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On the Hunt for Lateral Phonological Cross-Linguistic Influence in Third or Additional Language Acquisition

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Contents

Abbreviations

CLI = cross-linguistic influence

LPT = lateral phonological transfer

TALA = Third or Additional Language Acquisition

SLA = Second Language Acquisition

NNL = non-native language

L1 = mother tongue

L2 = chronologically first non-native language

L3/Ln = chronologically second, third, fourth, etc., non-native language

TL = target language

SL = source language

SR = syllable ratio

CC = consonant cluster

CCC = coda consonant cluster

VOT = voice-onset time

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1. Introduction[1]

What do Her Royal Highness Queen Elizabeth II and the author of the present study have in common? Well, in fact, both like to go hunting. But whereas the former tends to do that in the forests around Balmoral Castle during her summer holidays, the latter prefers the area of multilinguals' acquisition of phonology, particularly the types of interlingual influences therein, as hunting grounds.

Within the discipline of language acquisition research the field of multilingual language acquisition, or Third or Additional Language Acquisition (henceforth *TALA*), as an established field of research of its own right is rather young, with a noticeable increase of relevant publications starting only around the year 2000 (e.g. Cenoz & Jessner, 2000; Cenoz et al., 2001; De Angelis, 2007). Before that, Second Language Acquisition (henceforth *SLA*) studies focused on the developmental processes in learners of their first non-native language (henceforth *NNL*), the L2. That was investigated primarily with cross-sectional data from a manageable number of learners at different stages of their acquisition (e.g. Jarvis & Odlin, 2000; Kellerman, 1995; Odlin, 1989; Sharwood Smith, 1996). Besides relatively small-scale empirical bases, also some longitudinal studies were conducted (e.g. Bardovi-Harlig, 2002; Lightbown et al., 2002).

All of them, however, neglected that there are crucial differences between proper L2 learners with one NNL and multilingual learners with more than one NNL in their mind: besides the obvious additional linguistic knowledge, further skills like language-learning experience or heightened metalinguistic awareness are inherent to multilinguals' more complex knowledge as opposed to that of learners with only one NNL. The central difference is that learners with more than one NNL can potentially rely on more and different sources when acquiring a new NNL. This can influence their productions and perceptions in their third or additional language either consciously or subconsciously, and consequently also differ from productions or perceptions of L2 learners.

Some rare exceptions dealing already with multilinguals were vanguard studies like those of Vildomec (1963), one of the first extensive discussions

[1] For ease of reading, the masculine form is used throughout the text for all persons, but is meant to refer to both genders.

of multilingualism, Weinreich (1953), who examined different types of interference and methods for investigating transfer, or Rivers (1979), which constitutes one of the first detailed case studies of a multilingual learner's acquisition, illustrating the complex interaction of more than two languages with each other.

The investigation of cross-linguistic influence (henceforth *CLI*) between the multiple NNLs within a multilingual learner's mind – one main strand of research in TALA – is comparatively sparsely investigated when it comes to CLI not only from a multilingual's mother tongue, but between such a learner's NNLs. Whereas transfer of lexis between NNLs has elicited relatively numerous studies (e.g. Ringbom, 1987, 2001; Dentler, 2000; Ecke, 2001; Herwig, 2001; Müller-Lancé, 2006), there are rather few studies with regard to the syntactic level (e.g. Flynn et al., 2004; Zobl, 1992; Klein, 1995) or morphology (e.g. Bouvy, 2000; Fantini, 1985; Hammarberg, 2001; Jarvis & Odlin, 2000; Orr, 1987). Even fewer contributions are available to date which deal with this latter kind of transfer between NNLs on the level of phonology (e.g. Gut, 2010; Wrembel, 2010; Llama et al., 2010; Wunder, 2011).

Many of these contributions on transfer were conducted within the realm of sociolinguistics. There, transfer was examined as a result of language contact (e.g. Bonvillain, 2003; Cenoz & Genesee, 1998; Clyne, 2003; Myers-Scotton, 2002; Odlin, 1989); it was investigated as a phenomenon occurring within entire language communities. Other studies, though, rather focused on transfer along the psycholinguistic strand of research (e.g. Cenoz et al., 2001; Jarvis, 2000b). Contrary to the sociolinguistic studies, the occurrence of transfer from a psycholinguistic view was investigated within the individual language learner. The present study also takes such a psycholinguistic approach to the topic.

The fact that there is a dearth of studies on interlingual transfer in multilinguals' phonologies of their NNLs is probably not least due to the fact that the emergence of such phonological CLI between NNLs depends on a number of factors; of these, we only have minimal knowledge to date. Another reason could be that an empirical investigation of this kind of transfer is rather time-consuming and complex. But mostly it is due to the fact that the sole existence of phonological CLI between NNLs has not even been proven yet with extensive empirical data. Most studies to date on the phonological acquisition of a third or additional language are individual case studies or comprise only very few participants with very limited language combinations. Only a handful of studies have been conducted so far which aim at investigating phonological transfer during the acquisition of a third or additional language, such as one of the earliest and to date still the only longitudinal case study by Hammarberg and Williams (1993, 1998; also Hammarberg & Hammarberg, 1993, 2005).

Analysing data from all of the speaker's languages, not only from their L1 and the TL, in order to cover all potential directions of transfer in an investigation is only at the beginning. But like setting up studies of CLI in multilinguals' phonological acquisition on a broader empirical basis with a higher number of participants (e.g. Wunder, 2011) and different speaking styles (e.g. Wrembel, 2012) or even corpus-based studies (e.g. Gut, 2010; Wrembel, 2012), it is eventually going to become standard practice.

The knowledge thus gained from such studies on the complex interactions of languages and conditioning factors of interlingual transfer in particular on the level of phonology could be applied in the didactics of NNLs, for instance. Perhaps it could eventually even help reduce the degree of accentedness in NNL learners, if due attention would be paid to facilitating effects of previous linguistic knowledge or to minimizing the effect of accent-inducing factors.

The present study will be conducted in order to help further such reflections on how the teaching in particular of non-native phonologies could benefit – taking into consideration such linguistic knowledge already acquired, the interaction of a learner's non-native phonologies and the respective factors promoting such CLI. All of these aspects, though, remain at a very preliminary level at the moment. Before such high-flying aspirations can actually become reality in the didactics of non-native phonologies, the sole existence of this kind of transfer and its conditioning factors have to be firmly established first.

Thus, the present work aims at investigating, on a much wider empirical basis than existent studies, whether said CLI between NNLs actually occurs in a systematic manner between non-native sound systems and how it manifests itself; perhaps it is only limited to the linguistic levels of lexis, syntax or morphology. Moreover, given that transfer between non-native phonologies exists, is this kind of CLI then indeed conditioned by certain factors, such as an advanced proficiency or the learner's age, which either hinder or promote its occurrence? What roles do these single factors play? Do they constitute a hierarchy in terms of their strength of being able to promote this kind of transfer, and, if yes, how does this hierarchy look like? These key questions and some entailed hypotheses will be investigated empirically in the present study with the objective to help bridge another gap in research.

The study will begin with a preliminary discussion of the terminology to be used in the relatively recently established field of TALA research in section 2. There, the most crucial and relevant terminological conundrums (section 2.1) and key questions (section 2.2) of TALA research will be attempted to be resolved. This is followed in section 3 by an elucidation of the work's central concept of CLI. Firstly, an attempt at summarising the various facets of CLI as displayed in the existent literature will be undertaken (section 3.1.1). Subsequently, the various dimensions of CLI are examined within the realm of TALA (section 3.1.2) and a working definition of CLI for the present study (section 3.1.3) will be given.

The aspect of factors which interact with CLI and either promote or hinder its occurrence will be looked at in the subsequent two sections: firstly, variables evoking CLI between NNLs with a view to TALA in general are examined (section 3.2); secondly, factors are investigated that specifically tend to promote interlingual CLI between NNLs on the level of phonology (section 3.3).

Section 4 then describes the empirical study conducted in the present paper investigating the existence of phonological transfer between multilinguals' NNLs. The description of the research questions and expected hypotheses (section 4.1) is followed by the discussion of the data and methodology of the cross-sectional study conducted (section 4.2). A contrastive delineation of the segmental and suprasegmental features investigated and of the participants' languages is given in sections 4.2.1 and 4.2.2, respectively. This is followed by a description of the study's participant profiles (section 4.2.3), the technical details of the recordings (section 4.2.4), the elicitation material used (section 4.2.5) as well as a subsequent explication of the data analysis process (section 4.2.6). A detailed description of the cross-sectional study's results across the segmental and suprasegmental features examined (section 5) is followed by an extensive discussion thereof (section 6). A concluding section 6.4 will summarise the most important and relevant findings of the present study. With a view to these, the conclusion (section 7) will finally discuss potential weaknesses of the study as well as implications particularly for the teaching of non-native sound systems. – Let the hunt begin!

2. Multilingualism: A Definition of Terms

Trying to state the beginning of research into multilingualism is relatively difficult. Though interest in multilingualism has been around for many years, with vanguard studies in the field produced, for instance, by Vildomec in 1963, the number of multilingualism studies has been increasing slowly since the 1970s, reaching a first peak just recently in the 2000s, as mentioned in the previous section.

In the very beginning of multilingualism research, as is often the case when a new field emerges, generally accepted terms and concepts were taken over from already established disciplines, such as bilingualism or SLA research. However, their adaptation to fit the argumentation of investigations of different strands of multilingualism research produced a fair number of quite ambiguous terms. As the field continued to progress and was recognised in its own right, a new terminology started to evolve on its own, complicating matters even further. This resulted in several, yet unresolved terminological challenges, the most important of which will be discussed in the following sections (see sections 2.1–2.2).

2.1 Terminological Conundrums in Multilingualism Research

2.1.1 The Concepts of Monolingual, Bilingual and Multilingual

One such terminological inconsistency concerns the use of *monolingual/monolingualism*, *bilingual/bilingualism* and *multilingual/multilingualism*. Whereas the psycholinguistic definition of a monolingual speaker as someone who only has competence in using one language (including regional, social and situational varieties of that same language) is still fairly straightforward (regardless of ongoing sociolinguistic discussions, as mentioned in De Bot et al., 2005: 5), it is mainly the question of what constitutes a bilingual as opposed to a multilingual speaker which is problematic.

In the literature, numerous types of bilinguals are proposed (e.g. Weinreich, 1953; see list in Wei, 2000: 6f), such as dominant bilinguals, i.e. learners who show greater proficiency in one of their two languages and also use it more frequently; or receptive bilinguals, i.e. individuals who, besides their native language, can use their second language only passively but not actively in writing or speech (e.g. Gass & Selinker, 2008: 27; Wei, 2000: 6f). One common but oversimplified definition of *bilingual* derived from bilingualism research refers to individuals who are raised with two mother tongues (*dual/double first language acquisition*, e.g. Herschensohn, 2007: 4; Ortega, 2009: 4; *bilingual first language acquisition*, e.g. De Houwer, 1995; Deucher & Quay, 2000: 1; La Morgia, 2011). According to an extreme version of this definition, bilinguals are supposed to end up with native speaker command of both languages (also called *balanced bilingualism*, e.g. Herschensohn, 2007: 4), contrary to the actual unequal proficiencies that most bilinguals show (e.g. Gass & Glew, 2008: 271; Edwards, 1994; Myers-Scotton, 2006: 3). This simultaneous acquisition[2] of two first languages is conceivable, for instance, when a child is born to parents with different native languages.

A full command is also the pivotal feature of another definition of a bilingual as a person who has native-like proficiency in two languages, regardless of whether he has acquired those languages simultaneously in bilingual first language acquisition (*simultaneous bilingualism*, e.g. Wei, 2000: 7), or whether one of the languages is his L1 and the other a later-learnt NNL (*sequential/successive bilingualism*, e.g. Gass & Selinker 2008: 28) – quite a narrow view in SLA research (e.g. Bhatia, 2004; Bloomfield, 1933; Valdés, 2001: 40). Conversely, others define bilinguals as individuals who know their mother tongue and are in the process of learning the first NNL, independent of the end point of the acquisition as a proficient speaker of both languages (e.g. Haugen, 1953; Hufeisen, 2000). According to this view, bilingualism is seen as a continuum where "any knowledge of another language will make you a bilingual" (De Bot et al., 2005: 5).

With regard to multilingualism, it is mainly two problems which arise concerning certain uses of the ambiguous concept of *bilingual*. Besides being a problematic and confusing term in itself (e.g. Wei, 2000: 5–7), *bilingual* was, and regularly still is, employed synonymously with *multilingual* in the literature in the sense of "speaking two or more languages" (e.g. Bhatia & Ritchie, 2006: 5; Gass & Selinker, 2008: 515; Grosjean, 1992: 51; Macaro, 2010: 39; Mackey, 1962: 27; Myers-Scotton, 2006: 2; Oksaar, 1983: 19; Skutnabb-Kangas, 1984; Wei, 2000: 7). This is

[2] The author is aware of different views on the distinction between learning and acquisition, i.e. conscious versus subconscious development of linguistic knowledge, dating back to Krashen (1985). However, in the present paper, no such differentiation will be made; the terms *acquisition* and *learning* will be used synonymously.

necessarily an inevitable consequence of the failure to make an exact distinction between *second* and *multilingual language acquisition*, as will be argued in section 2.1.2. On the other hand, there are researchers who do exactly the opposite by using the term *multilingual* instead of *bilingual* also for individuals who know only one NNL besides their mother tongue (e.g. Saville-Troike, 2006: 8; Kemp, 2009: 9).

Another point, as Kemp argues, is that because "[we] are discovering that the differences between multilinguals are as great as the differences between monolinguals and bilinguals" (2009: 23), even the concept of multilingualism seems to require further differentiation, which is already being practised by a few researchers (e.g. Dewaele, 2004, 2008). This is a rather new stance. Mostly, *multilingual* is used as an umbrella term for learners who know two or more NNLs, as it is claimed that the only difference manifests itself in the exponential increase of complexity of linguistic knowledge available in the learner's mind with each additional language, like illustrated, for instance, by Hufeisen's (2001, 2005) Factor Model. According to her, such a marked increase of complexity compared to First Language Acquisition (henceforth *FLA*) can be seen in the acquisition of the first NNL (= L2), with aspects like L1 knowledge, language-learning strategies or life experience added to the learner profile, as well as in the acquisition of the second NNL (= L3), where further enriching factors, like NNL-learning strategies and experience or previous linguistic knowledge of the L2, come into play to which the learner did not have access yet in SLA. From Third Language Acquisition onward, only language-specific knowledge of the respective NNL is added to the body of already existing knowledge, but no further drastic qualitative changes take place (cf. Hufeisen, 2001: 649). This study agrees in general with Hufeisen (2001), but still makes a slightly more fine-grained differentiation of *multilingual* where deemed necessary for reasons of methodological clarity (cf. section 2.1.3).

Regarding the delimitation of the terms *bilingual* and *multilingual*, the distinction can actually be made rather easily and unambiguously when looking at their etymology: The Latin prefix *bi-* stands for "two", whereas *multi-* means "many", or, if further differentiation is required, *tri-*, *tetra-*, *pentalingual*, etc., for speakers of three, four, five, etc., languages. So, to operationalise the distinction between the terms *bilingual* and *multilingual* in the present psycholinguistic study, the focus will be on the number of languages in a person's mind[3], whereas aspects like proficiency (e.g. Herdina & Jessner, 2002), level of linguistic skills (e.g. Cenoz & Genesee, 1998: 27; Kemp, 2009: 19), age of acquisition (child versus adult; e.g. Müller et al., 2006: 13), the temporal nature of the acquisition process (i.e. simultaneous versus sequential; e.g. Cenoz & Genesee, 1998: 16; Saville-Troike, 2006: 4) or the acquisition context (naturalistic versus instructed; e.g. Ortega, 2009: 6) do not have to be taken into consideration as primary criteria for the immediate differentiation. Henceforth, when referring here to a *bilingual* learner, it signifies that the learner knows only two languages, i.e. the L1 and the non-native L2[4], disregarding the proficiency level. However, the participants of the present study will be adult *multilinguals* (occasionally used alternative term: *polyglot*, e.g. Kemp, 2009: 15; Myers-Scotton, 2006: 2; for a detailed discussion of *polyglot* see Peek, 2009), named *L3/Ln-learners* in the following sections, ergo learners with a minimum of two NNLs acquired sequentially besides their mother tongue, regardless of their proficiency therein (cf. De Angelis, 2007: 8f).

Contrary to Jarvis and Pavlenko, who differentiate two approaches to analysing transfer, i.e. referring to "CLI at the level of the individual as a psycholinguistic phenomenon, and transfer at the level of society as a societal phenomenon" (2008: 28f; cf. also Hamers & Blanc's (1989) distinction of *bilinguality* versus *bilingualism*), this study will only investigate CLI in multilingual language acquisition as a psycholinguistic phenomenon, and not from a sociolinguistic point of view (e.g. Aronin & Ó Laoire, 2004; Cenoz & Jessner, 2000; Dewaele, 2004) or from the position of any other strand of multilingualism research (e.g. educational approaches like Cenoz, Hufeisen & Jessner, 2001; Ó Laoire, 2006; neurolinguistic approaches like Franceschini, 2000; Safont Jordà, 2005). Consequently, unlike for instance in the sociolinguistic approach, also no further terminological distinction will be made between terms like *plurilingual* in the sense of individual multilingualism and *multilingual* in the narrow sense of societal multilingualism (e.g. Aronin & Ó Laoire, 2004; Cenoz & Genesee, 1998: 17; Kemp, 2009: 15).

