to have improved their fluency were those who reported that they had paid attention to their pronunciation skills and aimed at improving them; these students were possibly also more capable of self-assessment.

However, it needs to be said that, first, the current study deals with read-aloud speech only, not spoken interaction. Second, we understand the development of fluency as a complex process, where features of articulation (such as e.g. pausing or patterns of intonation) intertwine with other (e.g. grammatical, lexical, pragmatic) characteristics. All these may be used in perceptions and evaluations of what is 'fluent'. The present study is part of a series of studies (Ullakonoja 2008a, 2008b) focusing exclusively on phonetic features. Third, the study abroad context itself involves

various social and cultural factors that could not be explored here (Freed et al. 2004, Wilkinson 1998). Fourth, more subjects should be investigated to be able to generalise the results.

Finally, many factors that are typically involved in the stay abroad context (for a review on the effects of study abroad on L2 learning, see Collentine & Freed 2004) are also considered important research foci in current studies on second language acquisition and foreign language education. In staying abroad, but in other contexts as well, it is not only the quantity of L2 input that is important but also its quality and meaningfulness. The overall role of the social and cultural environment, the significance of participating in the social networks of the target culture and the experience of authenticity and 'ownership' in one's learning process should not be forgotten. While recognizing the importance of these factors, we nevertheless feel that the study abroad context provides an excellent opportunity for a learner to become more fluent in L2. This opportunity could also be more systematically taken into consideration in university language education, for example in coaching students for their exchange visits and thus in helping them to gain optimal benefit from the target language environment.

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