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3 (Though of course the definition of what constitutes a language and "how languages can be counted with regard to individuals' proficiency, functional capability, and identity" (Kemp, 2009: 23) is problematic in itself again, but goes beyond the scope of the present discussion.)

4 *Bilinguals* in the sense of being the result of bilingual FLA are excluded from this paper.

2.1.2 Naming the Field: Third or Additional Language Acquisition

The most problematic issue concerning terminology in TALA, however, does not concern the differentiation of the terms *monolingual*, *bilingual* and *multilingual*, but already begins with naming the research field (cf. discussion in De Angelis, 2007: 10f). First of all, most scholars did and still do not distinguish between types of acquisition of NNLs, i.e. SLA or beyond, and instead group all NNLs together. They hold on to the dichotomy *FLA* for the learning of the mother tongue and *SLA* for the learning of all subsequent NNLs, and thus neglect important differences between L2 learners proper and multilingual learners (cf. section 2.2.2) (e.g. De Bot et al., 2005; Dulay & Burt, 1983; Gass & Glew, 2008: 270; Gass & Selinker, 2008; Mitchell & Myles, 1998; Ortega, 2009; Sharwood Smith, 1994: 7; Singh & Carroll, 1979).

A serious problem for multilingualism researchers and a logical consequence of using the umbrella term *SLA*, which equates all acquired NNLs, is that due to the lack of consensus on labelling the field it is impossible to make straightforward distinctions between SLA studies proper and studies in fact investigating multilingual individuals. This, firstly, could have serious methodological consequences, neglecting the possibility of interaction between NNLs in actually multilingual subjects of a study; and, secondly, could create "the potential danger of generalizing research findings that instead should be confined to a given subset of learners" (De Angelis, 2007: 10), which has most surely occurred.

According to De Angelis (cf. 2007: 10f), a further unsuitable term in use for NNL acquisition is *Multiple Language Acquisition* (e.g. De Angelis, 1999; Selinker & Baumgartner-Cohen, 1995) because of the connotation of *multiple* as "learnt simultaneously" rather than sequentially, as is usually the case. According to De Angelis, the term is "better suited to refer to some specific types of acquisition, for instance the case of children raised speaking multiple languages at the same time" (2007: 10f).

Moreover, *Multilingual Acquisition* can be found in the literature (e.g. Cenoz, 2000, 2005; Cenoz & Genesee, 1998: 16; Ortega, 2009: 5), which also remains vague to some extent. Regardless of the above-mentioned discussion of the term *multilingual* as opposed to *bilingual* and although otherwise acceptable, *Multilingual Acquisition* breaks with the continuity of the established terms *FLA* and *SLA* (cf. De Angelis, 2007: 11). Besides, to be precise in the use of the term *multilingual* referring to the learning process, De Angelis says, "[it] is in fact the learner who is multilingual, and not the acquisition itself" (2007: 11). So the term is also little suitable, although *Multilingual Language Acquisition* will be used synonymously, alternating with *TALA*, in this study.

Though the expression *Third Language Acquisition* (e.g. Cenoz, 2001, 2003; Cenoz, Hufeisen & Jessner, 2001; Hammarberg, 2010; Hammarberg & Williams, 1993; Herdina & Jessner, 2000) for the field does comply with the established terms *FLA* and *SLA*, it is an almost equally unsuitable umbrella term as *SLA*. Like *SLA*, *Third Language Acquisition* focuses on one NNL, i.e. the chronologically third foreign language acquired, and thoroughly neglects the ones learnt beyond (cf. De Angelis, 2007: 11). Similarly, the term *Tertiary Language Acquisition* appears in the literature from around 2000 (e.g. Cenoz, Hufeisen & Jessner, 2001; Hufeisen, 2000; Hufeisen & Lindemann, 1998; Marx, 2001: 179). The misleading name referring to the acquisition of tertiary languages, i.e. further NNLs beyond the second, goes one step further and implicitly claims a difference between SLA, Third Language Acquisition and the acquisition of tertiary languages (sometimes, *Tertiary Language Acquisition* is also taken to cover Third Language Acquisition and beyond). However, whereas the differentiation of SLA as being different is justified, the division into *Third Language Acquisition* and *Tertiary Language Acquisition* (sometimes also *Trilingual Language Acquisition*) seems a bit arbitrary. Reasons for considering the acquisition of exactly the third language as special and different from the acquisition of the fourth or, for instance, the seventh NNL, are not given, though further research might show that it would possibly make sense to consistently differentiate between third, fourth, fifth, etc., language acquisition, as mentioned above (cf. Kemp, 2009: 23).

The label *Foreign Language Learning* is also found in the literature (e.g. Ringbom, 1987, 2007). Besides the fact that, like the term *SLA*, it too subsumes the acquisition of all NNLs, regardless of whether it is the first NNL or the second or beyond to be acquired, two more problems arise with this term. Firstly, as will also be discussed in the following section (cf. section 2.1.3), *foreign language,* for instance in the sociolinguistic research strand, sometimes carries the connotation of having an inferior status compared to the mother tongue, similar to the expression *non-native language* (e.g. Sharwood Smith, 1994: 7). A more pronounced problem regarding the term, though, is that some researchers (e.g. Gass & Selinker, 2008; Ortega, 2009: 6) take the learning context into consideration and make the distinction between *SLA* in the sense of "learning of a nonnative language in the environment in which that language is spoken" (Gass &

Selinker, 2008:7) and *Foreign Language Learning*, referring to "the learning of a nonnative language in the environment of one's native language (…) [,] most commonly done within the context of the classroom" (Gass & Selinker, 2008: 7). In psycholinguistic research, the learning context *is* taken into account – however, as a potential factor conditioning the interaction of languages in a speaker's mind rather than seen as influencing the acquisition process per se, which would thus necessitate the use of a separate label like *Foreign Language Acquisition.*

To best account then for differences in L2 learners proper and multilingual learners in a psycholinguistic study on multilingualism like the present, De Angelis' suggestion will be taken up, preferring the term *TALA* because "it refers to all languages beyond the L2 without giving preference to any particular language" (De Angelis, 2007: 11). Despite the mouthful of a name and given the current state of knowledge, *TALA* is the most precise and suitable term to date for research on the sequential acquisition of two or more NNLs.

2.1.3 Naming the Non-Native Languages

A related issue to the naming of the field is that of most scholars overgeneralising *L2* as an umbrella term for all NNLs a speaker acquires, regardless, for example, of the chronology of acquisition. This rather inaccurate approach is taken quite frequently in the literature (e.g. Cook, 2002: 1; De Bot et al., 2005: 6; Gass & Selinker, 2008: 7; Jarvis & Pavlenko, 2008: 4; Myers-Scotton, 2006: 3; Ortega, 2009: 5; Saville-Troike, 2006: 2; Sharwood Smith, 1994: 7), such as by Gass and Glew:

> The term *second language speaker* refers to a person who speaks a language other than the native language. The term second language speaker can refer to a person who speaks a second, third, forth (sic!), etc. language. The term *second* simply means any language other than the first and focuses on the chronological order of learning.
>
> (Gass & Glew, 2008: 270)

Or by Jarvis and Pavlenko:

> The term second language (L2) will refer to any language acquired subsequently [author's comment: after the L1], regardless of the context of acquisition or attained level of proficiency.
>
> (Jarvis & Pavlenko, 2008: 4)

Thus, terms like *L2s*, *LN* or *LX* are applied to refer to all NNLs a multilingual learner knows (cf. De Angelis, 2007: 10). Other researchers label the second NNL and all NNLs acquired beyond *L3* – a similar overgeneralisation like the term *L2*, only this time treating all NNLs acquired after the L2 like the chronologically third language (e.g. Ó Laoire, 2005; Williams & Hammarberg, 1998). Using the same terminology, i.e. *L2s* versus *L3*, several scholars refer to the NNL being acquired at that moment as *L3* and subsume all previously learnt NNLs under the umbrella term *L2s* (e.g. Hufeisen, 1998). Additional grey areas are introduced when simultaneous bilinguals (cf. *bilingual FLA* in section 2.1.1) acquiring their first NNL are mixed with successive multilinguals learning their second NNL, or when "a childhood bilingual learning a third language and an adult with a second language who is learning a third language (...) are all considered third language learners or multilingual learners" (De Angelis, 2007: 10). All of this can have negative consequences on the possibility to generalise findings in studies on post-pubertal sequential multilingualism.

A rather radical change in terminology is suggested by Hammarberg (2010), who rejects both the linear approach of labelling an individual's languages chronologically (cf. 2010: 93), as well as the binary distinction of L1 acquired during infancy versus L2s acquired after infancy (cf. 2010: 93–95). The former is discarded on grounds of several alleged problems with a terminology based on the chronology of language acquisition (cf. Hammarberg, 2010: 94), all of which are not entirely insoluble, especially regarding the present study. His first issue, i.e. the problem of simultaneous acquisition, does not even arise in this study, as only sequential multilingualism will be looked at. Concerning his argument of whether to count a learner's "bonus languages" (Hammarberg, 2010: 94), i.e. closely related languages that enable reception without any formal education, as equivalent to NNLs acquired in an instructed learning context, it can also be refuted for the present study because only languages acquired in such an instructed context will be considered. Further, as regards the concern he puts forward with respect to how to treat intermittent or alternating acquisition, in accordance with the linear model the first point of contact with the language in a formal learning context is decisive for the study at hand. In addition, the type of knowledge required from the participants of this investigation is set to comprise at least beginner's proficiency in reading, writing and speaking abilities. However, as to proficiency, Hammarberg does have a point addressing the problem of how to set a proficiency threshold level:

> By what criteria shall we count or exclude languages of which a person knows "a little"? At what overall level of proficiency does a language become one of that person's languages? Can we determine on an *a priori* basis what degree of significance such a language will have in the person's language repertoire?
>
> (Hammarberg, 2010: 94)

There is still a considerable lack of empirical studies on the problem of where to set the threshold level of when a language can be counted as another NNL acquired by a certain learner. For the present study, besides the fact that no really objective way of measuring language proficiency – let alone phonological proficiency – is available yet, there is no data around at all regarding the setting of a level for phonological proficiency in NNLs, which is likely to differ from those in other linguistic subsystems like lexis or syntax (for a more detailed discussion of the threshold level question see section 2.2.3).

Though Hammarberg first correctly criticises the practice of subsuming all NNLs under the umbrella term *L2s*, he then puts forward the neither entirely satisfactory solution of naming the first NNL acquired *L2* and subsuming any NNL acquired beyond under *L3*. As mentioned, this is a similar fallacy like the term *L2s*. More adequate would be a terminology differentiating *L1*, *L2* and *L≥3* (Fouser, 2001), *third or additional language* (De Angelis, 2007) or *L3/Ln* (Wunder, 2011), despite the fact that there is no clear empirical basis yet for the claim that "no fundamental qualitative change of conditions for the acquisition of still further languages" (Hammarberg, 2010: 96), i.e. beyond the L3, exists.

In line with his suggested language distinction "based on different stages in the person's life, and not on a language-by-language chronology" (Hammarberg, 2010: 94), he finally adduces a further terminological approach: an augmentation of the dichotomic infancy/post-infancy differentiation, where "L3 (sic!) is used for the language which the multilingual speakers are currently using or acquiring (…) [–] not necessarily number three in order of acquisition" (Hammarberg, 2010: 97). Any L1(s) and so-called prior L2(s) are named *background languages* (cf. Hammarberg, 2010: 97). This different conceptualisation of a multilingual's languages "[relating] to a given situation of language use or acquisition" (Hammarberg, 2010: 97), however, with a slight terminological change, is put forward by Hammarberg as most suitable for the time being as specification for the unclear concepts in use in language acquisition research. He proposes a threefold hierarchy, modelled at

Hufeisen's above-mentioned Factor Model (2001, 2005), which suggests qualitative differences in FLA, SLA and TALA, but replaces the established terms *first*/*second*/*third languages* with *primary*/*secondary*/*tertiary languages* and "orders them in a hierarchy according to how they are cognitively related to each other for their user" (Hammarberg, 2010: 99). However, several questions arise with this argumentation.

Firstly, Hammarberg claims the *primary*/*secondary*/*tertiary* terminology

> expresses a cognitive hierarchy between the languages for the user-learner (...) [where] an L2 is secondary to L1 in the sense that it has been added after the period of the child's early encounter with the world and incipient social and intellectual development, when the categories and patterns of L1 were established (...) [and] [an] L3 is then tertiary in relation to L1 and L2, the primary and secondary background languages.
>
> (Hammarberg, 2010: 99)

However, does this not follow along the same line as the linear approach, where *L1* also refers to the mother tongue acquired during infancy, *L2* (or *L2s*, using the imprecise but widely used umbrella term) to the first NNL acquired after the L1, and *L3* (also employed in the imprecise sense of "comprising all NNLs acquired after the first NNL") to the NNL acquired after the L2? Though Hammarberg himself says that he "argued for a definition of L3 which is an extension of the conventional infancy/post-infancy distinction between L1 and L2" (Hammarberg, 2010: 102), it does not become obvious why he chooses to follow Hufeisen's "three-order hierarchy but [rejects] its linear chronological interpretation" (Hammarberg, 2010: 102) in favour of a conceptualisation according to the cognitive roles of the single languages. Secondly, it remains unclear how exactly the differentiation of languages "according to the differential cognitive roles they play for their user" (Hammarberg, 2010: 101) is supposed to work. If this refers to the distinction of L1 acquired in infancy, L2(s) as NNL(s) acquired post-infancy after the L1, and L3 as the NNL being acquired or used at the time being, the question arises at how specifically the differentiation of a currently used NNL as opposed to all other languages is to be operationalised, especially, for instance, if language-mixing phenomena like code-switching in multilinguals is investigated. Apart from that, according to which criteria are several secondary languages that exist in parallel distinguished from tertiary languages? And what exactly is the difference between a secondary and a tertiary language in the end if not a chronological one? So, although the author agrees with Hammarberg that there is definitely a need for "clarification of some basic concepts" (Hammarberg, 2010: 102), she believes his is not the most suitable approach.

Especially in research on CLI it is crucial to differentiate between the different languages in a multilingual learner's mind to be able to pin down the source of influence from a specific language. Consequently, the linear approach will be adopted and a clear distinction will be made here between the later acquired NNLs, ranking them according to the order of acquisition: a multilingual speaker's native language is termed *L1* (as mentioned previously, simultaneous first language acquisition will not be considered here), the first NNL to be acquired afterwards *L2*, proceeding with *L3/Ln* as an umbrella term (if not indicated otherwise) for any NNL including and learnt beyond the chronologically third foreign language. If necessary, especially for clarification in the empirical study conducted for this study, an additional distinction will be made between *L3*, *L4*, *L5*, *Ln* for further acquired NNLs to be able to distinguish which language exerted influence in an instance of cross-linguistic transfer. For reasons of standardisation and an unambiguous operationalisation – at least as regards the present study –, this labelling is purely chronological and does not rank the NNLs according to proficiency, frequency of use, conceptual role or any other variable.

Additionally, as neutral cover terms, *non-native language* or *foreign language* will be used, which does not intend to imply an inferior status of acquired foreign languages compared to the L1, as Sharwood Smith fears will be the case (cf. 1994: 7). Moreover, the general terms *source language(s)* (henceforth *SL[s]*) and *target language* (henceforth *TL*) will be employed to illustrate the quality of relationship between two or more languages involved in interlinguistic transfer by a multilingual learner, the SL(s) being the language(s) exerting influence, and the TL being the language affected by CLI.

All these terminological struggles might largely be due to the relative recency of the field of TALA. According to Kemp, the reason for these grey areas concerning a unified terminology is that "researchers who [work] on different topics and within different traditions of multilingualism research [use] different definitions of multilingualism" (2009: 12), which will necessarily "have implications for choice of participants, research methodology, and consequently, research findings" (2009: 12). Thus, the need for a commonly accepted terminology is a pressing matter. However, as more and more research is carried out in Multilingual Language

Acquisition, a uniform standardised terminology will eventually be established.

2.2 Defining Third or Additional Language Acquisition: Points at Issue

The overarching issue in multilingualism research is that a general theory of NNL acquisition must not only account for SLA, but especially consider TALA. However, we are still some way off such a general theory. The terminological uncertainties discussed in section 2.1 unfortunately also contribute to persisting contentious points in multilingualism research, the most important four of which, i.e. monolingual versus bilingual bias in TALA, Difference versus No-Difference Hypothesis, the threshold question and the problematic differentiation of multilinguals, will be discussed in the following.

2.2.1 Monolingual and Bilingual Bias in Non-Native Language Acquisition

Of course, considering the above discussion about classifying learners as mono-, bi- or multilinguals, the ongoing controversy of when a speaker is considered a multilingual warrants a more in-depth investigation. It cannot be denied, however, that about a third of the world's population is bilingual or even multilingual (cf. Cenoz & Genesee, 1998; Cook, 2003: 4; Edwards, 1994; Wei, 2000: 5). This proves the claim wrong that monolingualism is the norm (e.g. Cook, 1993; De Bot et al., 2005; Edwards, 1994; Hammarberg, 2010; Herschensohn, 2007; Saville-Troike, 2006), not least also because

> all humans possess the capacity to learn several languages. An adequate theory of language competence, use and acquisition must be able to account for this, treating multilingualism, rather than monolingualism, as the default case.
>
> (Hammarberg, 2010: 92).

Yet, many language acquisition researchers seem to be monolingually biased, i.e. they "[measure] second language competence or performance [author's comment: referring here to competence or performance in a NNL] according to monolingual norms" (De Angelis, 2007: 12), despite the fact that monolingualism is not the default language setting, as the majority knows at least two or increasingly even more languages.

To rate L3/Ln-learners according to L1 norms then is a contradiction in terms, as firstly, L3/Ln-learners logically are multilingual, and, secondly, they will hardly achieve a native-like level in their NNLs (e.g. Baker & Jones, 1998; Bley-Vroman, 1983; Cook, 1995, 1997; De Angelis, 1999; De Angelis & Selinker, 2001; Grosjean, 1992; Kemp, 2009: 19; Ortega, 2009). Instead of taking L1 target-language categories as the reference point against which NNL-learners' competence and performance is measured (cf. also *comparative fallacy*, Bley-Vroman, 1983), it is more sensible to look at learner language as a system of its own, labelled *interlanguage* (henceforth *IL*) by Selinker (1972; cf. also *transitional idiosyncratic dialects*, Corder, 1971; or *approximative systems*, Nemser, 1971).

According to Gass and Selinker (2008),

> [the] basic assumption in SLA [author's comment: valid for any kind of NNL-acquisition] research is that learners create a language system, known as an interlanguage (IL). This concept validates learners' speech, not as a deficit system, that is, a language filled with random errors, but as a system of its own with its own structure.
>
> (Gass & Selinker, 2008: 14)

Said IL created by the learners in response to the input they receive of the respective language can consist of a mixture of features from the learner's L1, the non-native TL, from all other languages known to the learner, as well as of completely new features created by the learner himself (e.g. Fuller, 1999; Gass & Selinker, 2008). Moreover, the system is dynamic to a certain extent because it is able to change as the learner progresses. However, at some point in the acquisition process, it is claimed by some researchers that the learning of a NNL slows down and then simply ceases, which is referred to as the *fossilisation* or *stabilisation* of learner language (cf. Gass & Selinker, 2008: 14). Accordingly, learners usually never attain L1-comparable levels, according to the hotly debated opinion of some.

As the "interlanguage grammar [author's comment: *grammar* in the sense of 'total knowledge of a certain language in the mind', not just of its syntax] cannot be measured against a native-like norm because the L1 grammar is not an interlanguage grammar by definition" (De Angelis, 2007: 13), it only makes sense then to examine learner productions in their own right. Juxtaposing them to ideal native-like productions again promotes a monolingual bias, resulting in the widespread assumption, especially in earlier SLA research, that learners are a failure for not being able to imitate a native speaker perfectly (e.g. Chomsky, 1986; González-Nueno, 1997; Kasper & Kellerman, 1997; Sebastián-Gallés & Bosch, 2005). Besides, to place monolingual norms on learner language might likely also preclude the understanding, firstly, of interlanguages as systems of their own (cf. Gass & Selinker, 2008: 51) as well as, secondly, leave processes occurring during TALA that specifically pertain to multilingual learners undetected.

Yet, monolingual bias does not only ensue as an inappropriate method of how learner productions are assessed. It also shows itself in the conception of a bilingual as the sum of two more or less complete monolinguals (cf. De Angelis, 2007: 14), or of a multilingual's mind consisting of several monolingual states, which utterly goes against what Grosjean (1985, 1992) calls a *holistic perspective* in his study of bilinguals. Said holistic perspective claims that "a bilingual is NOT the sum of two complete or incomplete monolinguals; rather, he or she has a unique and specific linguistic configuration" (Grosjean, 1992: 55), referring to learners' interlanguages mentioned above, which are more or less integrated in their mind. By extension, a multilingual is equally not the sum of three or more complete or incomplete monolinguals, but his linguistic make-up must be looked at in its own right as well.

Methodologically, it is obviously much more convenient to operationalise the concept of a multilingual's linguistic configuration if one assumes a fractional view, i.e. all languages of a multilingual are seen as nicely separate systems (cf. De Angelis, 2007: 14) with "competencies (…) implied to be similar to those of a native speaker" (De Angelis, 2007: 14) and thus of course are measured against L1 norms. So, "the bilingual is conceived as two monolinguals within the same person" (De Angelis, 2007: 14), and consequently the multilingual in analogy as three or more monolinguals within the same person.

However, according to several studies, especially in the area of the multilingual lexicon (e.g. Dijkstra, 2003; French & Jacquet, 2004; Kroll & Dijkstra, 2000; van Hell & Dijkstra, 2002; van Heuven, 2005), it seems that linguistic knowledge in a multilingual's mind is not divided into separate sections for the single languages, but that it is at least partly integrated (cf. De Angelis, 2007: 14). Evidence for this stems, for instance, from reaction-time experiments in a lexical decision task like that by van Hell and Dijkstra (2002), who measured faster reaction times in L1-Dutch speakers with L2 English and L3 French for the recognition of correct or incorrect L1 words, using non-cognate Dutch words and Dutch-English cognates as well as Dutch-French cognates as stimuli. Overall, reaction times were shorter for cognates from both languages than for non-cognates. Due to the fact that cognates show stronger connections because of their formal similarity, they are likely to be accessed or recognised faster than non-cognate words in an integrated lexicon, where ”words from different languages are activated in parallel until a certain point in the selection process” (De Angelis, 2007: 103), referring to the so-called *non-selective lexical access*. Such an integrated view of the multilingual lexicon would also comply with the principle of linguistic economy to avoid duplicating information to keep storage and processing loads as low as possible. Nevertheless, the debate on the degree of integration or separation of linguistic knowledge in general currently remains unsolved due to existing mixed evidence and the lack of unequivocal findings.

Cook (1991, 1992, 1993, 1995), like Grosjean (1989, 1992) another opponent of the monolingual view of NNL-users and of the fractional view of bi- or multilinguals, describes mentioned integrated state of knowledge in his concept of *multi-competence*, the knowledge of two or more languages in one mind (cf. e.g. Cook, 2003). It refers to a learner's mental state containing his L1 knowledge, all ILs from every previously acquired NNL, as well as what Cook calls "other mental processes" (2008: 17), which he leaves unspecified; the L2, L3 or Ln as spoken by a monolingual native speaker of the respective language, however, remain outside the learner's mind. Consequently, to come back to the first aspect of monolingual bias mentioned above, it also does not make any sense to assess the learner's L2 or L3/Ln ILs with reference to monolingual native speakers. Instead, Cook claims, it is "the competence of the successful L2 user [author's comment: or L3/Ln user, respectively]" (2008: 18) that should be used as a yardstick to compare the ILs to. Admittedly, another problem arises thus, which cannot be discussed here, i.e. the conceptualisation of what a successful L2 or L3/Ln user actually is (for a more detailed discussion of this issue e.g. refer to Cook, 2006a, 2006b; Han, 2004).

Opposed to the monolingual bias, which "refers to the tendency to view multilinguals as bilinguals with some additional languages rather than as speakers of several languages from the start" (De Angelis, 2007: 15), recently stands the bilingual bias. This harks back to the already discussed problematic definition of what constitutes a multilingual (cf. section 2.1.1). Concerning the bilingual bias, this would signify that, as the focus is on the L2, all other NNLs acquired beyond can be disregarded because it does not make much of a difference if there are two or three or 20 NNLs in the learner's mind; every additional language besides the L2 can be considered optional. Thus, an L20 learner could also be subsumed under *L2 learner*, according to the logic of the bilingual bias.

Further, a different kind of comparative fallacy also holds for the bilingual bias that becomes evident every time a multilingual learner is compared to a bilingual speaker who shows native-like proficiency in both of his languages, when actually "multilinguals possess a configuration of linguistic competencies that is distinct from that of bilinguals and monolinguals" (Cenoz & Genesee, 1998: 19). This unique linguistic configuration does not only concern all NNLs in a multilingual's mind, but also his L1, as Cook claims: "[The] first language of people who know other languages differs from that of their monolingual peers" (2008: 1). We will come back to this when discussing the potential directions of transfer in multilinguals (cf. section 3.1.2.1). Hence, to stress this once again, the "language super-system" (Cook, 2008: 2), as Cook calls the multi-competent state of mind of a learner with knowledge of two or more languages, must be examined in its own right, and neither be measured against monolingual nor bilingual ideal norms.

Thirdly, the pervasive fallacy of a bilingual bias was also already implicitly addressed in the discussion of researchers who view L3/Ln acquisition and production processes only in the light of L2 acquisition and production, respectively (cf. section 2.1). This is reflected in treating all NNLs, their respective acquisition processes and NNL-productions as equal, subsumed under the terms *L2s* and *SLA*, respectively, regardless of whether it is the L2, L3 or L20. Failing to differentiate between SLA versus TALA, as well as L2 versus L3/Ln, is exactly the crux of the following section about the *Difference* versus *No-Difference Hypothesis*.

2.2.2 The Difference versus No-Difference Hypothesis

Whereas the distinction between FLA and the acquisition of NNLs is accepted by virtually all language acquisition researchers due to obvious differences in the acquisition process, such as the learner's age and consequently his cognitive maturity as well as the presence of previous knowledge in their mind (cf. De Angelis, 2007: 4), many scholars take the no-difference stance when it comes to SLA versus TALA. Some even claim that "multilingualism is a kind of multiple bilingualism" (Haugen, 1986: 9), which ties in with the discussion in section 2.1.2.

The argumentative basis also for the above-mentioned monolingual and bilingual bias (cf. section 2.2.1), respectively, actually stems from this so-called *No-Difference Hypothesis*, which states that SLA and TALA proceed fundamentally the same (e.g. Mitchell & Myles, 1998; Singh & Carroll, 1979). Like Haugen (1986), Kemp (2009), for instance, too is of the opinion that the “problems of learning, interference, borrowing, and the like do not seem to be essentially different when a third or further language is added, and it is convenient to regard polyglossy as a kind of multiple bilingualism” (2009: 9), and Hoffmann (2001) adds that “trilinguals have been shown to follow the same patterns and to be subject to influence of the same kind of social and psychological factors as bilinguals” (2001: 19).

Naturally, if SLA and TALA are equated, differences between bilingual and multilingual learners are also negated. However, compared to L2 learners, learners of a third or additional language have knowledge from at least two languages stored in their mind, have gained considerable metalinguistic awareness, and are also better equipped with learning strategies (e.g. Clyne, Hunt & Isaakidis, 2004; Cook, 1992, 1995; Fouser, 2001; Ó Laoire, 2005). All of this must be considered in a general theory of NNL acquisition, processes and use, which has to be able to account for all languages and the related phenomena in the learner’s mind, and not just for those of one or two. Hence, “assuming an identity of processes between bilinguals and multilinguals” (De Angelis, 2007: 16) is just one other contentious point between language acquisition researchers.

Again, though, it is more convenient to not distinguish between bilinguals and multilinguals and the respective acquisition processes and productions. Yet, this kind of bilingual bias inhibits more apt suggestions specifically for multilinguals (cf. De Angelis, 2007: 16). Some researchers, such as Dijkstra (2003) in lexical research, even take the easy way out, choosing the “lack of evidence equals evidence”-option: as long as no counterevidence is brought forward from valid psycholinguistic studies, it is perfectly legitimate to apply monolingual or bilingual concepts or models, in Dijkstra’s case of word recognition, also to bilinguals or multilinguals, respectively (cf. Dijkstra, 2003: 25), despite the fact that this probably utterly disregards “some behaviours or production mechanisms [that] may well be unique to multilinguals, [or] (…) cannot be identified if their existence is not even postulated” (De Angelis, 2007: 16).

The opposing standpoints of difference versus no-difference that neglect this uniqueness of L3/Ln-learners, their productions and acquisition processes likely have severe repercussions in several regards. On the one hand, as already mentioned above, it might have the consequence that maybe some exclusively multilingual phenomena are overlooked or prevented from being discovered in the first place. An example would be the lateral type of transfer, which by definition is only possible between NNLs and cannot appear in SLA proper because L2 learners only have knowledge of their L1 and one NNL, the L2. So, this bilingual bias "overshadows the identification of a range of phenomena that only multilingual speakers can display" (De Angelis, 2007: 13).

On the other hand, negating the special status of TALA will also lead to the necessity to re-evaluate existing research. Claiming that additional prior linguistic knowledge besides the L2 is negligible, consequently also not controlling for the associated variables in research, thus ignoring the differences between L2 versus L3/Ln learners and instead grouping them all together under one umbrella term, necessarily leads to confusion when it comes to specifying the types of participants of a study. Unfortunately, it has been the case for many years – and sometimes still is the case – that no rigorous differentiation is made between L2 learners (or SLA) proper, who only speak their L1 plus one NNL, or in fact L3/Ln learners (or TALA) proper, who additionally have at least some knowledge of another NNL.

Consequently, no unequivocal conclusions can be drawn from the results of the respective studies, which then also can neither be generalised to a certain group of learners nor can results of different studies be compared. All of this impedes theoretical generalisations about L3/Ln-learners and stalls progress in TALA research, condemning us to partial knowledge. One cannot draw conclusions about transfer patterns in SLA, for instance, if the data stem from a mixture of L2 and L3/Ln learners, thus thwarting insights in research on CLI.

Studies will have to be re-examined in the light of the actual data they are based on, as far as allowed by the given information, and be reassessed as SLA or TALA studies – or as unclassifiable due to the lack of methodological rigour and a too heterogeneous group of participants. But taking the no-difference stance and disregarding the obvious differences between L2 and L3/Ln learners and overgeneralising findings to TALA, be it from pseudo-SLA studies or from SLA-studies proper – if they can be identified as such – “cannot adequately inform us about phenomena related to multilingualism” (De Angelis, 2007: 2).

Despite the fact that several papers labelled *SLA studies* might have been conducted with multilingual subjects inadvertently, this still necessarily leads to a dearth of methodologically rigorous studies on TALA and the processes and specific multilingual phenomena involved with it, hindering among others “informed discussions on the similarities and differences between types of acquisition” (De Angelis, 2007: 5). So, language acquisition researchers, especially those engaged in multilingualism research, are called for to conduct studies that pay attention to the Difference Hypothesis and the “qualitative and quantitative differences between individuals who use two languages and individuals who use three languages” (Kemp, 2009: 15), and consequently also to the differences in the types of acquisition.

For the present study, L3 and all subsequent foreign languages are grouped together under the umbrella term *L3/Ln* in TALA, as evidence so far suggests that the only difference manifests itself in the exponential increase of complexity of linguistic knowledge available in the learner’s mind with each additional language. The acquisition processes, however, will proceed similarly, as far as is known to date, with the learners drawing on all their prior linguistic knowledge. Multilingual learners apparently subconsciously, or even consciously if more experienced, draw on this prior knowledge in all ensuing language learning, much more so than compared to L2 learners, who can theoretically only resort to their L1 and L2 interlanguage, in case they apply such a strategy at all. To enable a more detailed comparison of L2 versus L3/Ln learners and their strategies, for instance, presupposes the existence of clear guidelines of how to classify types of learners first, of course. This question will be discussed in the following section on the definition of a potential threshold between L2 as opposed to multilingual learners.

2.2.3 The Threshold Question: When Does a Learner Reach Multilingual Proficiency?

The repercussions of a lack of methodological rigour do not only concern the choice of participants or the differentiation between types of acquisition, but also entail a further problem: it is the researcher who determines “whether learners’ prior knowledge has the potential to bias the result of a study or not” (De Angelis, 2007: 5), i.e. the researcher decides on the classification of the participant – bilingual or multilingual. Consequently, he thus also determines the type of study, i.e. whether it is a study on SLA investigating bilingual subjects or on TALA studying multilinguals, though obviously an independent, objective and calibrated test of proficiency would be more desirable.

However, the decisive question here is: When does an L3/Ln learner actually have enough proficiency in the L3/Ln to be called a *multilingual* learner as opposed to an *L2 learner*? How are we to define proficiency threshold levels in the different NNLs at all? This objection might also have consequences for previous studies on “second” language acquisition, which may have to be re-evaluated in case no distinction was made between L3/Ln- and L2 learners, as was discussed in the previous section on the Difference versus No-Difference Hypothesis (cf. sec tion 2.2.2). Unless it is explicitly stated otherwise, L2 learners might have been in fact multilinguals, but the term *L2* was used as an umbrella term and their smatterings of other NNLs besides their L2 might have simply been neglected.

Hypothetically speaking, the threshold from L2 to L3/Ln learners should ideally be set at the point where a language, here for instance the L3, starts being able to potentially influence another language – be it the acquisition of a subsequently learnt language or the L2 or even the L1 (for a detailed discussion about directions of transfer, refer to section 3.1.2.1). Then, the L3 would have to be counted as one of the learner’s languages and, consequently, we would be dealing with a multilingual learner. It is a different matter altogether whether it is methodologically possible to determine this exact point of transition from a bilingual to a multilingual learner – which it is probably not, according to Mackey (1962).

Besides lacking the methodology, it is due to a dearth of studies on the one hand and once again due to the mingling of different types of acquisition and learners in studies on the other hand that researchers are still groping in the dark when it comes to the establishment of threshold levels between L2 and L3/Ln learners. Thus, to date it is still impossible to say, based on a firm empirical basis, for example, how much time of instruction in a NNL is necessary for a learner to reach a certain level to be able to count said language as “one of his own”.

Studies so far contain many inconsistencies and varying statements regarding the required amount of instruction in a language for it to be able to show influence on the acquisition of another language. Apparently, even only one or two years of formal instruction may already suffice (cf. De Angelis, 2007: 34), as reported in some investigations trying to elicit CLI from NNLs the learner has a low proficiency in (e.g. De Angelis, 1999; Rivers, 1979; Selinker & Baumgartner-Cohen, 1995; Vildomec, 1963). To stress it once again, that is why previous linguistic knowledge of a learner must not be disregarded – even if it is only very basic because it still might have an impact. Restrictively, one has to concede that, according to Ringbom (1987), seemingly only certain types of transfer tend to occur already from languages the learner has a low proficiency in (for a detailed discussion of the role of proficiency in occasioning CLI refer to section 3.4.1).

Moreover, especially studies on language attrition (e.g. De Bot, 1998; De Bot & Hulsen, 2002; De Bot & Weltens, 1995), for example, have demonstrated that proficiency is a rather fleeting concept as it tends to change over time (cf. Kemp, 2009: 12). Interestingly, a much discussed idea in language attrition research is that of Neisser (1984), who claimed there might be "a critical threshold during learning" (Neisser, 1984: 78), following a study by Bahrick (1984) where L2 learners of Spanish of different assessed proficiencies who had not used Spanish for varying amounts of time were shown to have lost most of their L2 competence initially and less in later periods of non-use. From these results, Neisser (1984) concluded "that some knowledge that has been learned up to a certain level has become immune to forgetting" (De Bot & Hulsen, 2002: 259), or put in Pan and Berko-Gleason's words, "a critical mass of language that, once acquired, makes loss unlikely" (1986: 204).

To complicate matters even further, some studies show that proficiencies seemingly vary across the different linguistic levels as well as across the different types of skills (e.g. De Bot & Hulsen, 2002; Moorcroft & Gardner, 1987; Weltens, 1988). Regarding the latter, this means, for instance, that proficiency in active-productive skills in a language, such as speaking, can differ from the passive-receptive skills, like reading, in the individual learner. Weltens (1988) investigated the retention of L2 French by L1-Dutch speakers assessing their receptive proficiency in lexis, grammar and phonology, and discovered that only particular aspects on certain linguistic levels attrite more quickly than others. Further, Weltens found that attrition also depended on several variables; for instance, regarding L2-French lexis, he noticed that a low frequency of occurrence and dissimilarity to L1-Dutch words as in non-cognates aid attrition, whereas aspects like the level of achieved L2 competence was not shown to be significant for promoting attrition in general, and period of non-use had an impact only on certain linguistic levels.

What these investigations show is that firstly – and most importantly –, proficiency fluctuates; secondly, it changes depending on the linguistic level; and thirdly, it varies according to the type of skill being tested. For the threshold question, this means that a broad-brush evaluation of proficiency is not feasible, and thus it will not even be possible to set up generally valid threshold levels. Instead, it might require rather an individual assessment and adaptation of proficiency tests to the specific study being conducted at a certain point in time.

With regard to proficiency variation, for instance in syntax from that in lexis as well as phonology, different methods consequently have to be used to measure the single skills on the respective linguistic levels. Reichert et al. (2010) believe C-tests, which consist of several short texts where the second half of every second word is omitted and has to be completed by the testees (e.g. Grotjahn, 1992; Klein-Braley, 1985; Klein-Braley & Raatz, 1984), are supposed to be integrative tests of "global language skills levels rather than (…) [of] proficiency levels in the different language competency domains" (Reichert et al., 2010: 206). However, the opponents' scepticism about this generalisation is summarised in Huhta's (1996) words: "How valid is it to say that somebody who does well on a foreign language C-test can also speak the language well?" (1996: 219). Huhta and others claim that "it is hardly possible to infer from the results of a C-test to a learner's oral communication skills" (Bolten, 1992: 196f; author's translation) because of its rather simple conception: it is a pencil-and-paper test focusing actually on lexical and grammar skills, which can hardly serve as a substitute for a test of oral proficiency (e.g. also Freese, 1994; Huhta, 1996; McNamara, 2000). Moreover, to date there are not even any calibrated C-tests around. Bettina Dresemann from the University of Erfurt is currently undertaking the long-term project of collecting C-test items in the database *C-Test-Pool* (http://www.c-test-pool.de) that are calibrated according to the standards of the Common European Frame of Reference in order to establish an objectively valid and comparable measurement tool to assess NNL skills – at least for lexis and grammar.

Concerning testing skills in a non-native phonology, however, there are no generally accepted, validated and objective tests around at all. Research into standardised phonological proficiency testing is pretty much at the beginning. So far, for convenience's sake, researchers mostly rely either on self-evaluation of participants or on expert judges.

As the present study focuses on aspects of phonological acquisition in NNLs it is thus obviously necessary to establish the learners' proficiency therein – especially as proficiency is one of the most important factors influencing transfer (see section 3.4.1). The basic goal of a test of phonological proficiency is two-fold, regardless of whether it is conducted by way of an objective and validated test, by self-evaluation or by expert listener judgement: Firstly, it is expected to ensure a homogeneous proficiency level of the participants in the respective NNLs. Secondly, on which the first is actually based, it is supposed to establish an objective threshold level between L2 learners and L3/Ln learners, i.e. deciding when an L2 learner has enough knowledge in a NNL to be called an *L3*, *L4*, *Ln learner*. This, of course, presupposes that one is able to count the languages in a learner's mind. But how can languages be counted?

This is a very complex question, not least because it depends on the definition of what a language is, first of all – a still hotly debated issue in linguistics. According to a psycholinguistic point of view, it is not even possible to separate a multilingual's linguistic make-up into single languages, says Kemp (cf. 2009: 16). She underlines this claim adducing the existence of CLI as proof for an integrated system of all languages in a multilingual's mind, but believes

> for practical reasons it is easier to use an externalised definition of a language with reference to linguistic features or social use than an internalised definition with references to mental processing. In other words, even if researchers lay aside the theory that a multilingual's languages function as a holistic and integrated system or repertoire, and view the system as separable into individual languages, it is difficult to assess for each participant where the mental boundaries lie between the languages used.
>
> (Kemp, 2009: 18)

To be able to make a statement about the type of learner, one has to be able to count the languages in his mind one way or another, which is difficult enough, preferably using specific external criteria to operationalise such a count, just this once disregarding the actual psycholinguistic reality of the multilingual mind. Besides the achievement of a certain proficiency threshold level, Kemp (2009) also lists further criteria according to which one could potentially count languages in a learner's mind, such as the degree of literacy required for reading and writing in a specific language, or the degree of functional capability necessary to be able to use a language adequately in various contexts (cf. Kemp, 2009: 18–22).

So, depending on the definition of *language*, different categorisations of learners would be possible then. For example, learner XY, a native speaker of Spanish with L2 English, who benefits from the linguistic similarity of his L1 with Portuguese and thus has relatively well-developed reading skills in Portuguese by virtue of knowing Spanish, could be classified as a multilingual L3-learner by one researcher and as a bilingual L2 learner by another, simply because the researchers differ in their view on whether only partial skills – i.e. in mentioned example reading skills – in a language allow for it to be counted as one of the learner's or not. Like Weinreich (1953), who already classified different types of bilinguals, voices in multilingualism research have been raised recently which claim that in the light of such potentially differing classifications of learners as just mentioned there is also the need to differentiate kinds of multilinguals, which will be discussed in the subsequent section.

2.2.4 Differentiating Multilinguals

Only recently, a further issue has arisen concerning the differentiation of types of multilinguals. It has been sufficiently discussed in the previous sections that a strict distinction must be made between bilingual and multilingual learners proper. Some scholars now voice doubts that acquisition processes of the second NNL, i.e. the L3, as well as of those acquired beyond, i.e. the Ln, are sufficiently similar to group them together in TALA, and have started calling for discriminating also between kinds of multilinguals. However, an empirically sound and tested framework for specifying multilinguals is not available yet.

To forestall any terminological problems, various criteria could be adduced to classify potential types of multilinguals, depending on the purpose of the respective study. Firstly, one could categorise multilinguals according to the number of languages they know. As just discussed in the previous section (cf. section 2.2.3), this is not as easy as it sounds because the psycholinguistic reality of a multilingual mind does not allow for a simple division of languages. It was suggested to apply criteria like linguistic features to separate languages and thus enable a count, which warrants a straightforward classification of a multilingual into an L3-, L4-, L5-, Ln-learner. To date, for those who are sensitive to the fact that one multilingual is not like another, it is also the most common way of differentiating them (e.g. Dewaele, 2004, 2008), i.e. according to the number of NNLs acquired in chronological order. This is also the case for the present study, which too pursues the quantitative approach of classifying multilinguals, i.e. the second NNL as well as further NNLs acquired will be subsumed under the term *L3/Ln*, unless a more detailed differentiation is required for methodological purposes, such as to be able to single out the source language for CLI.

Another criterion, i.e. proficiency, which could be used to categorise multilinguals was also mentioned already. However, a distinction has to be made between different kinds of proficiency. As pointed out above, proficiency is a rather difficult concept to grasp and to be measured (see section 2.2.3). It should be possible, though, to apply it as a distinctive feature for different kinds of multilinguals. On the one hand, proficiency could be looked at as global language proficiency, despite the fact that it has been shown to be very difficult – if not impossible – to assess properly. Nevertheless, the degree of overall proficiency in the single languages would warrant for a categorisation of multilinguals. On the other hand, one could separate multilinguals also according to their level of competence in the specific linguistic subfields, or according to their proficiencies in the separate skills in the single languages, which would be easier to operationalise but at the same time be more complex. Which aspect of proficiency would be taken as benchmark for a classification would obviously have to depend on the objective of the study. What applies to all proficiency classifications, though, is that they would only be valid for a certain point in time due to the fact that proficiencies fluctuate, as mentioned before (cf. section 2.2.3).

Regarding proficiency in certain skills, the degree of literacy in the single languages is a very specific characteristic that could be applied to discern multilinguals. For instance, a multilingual learner might be literate to varying degrees in his L2, L3 and L5, but not in his L4 because he may have learnt it purely orally via immersion. Integrating a participant like that in a group of other literate multilinguals with knowledge of said L4 could potentially affect the results, depending on the study's objective (e.g. Scribner & Cole, 1981). As Kemp (2009) rightly admonishes, "[depending] on the purpose of the research, it may (…) not be meaningful to mix groups of multilingual participants who differ in their literacy skills" (Kemp, 2009: 22). Another case where the degree of literacy in a language also matters could be in research on the impact of orthography as triggering factor for CLI. For example, if the L5-productions of the above-mentioned multilingual learner who can read and write in his L1, L2, L3 and L5, but is illiterate in his L4 were to be examined for orthographic CLI, obviously no influence from the L4 could be detected because of his lack of literacy therein; results could easily differ for a multilingual who *is* literate in said L4.

A further variable that could potentially be used as differentiation criterion for kinds of multilinguals is the degree of ability to use their single languages across various domains as well as in different social situations within a community (cf. also *polyglossia*/*multiglossia*; Hary, 1992; Kaye, 1994). A multilingual who uses his L3 only in official contexts will have different competencies in the L3 than a multilingual who uses his L3 primarily to communicate with his girlfriend, and consequently would, for instance, bias the results of a study on the use of colloquial language in the L3. As this variable is more relevant to the sociolinguistic or pragmatic strand of research, it does not make too much sense to apply this type of classification of multilinguals to a psycholinguistic study as the present. From such a psycholinguistic perspective, the social and functional roles of a language may actually be neglected because psycholinguists are more interested in language-internal phenomena or acquisition processes per se, rather than in sociolinguistic issues such as reasons for code-switching in a multilingual between several languages in specific situations, with specific interlocutors in specific domains.

Once again, it all comes back to the need for an unambiguous terminology. For the question at hand of whether there are differences in multilinguals, the prerequisite is to define more meticulously what a multilingual (or multilingualism) actually is. Thus, Kemp (2009) would recommend to "give a detailed definition of multilingualism as part of each study (…) [,] [which] would allow others to understand the principles behind the study, and how each study relates to the existing literature" (Kemp, 2009: 24). This seems a reasonable recommendation for all kinds of multilingualism studies because, depending on how multilingualism is defined, its operationalisation has "consequences with regard to how researchers view the language background data they collect from participants and what methods of analysis they then consider they can use on the data, whether qualitative or quantitative" (Kemp, 2009: 22).

Consequently, for the study at hand, *multilingualism* is understood to refer to the state of having sequentially acquired a minimum of two NNLs in an instructed learning context such as school or university (cf. 2.1.1). So, for a psycholinguistic study such as the present, a more fine-grained differentiation of multilinguals will have to be more or less neglected until solid evidence is found and differences between the acquisition of the L3, L4 and L20 can be operationalised unambiguously. Yet, research methodology will have to progress considerably before it will be possible to discriminate multilinguals further in psycholinguistics according to more detailed categorisation criteria.

3. Cross-Linguistic Influence in Third or Additional Language Acquisition: A Systematic Overview

The key concept of this paper is that of *cross-linguistic influence*, a term coined by Sharwood Smith (1983) and Kellerman (1984). In the present study, the term *CLI* will be used interchangeably with the term *transfer*, which will be explained subsequently, to refer to the influence of prior linguistic knowledge mainly on the acquisition and production of a TL (cf. De Angelis 2007: 19). Interest in CLI has been strong in research throughout the last decades, manifesting itself mainly in individual studies (e.g. Gass & Selinker, 1992; Hammarberg & Hammarberg, 1993; Hammarberg & Williams, 1993; Kellerman, 1984; Ringbom, 1987, 2001; Schmidt & Frota, 1986; Selinker, 1992; Selinker & Baumgartner-Cohen, 1995; Sharwood Smith & Kellerman, 1986; Vildomec, 1963; Weinreich, 1953), but also in two general overviews of transfer research (Jarvis & Pavlenko, 2008; Odlin, 1989).

The first fairly comprehensive synthesis of transfer research was written by Odlin (1989) at the end of the 1980s. In 2008, Jarvis and Pavlenko published a volume on "CLI in Language and Cognition", which they meant as a continuation of Odlin's work. With their monograph, Jarvis and Pavlenko wanted to report on transfer studies in the established areas that had been conducted between 1989 and 2008, and the considerable number of new topics that had been started to be investigated since. Their book was moreover designated to put the field's progress into its appropriate scientific context. Nevertheless, they also conceded that their scope was necessarily more limited than Odlin's: in view of the meanwhile considerable body of transfer research, Jarvis and Pavlenko had to restrict their work to where and when transfer occurs as well as to exploring its nature. So they focused on transfer phenomena in adults from a psycholinguistic perspective in order to be able to cope with the expansive material (cf. Jarvis & Pavlenko, 2008: 3).

To give an overview of the concept of CLI and its numerous facets in the present study, firstly a general definition of the term *CLI* including alternative definitions found in the literature will be given, and the different types of CLI will be presented (see section 3.1). Afterwards, in the subsequent sections, factors that predominantly condition CLI between NNLs on various linguistic levels, particularly phonological transfer, will be examined (see sections 3.2 and 3.3).

3.1 Definition and Types of Cross-Linguistic Influence as a Psycholinguistic Phenomenon

Due to the wide range of contributions on CLI in language acquisition, a diversification of the term *CLI* has taken place. This leads to a similar problem as that mentioned for terminological inconsistencies in multilingualism research (see section 2). The main problem is that, although all definitions refer to language contact phenomena[5], they derive from a certain theoretical framework and are consequently also tainted with the notions associated with that theory (cf. Corder, 1983: 86). In their attempts to steer clear from polysemous and ambiguous terms or any unwanted connotations, researchers instead try to coin completely new terms. Often, however, these inadvertently show influence from existing terms, and thus contribute to terminological conundrums and ambiguities (cf. De Angelis, 2007: 8). With regard to language contact research, this has led to a myriad of definitions of the concept of transfer, resulting not only in confusion concerning its reception, but also in uncertainty about naming this language contact phenomenon.

A temporary solution to this dilemma until a generally agreed upon terminology has been established is put forward by Kemp (2009). She suggests that for every study each researcher give a definition of the core term(s) of the respective work to make it clear from the beginning what is being discussed and thus avoid terminological confusion. Thus, following Kemp's (2009) plead, a synthesis of CLI-definitions of the existing literature will be given in the following (see section 3.1.1), the different types of transfer (see section 3.1.2) will be looked at more closely, and the concept of CLI will be described in a working definition tailored to the purposes of the present psycholinguistic study (see section 3.1.3).

[5] The author is aware of the fact that the term *language contact* is used in sociolinguistic research to refer to the convergence of languages of different peoples due to geographic movement, such as migration or conquest, resulting in hybrid languages like pidgins and creoles; however, for the present psycholinguistic work, *language contact* is used in the very general sense of two or more languages being mentally represented in an individual speaker – without any sociolinguistic connotations.

3.1.1 Defining Cross-Linguistic Influence: The Various Facets of Transfer

3.1.1.1 Alternative Terms and Differing Definitions

A negative attitude towards the phenomenon of transfer that persisted for decades until a slow change of mind began in the 1950s is reflected in the early terminology, for instance by Weinreich (1953). A pioneer of language contact research and actually an objective investigator of the phenomenon of transfer, he used the expression *interference* to refer to "instances of deviation from the norms of either language" (Weinreich, 1953: 1) in bilinguals. Clearly, as can be seen from Weinreich's choice of words, *transfer* was understood only in the sense of negative transfer, i.e. as interlingual influence that solely has a negative impact on TL productions. With Weinreich focusing on bilingual speakers, meaning here learners with one NNL besides their L1, this interference was seen to come only from the native language during the acquisition of the L2. However, demonising influence from the L1 completely disregards the potentially facilitative effect previous knowledge of other NNLs in multilingual language acquisition can have on the acquisition and production of another non-native TL.

This possibly positive influence of previous knowledge gradually came to be recognised, and thus new terminological suggestions were brought forth. The first one to advocate the cover term *transfer* for both negative and positive mutual influence of two or more languages was Odlin (1989) in his seminal monograph "Language Transfer". Due to Odlin's encompassing general working definition, the term *transfer* is still widely used: "Transfer is the influence resulting from similarities and differences between the target language and any other language that has been previously (and perhaps imperfectly) acquired." (Odlin, 1989: 27). An especially noteworthy and far-sighted aspect of this definition is that Odlin does not restrict transfer to influence from the L1, as the majority of researchers up to then had (e.g. Corder, 1967, 1992): he includes all previously acquired languages as potential SLs. However, despite this neutral and broad enough – according to some even too broad and thus already again vague (e.g. Fisiak, 1993: 319; Steinhauer, 2006: 16) – definition, Odlin concedes that it still contains some problematic aspects: for instance, how objective judgements of similarities and differences of languages are to be made, especially as he considers this a crucial factor in triggering transfer (cf. Odlin, 1989: 27–28); or how the definition fails to explain what this "influence" actually comprises (cf. Odlin, 2006: 436).

Transfer in the sense of "interlingual influence" also appears in Lado's (1957) "Linguistics Across Cultures", which became the basis for the Contrastive Analysis Hypothesis (henceforth *CAH*) (cf. Müller-Lancé, 2006: 135). The CAH presumed to be able to predict leaner errors based on systematically comparing structural similarities and differences between the L1 and the TL; according to the CAH, these similarities and differences were supposed to lead to positive or negative transfer and thus to facilitation or learning difficulties, respectively (cf. e.g. Lado, 1957: 2; Odlin, 1989: 26; Osgood, 1953: 520; Selinker, 1983: 34). However, the CAH was very much associated with the prevailing behaviorist idea of that time that linked language learning with habit formation. It proposed that in order to successfully acquire a NNL a learner had to overcome L1 habits, the difficulty of which depends on the extent of differences between his L1 and the non-nativeTL (cf. Kellerman & Sharwood Smith, 1986: 2); the more pronounced the differences are the more negative transfer will occur, according to the CAH. Thus, the expression *transfer* carried – and for some still carries – behaviorist undertones.

To avoid such behaviorist connotations, or any positive or negative value judgements for that matter, some researchers replaced the term *transfer* with the theory-neutral cover term *CLI*. It was suggested by Sharwood Smith (1983), Kellerman (1984) or Sharwood Smith and Kellerman (1986) to account for a much wider range of interlingual influence phenomena. Sharwood Smith and Kellerman define CLI very broadly as "the interplay between earlier and later acquired languages" (1986: 1). Similar to Odlin's (cf. 1989: 27) imprecise wording, "interplay" is also a blanket expression that can comprise all sorts of processes as CLI. There also exist various other definitions for CLI (e.g. Dechert & Raupach, 1989; Gass & Selinker, 1994; Jarvis & Odlin, 2000; Kellerman, 1984; Odlin, 1989; Selinker, 1992; Sharwood Smith, 1983) that differ more or less in the extent of which phenomena are covered. Sharwood Smith and Kellerman (1986) even go one step further: they attempt to differentiate between language contact effects that become evident as products of the language acquisition process on the one hand, and those that affect the actual acquisition process itself on the other hand (cf. Jarvis & Pavlenko, 2008: 11; Murphy, 2003: 3; Ringbom, 1987: 58). Therefore, they propose to distinguish between *transfer* and *CLI* because they "would like to see the use of the term 'transfer' restricted to those processes that lead to the incorporation of elements from one language into another" (Sharwood Smith & Kellerman, 1986: 1), ergo to overtly manifested linguistic transfer in TL productions. For the "less obvious modes of CLI resulting in 'avoidance' or differential rates in the acquisition of certain L2 structures" (Sharwood

Smith & Kellerman, 1986: 1), i.e. more implicit phenomena such as language attrition effects or reverse transfer from a NNL onto the L1, however, they suggest *CLI* as the most suitable cover term.

Nevertheless, even Sharwood Smith and Kellerman's (1986) attempt at a neutral cover term has been called into question by relatively recent propositions from multilingualism research, like that by Cook (cf. 1995, 2002). Cook argues that linguistic knowledge in a multilingual's mind is integrated to a certain extent, which he takes up in his notion of *multicompetence* (cf. also section 2.2.1): a language learner's mind consequently contains not only his L1, but additionally all his interlanguages, i.e. the non-native-like learner language systems and further mental processes Cook does not specify. Within this framework, Cook sees interlingual influences as proof to this exceptional linguistic arrangement which he postulates for a multilingual's mind. CLI is then perceived as the result of such an integrated multi-competence rather than of two or more single languages influencing each other (cf. Jarvis & Pavlenko, 2008: 4).

Whichever terminology one follows, the manifestations of transfer are the same. More recent research has begun to distance itself from the dichotomous value judgements on transfer as positive or negative, formerly with a special emphasis on the examination of negative CLI. Instead, the scope of transfer investigations has been extended to linguistic domains that previously were left unexplored: transfer is now conceptualised as comprising a range of phenomena in different subsystems that affect not only TL production but also comprehension as well as various further psycholinguistic processes during language acquisition (cf. e.g. Jarvis & Pavlenko, 2008: 14, 212–213). The latter, for example, include phenomena like preference for or avoidance of certain TL structures, which are obviously more difficult to examine because they do not result in overt errors, as opposed to negative transfer behaviour like substitutions, hypercorrections or overproductions of certain structures (cf. Murphy, 2003: 3; Jarvis & Pavlenko, 2008: 14, 22-23). However, refuting the long-standing belief that transfer only has negative effects, nowadays the potentially beneficial effects of transfer are also taken into account (cf. Jarvis & Pavlenko, 2008: 14).

Regarding the terminology of the present study – although the author is aware of the above-mentioned behaviorist past of the expression *transfer* – it will be used interchangeably with the term *CLI*. Despite the fact that both *transfer* and *CLI* might be flawed, they are the most common and conventionalised terms in the present literature to refer to the concept of interlingual influences (cf. Jarvis & Pavlenko, 2008: 4). So, both expressions are applied here – without any theory-specific undertones (for a detailed definition see also section 3.1.3) – until a more indisputable terminology has been agreed upon.

Besides discussing terminological issues, more recent transfer research is moreover working on what Sharwood Smith and Kellerman (cf. 1986: 7–8) already advocated almost 30 years ago: firstly, to look at all the facets of transfer within the different linguistic subsystems in their own right; and secondly, to widen the inquiry into investigating CLI to include interdisciplinary studies that look at transfer from various angles. So since then, CLI has been explored from linguistic, psycholinguistic as well as sociolinguistic points of view (cf. Jarvis & Pavlenko, 2008: 3), as will be discussed in the subsequent sections.

3.1.1.2 Cross-Linguistic Influence as Linguistic, Psycholinguistic and Sociolinguistic Phenomenon

As multifaceted as transfer is, as diverse have been the approaches to investigating its nature, like the investigation of interlingual influence as a linguistic, psycholinguistic or sociolinguistic phenomenon just mentioned. With regard to the first, i.e. CLI as a linguistic phenomenon (for a more detailed discussion see also sections 3.1.2.4 and 3.1.2.5), this established approach to exploring transfer has a rather narrow focus on occurrences of CLI in the linguistic subsystems such as lexis or syntax, traditionally in bilinguals' productions; these occurrences depend on different factors (see sections 3.2 and 3.3) and vary moreover regarding certain dimensions of transfer (see section 3.1.2), like the directionality of influence or the linguistic domain affected (cf. Jarvis & Pavlenko, 2008: 14, 61; Odlin, 1989: 437; Sharwood Smith & Kellerman, 1986: 7). Transfer as a linguistic phenomenon is described nowadays in terms of how any previous linguistic knowledge of a learner interacting with similar or different structures and forms of a TL may affect its production, perception or comprehension (cf. Jarvis & Pavlenko, 2008: 61, 112).

In the meantime, transfer research has developed into an interdisciplinary field which approaches CLI from various directions (cf. Jarvis & Pavlenko, 2008: 15). It does not only focus on linguistic CLI, but also looks at transfer from further perspectives, like that of psycholinguistics. Whereas the linguistic approach explores CLI regarding linguistic structures and forms (cf. Jarvis & Pavlenko, 2008: 61), i.e. overt linguistic manifestations of transfer, investigations of CLI as a psycholinguistic phenomenon seek to explain the mechanisms underlying such transfer in the individual learner (cf. Jarvis & Pavlenko, 2008: 36). Put in other words, they explore the influence prior knowledge can have on an individual user's production, comprehension and acquisition of a TL (cf. De Angelis & Dewaele, 2009: 69), regardless of whether the results are overt linguistic or more implicit manifestations like avoidance of or preference for certain TL structures. The aim of such examinations of a learner's mental grammar is to gain insight into the actual mental processes that underlie transfer. They further try to understand the interaction of the different factors (according to Jarvis and Pavlenko, "internal [cognitive, conceptual, and affective] and contextual [linguistic, social, and environmental] factors" [2008: 29]) which evoke and constrain these mental processes (cf. Jarvis & Pavlenko, 2008: 29). A pivotal figure of the psycholinguistic approach to CLI, Selinker (1972), for example, sees language transfer as one of five central psycholinguistic processes[6] in language acquisition that are useful for trying to explain interlanguage developmental patterns. What interests psycholinguists most about the CLI process is how, when and why individual learners transfer, i.e. what, when and why it leads them to make mental associations between the forms or structures of two or more languages, thus establishing the basis for CLI (cf. Jarvis & Pavlenko, 2008: 36).

Besides investigating the mental processes CLI is based on, the psycholinguistic approach also wants to explore the different individual learner-internal and contextual factors that promote or hinder transfer: on the one hand cognitive, conceptual and affective variables, and on the other hand linguistic, social and environmental factors (cf. Jarvis & Pavlenko, 2008: 29; see also sections 3.2 and 3.3). Moreover, unlike at the beginnings of transfer research, which focused on interlingual influence between the L1 and the L2 in bilinguals, the interaction of more than two languages and in more than one direction, such as CLI between one or more NNL(s) or from one or more NNL(s) onto the L1, has also been investigated, particularly since the last decade (see section 3.1.2). Consequently, specifically multilingual perspectives and issues, like word selection problems in the multilingual lexicon or the development of

[6] Besides language transfer, Selinker (1972) suggests overgeneralisation, transfer of training, avoidance and hypercorrection as further central psycholinguistic processes, which are assumed to affect interlanguage development on all linguistic levels.

metalinguistic awareness in multilinguals, are being explored as well (cf. De Angelis & Dewaele, 2009: 70–71; e.g. Cenoz, Hufeisen & Jessner, 2003; Dewaele, 2001; Jessner, 2005; Kemp, 2001).

Furthermore, seen from a relatively recent psycholinguistic point of view, CLI does not only manifest itself as language transfer, but it is able to impinge on mental concepts, too. Analogous to the ways in which CLI can be investigated with regard to how the production and comprehension of linguistic structures and forms might be affected by a learner's previous linguistic knowledge, it is also possible to explore transfer with regard to how it affects the mental concepts underlying these linguistic structures and forms (cf. Jarvis & Pavlenko, 2008: 61). As it appears that transfer both from a linguistic as well as from a psycholinguistic view occurs on the level of the individual, both perspectives moreover imply that there is individual variation of the occurrences of CLI, such as concerning their form of manifestation or the factors constraining their emergence (see also sections 3.1.2, 3.2 and 3.3).

A crucial point of examining transfer as a psycholinguistic phenomenon is thus that it is investigated in an individual, i.e. the mental processes underlying an individual learner's uses of transfer are examined. This is opposed to how a sociolinguistic approach explores CLI: from a sociolinguistic perspective, transfer is examined in relation to a whole society as a result of language contact (cf. Jarvis & Pavlenko, 2008: 29). The sociolinguistic approach explores to what extent manifestations of interlingual influences in a language contact situation with two or more speech communities are governed by similar linguistic structures or a common sociocultural past. Hence, the focus lies on interactions between the languages of two or more groups, not on interlingual influences within an individual (cf. Jarvis & Pavlenko, 2008: 29; e.g. Clyne, 2003; Myers-Scotton, 2002; Thomason, 2001; Thomason & Kaufman, 1988).

When it comes to examining transfer from a sociolinguistic point of view, a further term might play a role, i.e. *code-switching*. This is understood as the switching of words up to complete sentences between two or more languages,[7] which again occasions some terminological conundrums.

[7] Besides *code-switching*, some researchers additionally use the term *code-mixing* to refer to a slightly different notion, although some use both *code-mixing* and *code-switching* synonymously. For example, some make the differentiation between *code-mixing*, where neither of the mixed languages is dominant, as opposed to *code-switching*, where a matrix language is clearly discernible (cf. Bußmann, 1996).

Whereas some researchers perceive it to be synonymous with *CLI* (e.g. Steinhauer, 2006), others make a distinction between *code-switching* and *transfer* (e.g. Hammarberg, 2010). Besides the fact that the terms come from different fields, i.e. from a sociolinguistic tradition on the one hand and from language acquisition research on the other, there are two crucial aspects of differentiation between *code-switching* and *transfer*, according to Williams and Hammarberg (cf. 1998: 296): intentionality and proficiency. Code-switching is often performed intentionally by the speaker, usually in order to indicate some sort of group membership. Transfer, on the other hand, frequently occurs unintentionally in learners of a NNL; however, it can also be applied intentionally when it is used as a communication strategy to cope with the learner's insufficient knowledge of the non-native TL (e.g. Faerch & Kasper, 1983), which leads to the second focal difference, proficiency. Speakers who code-switch normally have a near-native to native command in the languages involved in the switching process, which usually occurs in a bi- or multilingual society. Consequently, the results of code-switching processes are grammatically correct mixed utterances that are consistent with the rules of each language or variety involved. NNL-learners, though, especially at beginner's or intermediate level, are still developing their NNL-skills. Due to this lack of sufficient TL-knowledge they draw on previous languages, and thus often end up producing erroneous interlanguage forms with noticeable SL-influence.

In addition to *code-switching*, Williams and Hammarberg (cf. 1998: 296) propose another term with regard to learners producing mixed utterances in a NNL. Further, they discuss the different sources for what they call *non-adapted language switches*, i.e. switches ranging from single words up to entire utterances from language A into language B without any formal adjustments (cf. Faerch & Kasper, 1983): these can occur due to sociopsychological reasons, varying proficiency levels or as metalinguistic comments. Regarding the latter, these switches tend to function, for example, as a comment on the communicative situation at hand; proficiency-related switches into a known language often serve as a coping strategy for dealing with insufficient TL knowledge; and sociopsychologically motivated language switches can, for instance, convey attitudinal information about the language user or the interaction situation (cf. Williams & Hammarberg, 1998: 296–297).[8] However, as soon as a SL-element is integrated into the learner's TL-productions and formally adjusted, for example regarding its morphological structure, this interlanguage product represents an instance of transfer (cf. Faerch & Kasper, 1983: 47; Williams & Hammarberg, 1998: 296–297).

For terminological clarity's sake and to avoid potential sociolinguistic connotations, *code-switching* will not be applied in the present psycholinguistic work; solely the term *transfer* (or *CLI*, respectively) will be used to refer to interlingual influences manifested in an individual learner's non-native TL productions.

3.1.1.3 The Scope of Cross-Linguistic Influence: Transfer as a Communicative or Learning Strategy

The scope of interlingual influences has been conceived varyingly throughout the history of transfer research. Having gone through phases of importance (e.g. Lado, 1957) and negligence (e.g. Dulay & Burt, 1974), the current view on transfer is that it denotes an important and complex aspect of non-native language acquisition (e.g. Gass & Selinker, 1983; Odlin, 1989; Jarvis & Pavlenko, 2008). Within the realm of CLI in individual learners, as is the present study's focus, frequently a differentiation is made between transfer functioning as a learning strategy and transfer functioning as a communicative strategy.

The latter, i.e. CLI as communicative strategy, was already taken up by representatives of the what was later named *Ignorance Hypothesis* (e.g. Krashen, 1983; Newmark, 1966). The hypothesis claimed that interlingual transfer is solely a falling-back on previous linguistic knowledge, especially onto the L1, to cope with an unknown TL (cf. Jarvis & Pavlenko, 2008: 8–9). This is a rather strong assertion which could not be upheld in this form. Drawing on prior learnt languages as a communicative strategy in order to fill TL gaps still *is* a rather common conception of transfer (e.g. Dörnyei, 1995). Nevertheless, it is not the only situation CLI can occur in: transfer is moreover often applied as a learning strategy, as mentioned above (cf. Jarvis & Pavlenko, 2008: 9). In this function, learners resort to previously

[8] According to Williams and Hammarberg (cf. 2008: 296), besides acquiring linguistic knowledge in a NNL, learners possibly also develop knowledge about the usage of said language simultaneously, i.e. strategies of how to code-switch correctly between language A and language B.

learnt languages as a repository for hypotheses about new TL structures, unknown rules or meanings when they expand their interlanguage (cf. R. Ellis, 1994: 314). Using transfer to advance TL knowledge frequently results in hybrid SL/TL structures, as a mixture of source and target language forms and meanings (see also *structural transfer* and *semantic transfer*, section 3.1.2.4) in the TL output, or even as a particular preference or avoidance behaviour towards a specific structure.

Ringbom (1993) also distinguishes transfer as a communicative strategy from transfer as a learning strategy. With regard to the first, Ringbom distinguishes overt transfer, i.e. when learners perceive similarities between their L1 and the language they are acquiring and use this knowledge in TL production and comprehension, and covert transfer, i.e. when learners fail to see any similarity and consequently either tend to omit or avoid certain unknown TL structures or draw on prior languages to fill knowledge gaps in TL production, which mostly results in erroneous TL forms (see Ringbom, 1993: 48–49). Transfer as a learning strategy, according to Ringbom (1993), does not affect only the learners' output – like its use as a communication strategy would –, but actually occasions changes to their interlanguage system. However, these changes to the learner's mental representations of the TL are caused in the first place by applying CLI as a communication strategy. If learners repeatedly keep making use of transfer as a communication strategy with positive results for their TL production or comprehension, it will eventually turn into a learning strategy, according to Ringbom (cf. 1993: 50).

A slightly different angle towards the scope of CLI as a communicative or as a learning strategy is taken by Jarvis and Pavlenko (cf. 2008: 24). According to them, conscious (or *intentional*) transfer is manifested as communicative strategies the learners apply in the new language they are acquiring in order to bridge knowledge gaps in the TL (e.g. Faerch & Kasper, 1983). For instance, in order to communicate in Portuguese an L1-Turkish learner of this Romance language with previous knowledge of Italian, another Romance language, might draw on his Italian lexical knowledge if he cannot think of an appropriate Portuguese word. By making use of such transfer, the learner avoids a breakdown of communication. Unconscious (or *unintentional*) CLI (e.g. Poulisse & Bongaerts, 1994; Ringbom, 1987; Stedje, 1977; Vildomec, 1963), on the other hand, typically emerges when learners establish interlingual mental associations between their languages without being aware of it, thus modifying their TL competence, and then revert to them during language production – also being unaware of this. An L1-Romanian learner of Swedish with German knowledge, for example, might subconsciously associate certain Swedish words to similar words he already knows from German. Whenever he is at a loss of words in TL production, he might still unconsciously draw on his German, even in cases where it is inappropriate.

Important to note is that not all instances of intentional transfer are instances of communicative strategies; similarly, not all interlingual identifications of forms and structures of a SL with those of a TL or further interlingual mental associations are automatically unintentional occurrences of CLI (cf. Jarvis & Pavlenko, 2008: 24). For example, experienced multilingual language learners often analyse the grammatical system of a TL and compare it to the knowledge they have of their previous languages' grammar. If they detect structural similarities, they might form interlingual identifications between the TL and a specific SL(s), which they can refer to and consciously draw on when needed. Being able to recognise such elements that are potentially suitable for transfer is part of learners' metalinguistic competence, i.e. the ability to analyse and think about language that they usually develop when learning languages beyond the L1 (e.g. Jessner, 2006). Applying this metalinguistic competence in language learning thus enables intentional transfer.

An interesting study investigating intentional and unintentional CLI is that by Williams and Hammarberg (1998). They found in their L1-English participant's productions of the TL Swedish with L2 German knowledge that her L1 and L2 in fact played different roles: her L1 performed mainly an instrumental role for metalinguistic comments or further communicative strategies to avoid gaps in the TL communication; whereas the L2 served a supplier role providing lexical material from the L2 (mainly function words) when at a loss in the TL. Again subject to certain factors, such as the above-mentioned linguistic similarity between the potential source and target languages, resorting to the L1 appeared chiefly in intentional switches as opposed to using the L2, which was used for most unintentional language switches (cf. Williams & Hammarberg, 1998: 302). However, as the intentionality of transfer is rather complicated to investigate, particularly cases of unintentional CLI, to date there are still very few studies (e.g. Hammarberg, 2001; Williams & Hammarberg, 1998) that explicitly look at conscious versus unconscious transfer.

Jarvis and Pavlenko (2008) also explore different variables that can promote instances of CLI with a view to whether – together with the transfer they occasion – they can contribute to learning. These factors can affect a learner's performance or competence. Regarding the first, it is more context-related factors which can promote transfer that consequently might have an effect on the actual occurrence of transfer phenomena in language use; whereas structural factors affect transfer that could lead to potential changes of mental representations of the TL (cf. Jarvis & Pavlenko, 2008: 175). Yet, according to Jarvis and Pavlenko (2008: 175), no simple black-or-white classification is possible for a number of factors, which are able to affect both performance and competence. This led them to propose a different kind of categorisation of factors (cf. also sections 3.2 and 3.3).

In sum, the scope of transfer is very complex and multi-faceted. Besides characterising CLI as a communicative or a learning strategy, different researchers have attributed several more different phenomena to it: Krashen (cf. 1983: 148), for instance, relatively early claimed transfer to be only a production strategy without further benefit to interlanguage development; Faerch and Kasper (cf. 1987: 112) see CLI as a "psycholinguistic procedure"; and according to various more or less similar definitions in Gass and Selinker's (1983) edition on "Language Transfer in Language Learning" CLI is further seen, for instance, as an effect of interaction between languages, a process occurring within the learner during interlingual interaction, as a constraint on such interlingual interaction, or as the use of the L1 or any other prior learnt NNL in TL acquisition (cf. also Fisiak, 1993: 319–320).

3.1.1.4 Transferability and Constraining Factors

Regardless of whether CLI occurs as a communicative strategy or as a learning strategy, be it consciously or unconsciously, the generally relevant question for all kinds of CLI remains of how likely the actual occurrence of transfer then *is* from one language onto another. This "likelihood of transfer (…) of a given structure in a given context" (Jarvis & Pavlenko 2008: 12), termed *transferability*, is a central concept put forward by Kellerman (1983) based on previous research (e.g. Jordens 1977; Kellerman 1977, 1978). According to him, transferability refers to the fact that L2 learners[9] tend to transfer less those structures that are perceived as marked or too language-specific. A second constraint suggested by Kellerman, named *psychotypology*, postulates a higher likelihood of transfer when the L2 learners perceive similarities between their L1 and the L2 (cf. Jarvis & Pavlenko 2008: 174; Murphy 2003: 5).

Similarly, Andersen (1983), also following previous studies (e.g. Andersen 1977, 1979, 1980; Schumann 1978; Zobl 1980), delineated a principle that allegedly governs the likelihood of CLI: the *transfer to somewhere* principle. It claims as a necessary condition for the transfer of a certain structure that it has to "be compatible with natural acquisitional principles" or needs to be "perceived to have a similar counterpart (a *somewhere* to transfer to) in the recipient language" (Jarvis & Pavlenko 2008: 174). Despite certain noticeable differences (see Kellerman 1995: 134), Andersen's principle also shares a crucial aspect with Kellerman's constraints: both recognise the relevance of similarities across the respective source and target languages and of the universals in language acquisition as well as the interactions between them (cf. Jarvis & Pavlenko 2008: 174). Interestingly, up to today, numerous empirical studies on transfer still deliver positive evidence for the correctness of both Kellerman's constraints of transferability and psychotypology as well as of Andersen's *transfer to somewhere* principle (cf. Jarvis & Pavlenko 2008: 174; e.g. Kellerman 1995).

Analogously to Andersen's *transfer to somewhere* principle, Kellerman (1995) established the complementing principle of *transfer to nowhere* a little later. While Andersen focuses on the transfer of syntactic structures of the L1 onto the L2, Kellerman rather turns to the learner's conceptual organisation of his L1 and L2 (cf. Kellerman 1995: 137; Murphy 2003: 5). His *transfer to nowhere* principle proposes that besides the kind of CLI that is promoted by a (perceived) interlingual similarity between the L1 and the L2 that then becomes apparent in a learner's TL-output, there is also the type of transfer whose source does not become immediately accessible. This is due to the fact that it is not based on any structural or typological congruence of the L1 and L2 (this refers to the *nowhere* something is transferred to), but rather affects the conceptual organisation of the L2 (cf. Kellerman 1995: 137; Murphy 2003: 5). Based on what Sapir and Whorf already postulated in their hypothesis on linguistic relativity, if a learner's

[9] Kellerman (1983) only refers to "L2 users" or "L2 learners", which reflects the prevailing bilingual bias of that time (see also section 2.2.1; or cf. De Angelis 2007: 15).

L1 determines how he conceptualises his experiences, this conceptual framework can also influence how he conceptualises his L2, with concomitant linguistic features (for a more detailed discussion of conceptual transfer refer to section 3.1.2.4). According to Kellerman (1995) then, linguistic transfer can also be conditioned "by the conceptual need to find an adequate linguistic means of expression in the L2" (Murphy 2003: 6), not only by the perception of cross-linguistic similarity and structural congruence.

However, besides these principles and constraints suggested by Andersen (1983) or Kellerman (1983, 1995), there are various further factors that can have an effect on the rate of transfer or the transferability of structures and concepts. Rather little is known, though, particularly of the variables that condition transferability, increase the likelihood of CLI and govern the specific patterns of transfer that emerge subsequently.

As will be seen further on, for CLI to occur it has to be triggered by a certain catalyst. Such catalysts – or factors, as just referred to – that evoke transfer can be, for instance, language distance between source and target language, proficiency, order of acquisition of the NNLs, age of learning, recency of use of the prospective source language and many more (for a more detailed discussion see sections 3.2 and 3.3). Research in this area is still relatively new. Consequently, many issues are unresolved. It is assumed, for example, that there exists a hierarchy between these factors: certain high-level factors, such as probably proficiency in the source and target language, have more "strength" to trigger CLI than lower-level ones, such as the formality of the context in which the languages are used. This hierarchy, though, remains to be established and validated with empirical studies.

Moreover, these factors presumably are able to accumulate until their combined "strength" reaches a certain threshold level that allows them to trigger CLI. So, depending on the force of the single factors that come together it might require several or only one or two strong variables for CLI to occur. However, to date, this remains mostly speculation due to the lack of an empirical basis.

Still at its beginning of being investigated is also the research on transfer from NNLs and the factors by which it is evoked. Particularly, the impact of the factors probably differs depending on the directionality of transfer, for example whether CLI occurs from the L1 onto the L2 or vice versa. It is moreover quite likely that there are still several factors that influence transferability and the rate of transfer that are still unknown to date. What complicates matters even further is that CLI occurs in individuals, and individuals all differ with regard to which factors they bring with them and how pronounced these are. Not least because of this and due to the fact that the different factors intertwine with each other as well as with other aspects of CLI (such as the directionality of influence, or the number of languages involved; see sections 3.1.2.1 and 3.1.2.2), CLI is a highly complex area that requires thorough investigation.

These are all different aspects to the complex, multi-faceted phenomenon of transfer. In the subsequent section it will be discussed what forms CLI can actually take and according to which dimensions one can classify types of CLI.

3.1.2 Types of Transfer in Third or Additional Language Acquisition

With multiple languages in a learner's mind it is likely that different types of CLI will appear. According to Odlin (cf. 1989: 27), the constellations of source and target languages vary with the number of languages a person knows, and the different kinds of influence can be equally difficult to detect. These different types of CLI can be distinguished according to several dimensions, i.e. according to the directionality of transfer, the number of languages involved, the qualitative outcome of transfer, the cognitive domain as well as according to the language levels where transfer occurs (cf. also Jarvis & Pavlenko, 2008: 19–26), all of which will be looked at more closely in the following sections.

3.1.2.1 Directionality of Transfer

The first possible classification of types of transfer, following Jarvis and Pavlenko's (2008: 19–26) categorisation scheme, can be made according to the direction of transfer while simultaneously taking into consideration the status of the source and target languages: If influence onto a non-native TL comes from the L1, we speak of *forward transfer*, a term that has already been established in transfer research (e.g. Gass & Selinker, 2001; Su, 2001). This type of transfer has received the highest attention in research, and was especially focused on in the early phase of transfer research (e.g. García Lecumberri & Gallardo, 2003; Hammarberg & Hammarberg, 1993; Llisterri & Poch, 1987; Pyun, 2005; Ringbom, 1987).

The second type, the so-called *reverse* or *backward transfer,*[10] refers to influence that is being exerted from a NNL onto the L1, which mainly occurs in learners with a very high proficiency in the non-native SL. The two terms *reverse* or *backward transfer* have become conventionalised in the literature (e.g. Brons, 1994; Cook, 2003; Gass & Selinker, 2001; Su, 2001).

If a NNL influences another NNL (e.g. Cenoz, 2001; De Angelis & Selinker, 2001; Dentler, 2000; Dewaele, 1998; Flynn et al., 2004; Gibson et al., 2001; Hammarberg, 2001; Hammarberg & Williams, 1993; Müller-Lancé, 2006; Ringbom, 1987, 2001), Jarvis and Pavlenko (2008: 21–22) speak of *lateral transfer*[11], the investigation of which is the focus of the present study. A term denoting the same concept, *interlanguage transfer*, was suggested by Gass and Selinker (1983). With *interlanguage*, Selinker (1972), when he coined the term within his Interlanguage Hypothesis framework, referred to the autonomous, structured and dynamic learner-language system that differs from native speaker systems. As numerous researchers agree, learner-language systems have a different status compared to the L1-system,[12] and are also influenced by different factors compared to the L1. Thus, according to Gass and Selinker (1983), it warrants a differentiation between transfer involving the L1 and transfer involving solely NNL systems – the interlanguage transfer. Following Jarvis and Pavlenko's (cf.

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10 The choice of the terms *forward transfer* as well as *reverse* or *backward transfer* is a bit unfortunate because of their ambiguity: Though conventionalised and mostly clearly delineated in the research literature as referring to transfer from the L1 onto a NNL, and to transfer from a NNL to the L1, respectively, the terms could theoretically also be applied to other types based on the order of acquisition of the languages. That is, the former could be used for any kind of transfer occurring in a chronologically forward direction (e.g. from L2 to L3, from L6 to L7), regardless of the status of the languages as L3, L6 or Ln; similarly, the latter could be applied to any type of transfer in the backward direction (e.g. from L3 to L2, from L7 to L6).

11 Apparently, the term *lateral transfer* within traditional transfer terminology draws on a spatial metaphor, like the above-mentioned terms *forward* or *reverse transfer*. According to the online OED, the core meaning of *lateral* reads as follows: "**lateral, *adj* (…) 1. a.** Of or pertaining to the side; situated at or issuing from the side" (http://www.oed.com/view/Entry/106073?redirectedFrom=lateral#eid, accessed 26.05.2016), and thus fits clearly into the spatial-metaphor terminology. Hence, *lateral transfer* denotes CLI from one NNL situated on the same horizontal level like the NNL it influences, occurring "from the side", because it does not assume that one NNL preceded the other chronologically in terms of acquisition – regardless of whether it does or not (cf. personal communication with Aneta Pavlenko, 25.11.2011).

12 Simultaneous first language acquisition will not be dealt with in the present work.

2008: 22) argumentation, however, *lateral transfer* will be used here as the term referring to influence from one NNL onto another in order to circumvent any unwanted bias associated with the expression *interlanguage transfer*. Besides, the term conforms with the continuity of the previous two types of transfer mentioned, i.e. *forward* and *reverse* or *backward transfer*, that also draw on a spatial metaphor to indicate the direction of the interlingual influence.

The discussed types of CLI can also be classified along another angle of directionality, i.e. according to whether transfer occurs in a unidirectional, bidirectional or, in multilingual learners' case, potentially even multidirectional way, as will be explained below. The unidirectional kinds of CLI concern types of transfer that go in one direction from a SL onto a TL. Bidirectional transfer, on the other hand, refers to CLI from SL A onto TL B, but in this case, SL A simultaneously becomes also the TL of transfer originating from TL B. In a multilingual learner, the set-up becomes even more complicated: it is also possible for multidirectional transfer to occur if there are at least three languages in a learner's mind, i.e. multidirectional influence then refers to simultaneous CLI from three or more languages onto each other.

Combining both angles of directionality thus leads to a complex taxonomy of types of transfer that includes instances such as simultaneous forward and reverse bidirectional transfer (i.e. L1 onto a NNL and synchronously the same NNL onto the L1), simultaneous lateral bidirectional transfer (NNL-1 onto NNL-2 and synchronously NNL-2 onto NNL-1), and a myriad of other possible configurations of influence in multidirectional transfer. A most basic example would be forward transfer from the L1 onto NNL-1 and NNL-2, combined with reverse transfer from NNL-1 and NNL-2 onto the L1, as well as simultaneous lateral transfer from NNL-1 onto NNL-2 and vice versa – the potential configurations increasing in complexity with the number of languages a multilingual knows (cf. Jarvis & Pavlenko, 2008: 22).

3.1.2.2 Number of Languages Involved

Closely connected to the directionality of CLI is the number of languages involved in the transfer process. Traditionally, transfer has been conceptualised as a one-to-one type between one source and one target language (cf. De Angelis 2007: 20–21). For instance, if an L1-German learner of English produces pronunciations like [letmisɪŋk] instead of

/letmiθɪŋk/, a clear influence on the TL English can be determined from the L1-German sound system with its lack of the interdental fricative /θ/, which learners tend to compensate with the alveolar fricative /s/. This is opposed to what has been termed *combined CLI* by De Angelis, "the simultaneous influence of more than one language upon a target language, i.e. a many-to-one type" (2007: 21), or more detailed:

> [Combined] CLI is a type of transfer that occurs when two or more languages interact with one another and concur in influencing the target language, or whenever one language influences another, and the already influenced language in turn influences another language in the process of being acquired.
>
> (De Angelis, 2007: 49)

Thus, this combined CLI can either occur from two or more SLs at the same time, or one after another. For example, language A influences language B, resulting in hybrid A/B-forms, which in turn then influence language C and produce further hybrid forms. An example of this kind of combined CLI can be found in Llama et al.'s (2010) study on the acquisition of aspiration rates in 18 learners of Spanish with L1 Canadian French and L2 Canadian English or L1 Canadian English and L2 Canadian French. Measuring the voice-onset-time values (henceforth *VOT values*) in their subjects' L2 productions, it turned out that they did not resemble monolingual values, but exhibited L1-L2 hybrid values in both groups, pointing to influence from the L1 during L2-VOT acquisition. Besides, the L2 and the TL-Spanish VOTs were very similar as well, which additionally suggests transfer of the hybrid L2 values onto the TL. Hence, the TL-aspiration rates, which more or less mirror the L2 hybrid values, are likely the result of combined influence from the L1 and the L2 onto TL productions – i.e. simultaneous influence first from the L1 onto the L2, and then from the L2 onto the TL.

One-to-one CLI is thought to occur predominantly in L2 learners, as they have only access to their L1 and L2, although it might also appear in L3/Ln acquisition, of course. However, in most cases it will be rather difficult to attribute it to only one specific SL among several that may be interacting, like in the latter case of combined CLI; this is believed to be the common type of CLI between multiple languages in an L3/Ln learner's mind. As in many areas of L3/Ln acquisition, research on combined CLI is rather scarce (Chamot, 1973; Chandrasekhar, 1978; Clyne, 1997; Clyne & Cassia, 1999; De Angelis, 2005; Dewaele, 1998; Möhle, 1989; Odlin & Jarvis, 2004; Ringbom, 1987; Singleton, 1987), probably due to the methodologically highly difficult task of differentiating the numerous potential SLs. Already in 1973, though, Chamot conducted a study on what De Angelis classifies "a form of combined CLI" (2007: 53), i.e. on *double interference*. In her study, Chamot recorded a French-Spanish bilingual boy learning English in the US. She noted how the boy struggled to acquire phonetic features which are very much alike in French and Spanish but differ from English, and ended up replacing the target feature with the similar French-Spanish feature. Chamot concluded that this phonetic similarity facilitates combined CLI, which will also be looked at more closely later on (see sections 3.1.2.5 and 3.3).

3.1.2.3 Outcome of Transfer: Positive and Negative Cross-Linguistic Influence

A further possibility of distinguishing types of CLI is according to the qualitative outcome of transfer, i.e. negative or positive CLI[13]. The former refers to the transfer of different or similar, but not identical items from the source into the target language, which leads to incorrect TL representations. This negative CLI, or *interference* (see section 3.1.1), has been the focus of many studies so far (e.g. Odlin, 1996), despite the fact that only few learner errors derive from negative transfer (e.g. Ringbom, 1987: 69). Nevertheless, it is a significant concept to include in language teaching to make learners aware of potentially wrong transfer from one language into the other. Positive CLI, on the other hand, refers to the fact that a particular item is found in the source as well as the target language and can be transferred. Several researchers acknowledge the potential of positive transfer in facilitating non-native language acquisition: it is easier for learners to recognise or produce certain items in the TL if they are already familiar with them from one or even more SLs (e.g. Kecskes & Papp, 2000; Yip & Tang, 1998).

In L3/Ln learning, positive (but also negative) CLI acquires an additional form in that the transfer of a feature is possible that might exist in the non-native source and target language, but not in the learner's L1. This concept has been begun to be exploited in language teaching and learning only recently, despite the doubtlessly facilitating effect it could have. With respect to taking advantage of positive CLI in L3/Ln phonology, for example, a study was conducted by Marx and Mehlhorn (2010). They compared phonetic similarities between English as L2 and German as L3 in

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[13] Especially Selinker (1969) helped coin the terms *positive* and *negative transfer*, based on the establishment of the underlying concepts presented in previous research for example by Weinreich (1953).

order to detect possible features to utilise for positive transfer into the L3 German.

There are two approaches to assessing the outcome of transfer (Jarvis & Pavlenko 2008: 25): the first one derives from a pragmatic-discourse analytic point of view and examines whether the interlocutor understood the learner, whether the learner successfully conveyed the illocution and thus accomplished the intended communicative purpose, and whether the learner's productions managed to achieve, for instance, the appropriate register in a certain situation. As Jarvis and Pavlenko (2008) point out, the more traditional approach to analysing CLI, however, is to look at the learner's linguistic competence and compare his TL-productions with a view to what forms TL-native speakers would display. Obviously, it is rather complex and complicated to determine whether the outcome of transfer is positive or negative. It is even questionable if it sometimes can be decided at all whether it was CLI and not another psycholinguistic process such as overgeneralisation or hypercorrection during the development of the interlanguage system that affected the interlocutors' mutual understanding, the success of the illocution or the appropriate linguistic form. In any case, differentiating positive from negative transfer is going to be a rather subjective decision in many instances, and often no unambiguous decisions as to the outcome can be made at all. More recent studies circumvent this problem entirely and reject the value judgement of positive and negative transfer; instead, they try to "account for overall effects of CLI" (Jarvis & Pavlenko, 2008: 25; e.g. Cook, 2002).

3.1.2.4 Cognitive Level: Structural, Semantic and Conceptual Transfer

Another dimension of transfer classification is that of the cognitive level. The possible interaction of languages on three different cognitive levels, i.e. the levels of structural, semantic or conceptual representations, analogously leads to a differentiation between structural, semantic and conceptual transfer (cf. also Jarvis & Pavlenko, 2008: 22–23). These types of transfer may appear either only on one level or may cross levels and occur on the conceptual, semantic and/or structural level simultaneously (e.g. Jarvis, 2000a).

Structural transfer is the type of CLI the majority of studies in transfer research so far has been concerned with, and is also the present study' focus. It refers to instances of interlingual influence on the structural-representations level, or lexeme level, between the source and target languages. That means, a SL can influence how a certain form or structure in the TL is perceived, comprehended or produced (cf. Jarvis & Pavlenko, 2008: 61). These TL forms and structures concerned may pertain to any of the structural linguistic domains – be it syntax, morphology or phonology (see section 3.1.2.5) – and, as was discussed above in section 3.1.2.2, also more than two languages can be involved in structural transfer.

The second type of transfer according to the cognitive level involved is semantic transfer (e.g. Ringbom, 1987, 2001). This concerns the influence of one or more SLs on the semantic-representations level, or lemma level, onto the mental links between concepts and words, or between lexemes and lemmas of the source and target languages (cf. Jarvis & Pavlenko, 2008: 120). For example, an L1-Italian learner of German saying "Ich habe mir in die *<u>Sprache</u> gebissen!" (author's translation: "I bit myself in the <u>tongue!</u>") shows semantic transfer from his L1: in Italian, the word *lingua* means both "tongue" and "language", whereas the TL German has two different lexemes, i.e. *Zunge* for "tongue" and *Sprache* for "language". Due to the polysemy of Italian *lingua*, the learner errs on the semantic level and fails to link the concept TONGUE with the correct German target word *Zunge*.

However, CLI does not only ensue from linguistic differences or similarities of the source and target languages, as in structural or semantic transfer. Differences and similarities of the conceptual organisation across languages can also be the reason for the occurrence of CLI, i.e. of conceptual transfer (cf. Jarvis & Pavlenko, 2008: 112; e.g. Graham & Belnap, 1986; Ijaz, 1986; Jarvis, 1997, 1998, 2000b; Jarvis & Pavlenko, 2008; Kellerman, 1978, 1986, 1995; Kecskes & Papp, 2000; Lado, 1957; Odlin, 2005; Pavlenko, 1996, 1997, 1999, 2002a, b, 2003a; Pavlenko & Jarvis, 2001, 2002). This kind of transfer involves influence of mental representations of language-mediated concepts of a SL, i.e. concepts that have a "predetermined means of linguistic expression" (Jarvis & Pavlenko, 2008: 114), onto linguistic performance in a TL. It then manifests itself in overt linguistic forms on all of its levels – mainly, but not only, in lexis and grammar (also in pragmatics, discourse conventions, etc.). For instance, L1-German learners of Spanish only possess one conceptual category of state of being in their mother tongue, i.e. a permanent one. This can lead to confusion when it comes to expressing themselves in the TL because Spanish makes the more detailed distinction of permanent versus temporary states of being, using the verb *ser* for permanent states and *estar* for temporary ones. In order to be able to use both *ser* and *estar* correctly in the TL, L1-German learners need to modify their conceptual system and integrate an additional conceptual category of temporary state of being. Similar conceptual rearrangements or extensions are necessary, for instance, when acquiring Mandarin Chinese and when the learner's existing conceptual system differs from it, for example, in the way of classifying kinship (Mandarin Chinese differentiates between "older brother", 哥哥 *gēge*, and "younger brother", 弟弟 *dīdi*, as well as between "older sister", 姐姐 *jiějie*, and "younger sister", 妹妹 *mèimei*) or gender (no grammatical gender exists in Mandarin Chinese).

Obviously, the more languages there are in a person's mind, the more complicated the conceptual structures are; and naturally, the interlanguage systems might show deficits to varying degrees regarding conceptual categories that belong to a certain NNL, errors in the mapping of the same onto linguistic forms and vice versa, or might lack semantic knowledge and other structural information compared to native speakers (cf. Jarvis & Pavlenko, 2008: 120). But typically, learner language systems keep changing, i.e. rearranging and incorporating new conceptual, semantic and structural representations, and thus the frequency of occurrence of conceptual, semantic or structural transfer is likely to decrease (e.g. Selinker, 1972).

The main difference between the three types of CLI with regard to the cognitive level involved is that of its source: structural transfer originates on the lexeme level, semantic transfer on the lemma level, and conceptual transfer on the conceptual-representations level. For instance, reverting to the *lingua – Zunge/Sprache*-example: whereas semantic transfer only involves failing to re-link concepts and words (or lexemes and lemmas) on the semantic level (cf. Jarvis & Pavlenko, 2008: 120), conceptual transfer, on the other hand, stems from failing to modify conceptual categories or to acquire new conceptual distinctions when learning a TL, and instead solely drawing on the conceptual categories acquired in the SL – it thus purely concerns the conceptual level.

Most CLI studies so far have focused on structural transfer – possibly because it seems easier to investigate a CLI process that involves structural manifestations in a TL that can be traced back to the influence of linguistic forms and structures of one or more SLs, rather than to examine influence of less tangible conceptual or semantic representations of one or more SLs onto a TL. Nevertheless, there is still a considerable scarcity of studies of all three transfer types discussed in this section: a general dearth of research on both conceptual and semantic transfer, as well as a lack of systematic and empirically rigorous studies on structural transfer. As mentioned above, the present study will contribute to and concern itself with the latter, i.e. structural transfer on the level of phonology.

3.1.2.5 Linguistic Levels

Linguistic transfer can further be classified according to the linguistic level it occurs on. The focus of most older transfer studies lay on the levels of lexis and phonology; the existence of CLI in other domains, especially in syntax and morphology, was negated (e.g. Dulay & Burt, 1974; Felix, 1980; Rutherford, 1983; Zobl, 1986). More recent research has shown, however, that syntax and morphology are indeed also subject to transfer, as well as other linguistic areas, such as discourse conventions (e.g. Carroll et al., 2000; Connor, 1996; Kecskes & Papp, 2000; Shi, 2002), pragmatics (e.g. Eisenstein & Bodman, 1993; Olshtain, 1983; Takahashi, 1996; Takahashi & Beebe, 1993) or sociolinguistic aspects (e.g. Beebe, 1980; Lee, 2000; Schmidt, 1977; Yu, 2004).

Lexical transfer refers to "the influence of word knowledge in one language on a person's knowledge or use of words in another language" (Jarvis & Pavlenko, 2008: 72). Part of such lexical knowledge is semantic knowledge. Due to this close relationship it has to be noted that lexical transfer is closely connected with semantic transfer; standing in a hierarchical relationship, semantic transfer can be regarded as a kind of lexical transfer. Besides semantic transfer (or, more precisely, negative meaning transfer resulting in semantic errors), Jarvis and Pavlenko (cf. 2008: 75) also report morphophonological errors co-occurring with lexical transfer. As mentioned above (see section 3.1.2.4), language knowledge is represented in the human mind on three levels, i.e. the structural- (lexemes), semantic- (lemmas) and conceptual-representations (mental concepts) levels (cf. Jarvis & Pavlenko, 2008: 82; e.g. De Bot, 2004; Kroll & De Groot, 1997; Levelt, 1989; Pavlenko, 1999). Semantic transfer occurs on the lemma level as a result of the interaction of one or more source and target languages, affecting the word–word (lexeme–lemma) or concept–word (concept–lemma) connections of the source and target languages (cf. Jarvis & Pavlenko, 2008: 120); whereas morphophonological CLI, relating to form rather than meaning, appears on the lexeme level as formal transfer, which will be discussed further on in the present section. So, the distinction is made between formal lexical transfer (or *formal transfer*) on the one hand, and semantic lexical transfer (or *lexicosemantic transfer*; *semantic transfer*) on the other hand (cf. Jarvis & Pavlenko, 2008: 75).

Formal lexical transfer can result in morphophonological errors such as using a false friend in the TL (e.g. English *at the time he works in a *fabric*: CLI from Swedish *fabrik* = "factory"; cf. Ringbom, 1987: 117), unintentionally borrowing a complete word from another language and integrating it in the TL (e.g. Portuguese *É bonito, *pero não gosto* = "It's pretty, but I don't like it": CLI from Spanish *pero* = "but" onto Portuguese *mas* = "but"; personal example Wunder), or creating a new word by an amalgamation of different languages (e.g. English *In the morning I was tired and in the evening I was *piggy*: CLI from Swedish *pigg* = "refreshed"; cf. Ringbom, 1987: 117). Semantic lexical transfer, by contrast, involves errors like using a real word from the TL, but with a semantic aspect of a corresponding SL word, consequently unsuitable in the context at hand (e.g. German *Mein Latin Dance Club organisiert viel *Konkurrenz in England* = "My Latin Dance Club organises many competitions in England": CLI from English *competition* = German "Konkurrenz; Wettbewerb" – meaning of the German translation of English *competition* transferred onto the TL-German word *Konkurrenz*; personal example Wunder); or making use of a calque, a word-by-word loan translation, in the TL with additional transfer of semantic properties from a SL-lexical item in a combination of multiple TL words (e.g. English **child wagon* = "pram": CLI from Swedish *barnvagn*: *barn* = "child", *vagn* = "wagon"; cf. Ringbom, 1987: 117). Besides, some studies (e.g. Graham & Belnap, 1986; Jarvis, 2003) have shown that often, instead of using the TL-form with a completely exchanged SL-meaning, the SL-meaning is simply extended to the TL-word meanings (cf. Jarvis & Pavlenko, 2008: 81; e.g. Meo Zilio, 1993; Steinhauer, 2006). Often, however, no clear-cut decision can be made as to whether a particular instance of transfer at hand constitutes pure formal transfer or pure semantic transfer, respectively; both types co-occur frequently, although there are certain factors that tend to promote formal transfer and others that facilitate semantic transfer (cf. Jarvis & Pavlenko, 2008: 76; see also section 3.2).

Semantic transfer – but also other types of linguistic CLI – predominantly involves a learner associating TL-structures with certain SL-structures. Therefore, when the learner uses forms in one of the languages the parallel form in the other tends to be activated as well, thus opening the door for transfer (cf. Jarvis & Pavlenko, 2008: 82). This phenomenon depends on how lexical knowledge is arranged and processed in our minds. Looking at the organisation of the mental lexicon, notably of the multilingual lexicon, inferences can be drawn about how transfer – especially semantic transfer – ensues.

Most approaches to modelling the mental lexicon and lexical access are based on connectionist ideas (e.g. De Bot, 1992; Dijkstra & van Hell, 2003; Singleton, 1999): The mental lexicon can be modelled as a neural network, where lexemes, lemmas and concepts are interconnected by various links. These single items on the different representation levels are accessed via activation spreading over the synapses to all nodes connected to them. In the multilingual lexicon, according to the vast majority of studies, structures across all representation levels can most probably be interconnected additionally across all languages (e.g. Meara, 1999, 2004), either directly word-to-word or indirectly word-to-concept. Consequently, the "knowledge of words in one language may affect how we learn, process, and use words in another language" (Jarvis & Pavlenko, 2008: 74).

With regard to the direction of influence, the L1 seems to be the preferred SL for semantic transfer. It also occurs – though more rarely – as reverse (e.g. Jarvis, 2003; Pavlenko & Jarvis, 2002) and lateral semantic transfer, depending on certain variables (see section 3.2). Formal lexical transfer, on the other hand, also has been attested in the literature and by anecdotal evidence in the forward direction from the L1 and in the reverse direction from a NNL onto the L1, as well as very prominently in the lateral direction (cf. De Angelis, 2007: 41; e.g. Cenoz, 2001; De Angelis & Selinker, 2001; Dentler, 2000; Dewaele, 1998; Ecke, 2001; Gibson & Hufeisen, 2003; Hammarberg, 2001; Hammarberg & Williams, 1993; Herwig, 2001; Möhle, 1989; Müller-Lancé, 2006; Ringbom, 1987, 2001; Rivers, 1979; Odlin & Jarvis, 2004; Vildomec, 1963).

The existence of both morphological and syntactic CLI has been negated by many sceptics throughout transfer research for a long time. Only relatively recently, empirical evidence has started to appear and keeps being procured in an increasing number of studies, proving that both types of transfer do exist. The far-sighted researcher Weinreich already warned in his seminal work "Languages in Contact" (1953) of premature judgements regarding what can and what cannot be transferred in morphology, especially with a view to the extreme dearth of empirical studies around back then. Particularly the transferability of bound inflectional morphemes was negated (e.g. Krashen, 1978; Whitney, 1981), but several studies have proven sceptics about transfer of bound morphemes wrong (e.g. Colson, 1992; De Angelis & Selinker, 2001; Dušková, 1969; Selinker & Lakshamanan, 1992). Although the amount of research on morphological CLI to date is still manageable, it is possible now to attest morphological CLI for free and bound derivational morphemes as well as for free and bound inflectional morphemes. From what we know so far, however, it seems that morphological CLI is one of the less frequent kinds of transfer compared to, for instance, lexical transfer (e.g. Odlin, 1989). Steinhauer's (2006) explanation for this is that especially bound inflectional morphology represents a rather rigid, closed system and thus is less likely to allow the intrusion of morphemes from other languages (cf. 2006: 47). According to her, what might look like morphological transfer at first sight may in fact be rather a simplification or overgeneralisation strategy employed by the learner to be able to cope with an unfamiliar, complex morphological system (cf. Steinhauer, 2006: 50).

However, it appears that the factor of formal similarity probably promotes morphological CLI (for a more detailed discussion see section 3.2), although some studies also attest for the existence of morphological CLI between relatively dissimilar, unrelated languages (e.g. Dawkins, 1916; Jarvis, 2002; Jarvis & Odlin, 2000; Master, 1997; Orr, 1987). Nevertheless, if languages share a similar inflectional system or rather free, autonomous morphemes, nothing stands in the way of any kind of morpheme to be possibly transferred from one language into another (e.g. Clyne, 1997; De Angelis & Selinker, 2001). This similarity may furthermore not only encourage morphological CLI manifested in language production but also in language comprehension, although it requires even more accurate examination to detect it. Comprehension is thus helped because cross-linguistic similarity enables such interlingual identifications as the discovery of parallel morphological structures in two languages. This then permits the transfer of the meaning of the known structure onto the new one. Contrary to mono- or bilinguals, multilingual learners have the undoubted advantage of having more linguistic knowledge at their disposal. They thus can use it as additional bases of comparison for interlingual identifications in language production and comprehension. This is possible due to the fact that morphological transfer can occur in all directions (cf. Jarvis & Pavlenko, 2008: 96) – forward, reverse (e.g. Pavlenko & Jarvis, 2002) as well as lateral (e.g. Bouvy, 2000; Clyne & Cassia, 1999; De Angelis & Selinker, 2001; Hammarberg, 2001; Jarvis, 2002; Jarvis & Odlin, 2000). Regarding the latter, Hammarberg (2001), for example, found instances of transfer of inflectional morphemes from his subject's L2 German onto her L3 Swedish at the initial stages of acquisition. When trying to produce the Swedish target word *tält**a*** (= "to camp") she instead realised the incorrect form *tält**en***, which exhibits L2 CLI from the German equivalent *zelt**en***: to compensate for her lack of knowledge of the TL-Swedish inflectional system, the learner obviously drew on her L2 for the infinitive inflectional morpheme (i.e. German {-en} versus Swedish {-a}), which she then added to the correct Swedish stem.

Besides morphological CLI, as mentioned above, the existence of syntactic CLI was also seriously doubted, but is being confirmed in more and more studies (e.g. Hahn & Angelovska, 2011, 2012; Flynn et al., 2004; Pavlenko & Jarvis, 2002; Zobl, 1992). Syntactic transfer in production was investigated exploring, for instance, word order (e.g. Alonso, 2002; Luján et al., 1984; Selinker, 1969), branching directions of relative clauses (e.g. Flynn et al., 2004; Schachter, 1974), article placement and use (e.g. Diehl et al., 1991; James, 1994; Jarvis, 2002; Master, 1997; Pavlenko & Jarvis, 2002; Young, 1996) or the marking of subjects (e.g. James, 1994; Phinney, 1987; Selinker & Lakshamanan, 1992; Vainikka & Young-Scholten, 1994; White, 1985; Yuan, 1997). To give an example, various studies on subject marking compared L2 productions of learners whose L1 differs from the TL in the sense that it allows null subjects because gender and person are clearly deducible, for instance, from the verb or certain lexemes, so that additional marking by a pronoun is not required, such as in Spanish, Italian, Mandarin Chinese or Korean (e.g. Spanish "*La Princesa y el Guisante* me gusta mucho. **Es** un cuento de hadas muy bonito." – author's translation: "I like *The Princess and the Pea* a lot. **It is** a very nice fairy tale."). Nevertheless, they found that their participants still used null subjects in the TL despite it being ungrammatical (e.g. English "I like *The Princess and the Pea* a lot. __ ***is** a very nice fairy tale."), thus transferring from their L1.

The just described forward syntactic transfer from the L1 onto the L2, however, is not the only possible direction of influence. Reverse syntactic transfer has also been described in the literature (cf. Jarvis & Pavlenko, 2008: 102). With regard to lateral syntactic transfer, there is a great dearth of studies, although more and more studies are being conducted to investigate lateral (e.g. Angelovska & Hahn, 2011, 2012; Bardel, 2006; Bardel & Falk, 2007; Flynn et al., 2004; Gibson et al., 2001; Odlin & Jarvis, 2004; Sjörgen, 2001) as well as reverse transfer (e.g. Altenberg, 1991; Cook et al., 2003; Gürel, 2004; Jarvis, 2003; Köpke, 2002; Pavlenko, 2002b; Pavlenko & Jarvis, 2002; Su, 2001) in syntax. On top of that, though empirically invalid, anecdotal evidence galore exists for syntactic influence between NNLs and from a NNL onto the L1. Regarding the latter reverse syntactic transfer, for instance, the author of the present study can add to the anecdotal body of evidence reporting on CLI from her L2 English onto the L1 German regarding adverbial placement in sentences. She has observed repeatedly that she keeps integrating adverbials in the German word order analogous to the placement of certain adjuncts in English, such as in "Die brandneue Nichte ist relativ pflegeleicht anscheinend." (author's translation: "The brand new niece is relatively easy to handle, apparently."), thereby creating a marked sentence in German.

A further neglected type of transfer regarding the linguistic level it occurs on is orthographic CLI. To be precise, according to Jarvis and Pavlenko (2008: 70), a more appropriate term would be *writing system transfer* because it refers less to language-immanent transfer like that of word order or meaning from one language into another; it rather operates on a level where aspects like certain grapheme–phoneme correspondences of the orthographic system are being transferred. A prerequisite for writing system transfer to occur at all is that the learner has to be literate in at least one of the two languages, i.e. either in the SL or in the TL.[14] The most frequent kind is orthographic transfer in forward direction, when the learner is literate in the SL and is in the process of becoming literate in the TL. By the learner comparing the orthographic systems of source and target language, the likelihood of transfer is raised (cf. Odlin, 1989: 124).

This transfer from the orthographic system of the L1 can occur in comprehension (i.e. reading) as well as in production (i.e. spelling, speaking). With regard to reading, an important aspect to consider is whether the specific source and target languages are alphabetic (e.g. Italian, English or Czech) or nonalphabetic (e.g. Japanese, Mandarin Chinese or Korean). Apparently, if learners come from an alphabetic L1 background, they approach acquiring reading skills in a NNL differently compared to learners whose L1 orthography is nonalphabetic (cf. Jarvis & Pavlenko, 2008: 70). In studies exploring this (e.g. Akamatsu, 2003; Muljani et al., 1998; Wade-Woolley, 1999; Wang et al., 2003), it was discovered that if a learner who is already familiar with an alphabetic writing system from his L1 acquires English – also an alphabetic writing system –, he preferably draws on phonological aspects to facilitate reading-skills acquisition in the non-native TL English. On the other hand, if the learner's L1 differs from the TL English in that it has a nonalphabetic orthography, the learner pays more attention to the TL orthography itself than to the sound system (cf. Jarvis & Pavlenko, 2008: 71). So, the L1 of a learner seemingly plays an important role in learning to read, particularly when the learner still lacks sufficient knowledge to cope with the unfamiliar new orthography at the beginning (e.g. Wade-Woolley, 1999).

[14] If a language does not even possess a tradition of writing, obviously no transfer of writing systems can occur in that language as TL.

The L1, however, does not only affect the acquisition of reading abilities, but the development of spelling skills as well. Learners also allegedly draw particularly on their L1 when they are still in the early stages of their literacy development in the NNL (cf. Jarvis & Pavlenko, 2008: 72). In spelling errors in the non-native TL, the ostensible influence of a learner's L1 can be seen: either they result from a lack of distinction between certain sounds and/or graphemes in the L1 that exist in the TL and vice versa, or they are due to non-native TL sounds that are perceived in terms of L1-phonological categories and are consequently attributed corresponding L1 spelling, which results in incorrect TL forms (cf. Okada, 2005: 177; e.g. Bebout, 1985; Seeff-Gabriel, 2003).

Particularly interesting are the asymmetric relationships between certain source and target languages when it comes to the degree of difficulty of their respective writing systems. English, for instance, with its very low ratio of grapheme-phoneme correspondence, where usually several graphemes or grapheme combinations correspond to one phoneme (e.g. <f>, <ff> and <gh> correspond to /f/), poses many orthographic difficulties for native speakers and non-native learners alike. Conversely, writing systems of languages like German or Spanish with a very high ratio of grapheme-phoneme correspondence, i.e. orthographic systems that approach a one grapheme/one phoneme relationship, will not be as difficult to acquire. Consequently, an L1-English learner of German is likely to have fewer problems learning the German spelling system compared to an L1-German learner of English acquiring the English orthography (cf. Odlin, 1989: 127).

Contrary to the facilitating forward transfer of shared L1- and non-native-TL orthographic aspects, writing system transfer can also occur in the reverse direction from a NNL onto the L1 (e.g. Clyne, 2003; Cook & Bassetti, 2005; Kecskes & Papp, 2000) as well as between NNLs (e.g. Angelovska & Hahn, 2011), with positive and negative outcomes. However, like many aspects of certain types of CLI, there is also a general lack of research on orthographic transfer, especially regarding mentioned reverse CLI and even more so for the lateral direction. The only study to date, to the present author's best knowledge, of lateral orthographic transfer is an investigation by Angelovska and Hahn (2011). Besides failing to cover different directionalities, most studies to date have focused on English as the TL and on orthographic influence in the written language, i.e. in reading or spelling, but rarely in spoken language (cf. Jarvis & Pavlenko, 2008: 70).

Concerning the latter aspect of how writing system transfer can also be connected to spoken language, it must be noted that many spelling errors originate from the phonology of the SL, not solely the orthographic system (Odlin 1989: 124). Proof to his claim, for instance, is an example by Ibrahim (1978): His L1-Arabic learners substituted <b> for <p> in the TL English, producing TL forms like **blaying* (= *playing*) or **bicture* (= *picture*), due to the failure of their L1 Arabic to make the distinction between the voiced and voiceless bilabial plosives /b/ and /p/ like English does, which has obvious consequences for the learners' TL orthography. Consequently, even if a learner is not literate in the SL but only in the TL, orthographic CLI from the SL can occur, triggered by the SL sound system.

Exactly contrary to the fact that pronunciation can be a source for writing system transfer, a language's orthography might conversely also become the reason for phonological transfer to occur and thus affect the TL pronunciation (see section 3.3.5): learners tend to draw on their L1's sound-spelling correspondences when trying to pronounce words in a non-native TL (cf. Jarvis & Pavlenko, 2008: 70). Again, much anecdotal evidence attests to this but, once again, there is a lack of empirical studies that unambiguously confirm the existence of such phonological CLI.

Phonological transfer is defined by Jarvis and Pavlenko (2008) broadly as "ways in which a person's knowledge of the sound system of one language can affect that person's perception and production of speech sounds in another language" (2008: 62), or to be more precise, affecting "the perception and production of phonetic segments, segmental properties, phonemic contrasts, syllable structure, and suprasegmental qualities such as stress, intonation, and rhythm" (Jarvis & Pavlenko, 2008: 62). This means that, theoretically, the sound systems of all previously acquired languages can have an impact on how the TL's segmentals and suprasegmentals will be perceived or produced by the learner. However, this refers only to the phonetics of a TL. The definition is thus very broad in the sense that it lumps together phonological and phonetic transfer. Actually, one would have to distinguish between phonetic CLI affecting the actual perception and production of TL sounds on the one hand, and phonological CLI with an impact on the speech sounds' categorisation, structuring and mental organisation on the other hand (cf. Jarvis & Pavlenko, 2008: 62). Subsuming phonetic and phonological CLI under the umbrella term *phonological CLI* can be justified, though, if it is taken into consideration that they are often intertwined, especially regarding the abstract phonological type of transfer in language production: The only possibility to examine phonological CLI in language production is by analysing the phonetic output to determine whether an existing phonetic error actually has a phonological basis. From potential manifestations of phonological transfer in this phonetic output it is then possible to extrapolate to said categorisation, structuring or further organisation of a sound system within a language learner's mind, i.e. to the phonology of a language.

Whether learners will transfer phonological and phonetic aspects of their previous languages is constrained by various aspects. A popular method of determining the relative difficulty of a non-native-TL sound system compared to the learner's L1 is a contrastive analysis, which allows for predictions regarding learners' problems in a specific TL (e.g. Purcell & Suter, 1980; Suter, 1976). To prove these predictions, expert listener judgements are used to evaluate non-native speech, such as in Suter's study (1976) on TL-English pronunciation by learners of different L1s. As predicted, the pronunciation of his L1-Arabic and L1-Persian participants was rated more accurate than those of the L1-Thai or L1-Japanese learners of English. According to Brière (1968) or Odlin (1989), such a contrastive analysis across potential source and target languages should always look at both phonological and phonetic characteristics – at the latter specifically because sounds often differ cross-linguistically especially with regard to their articulatory and acoustic features (cf. Odlin, 1989: 113), although they perhaps appear very similar at first hearing (e.g. Flege, 1980). Consequently, they might lend themselves particularly well to phonetic transfer. What raises the likelihood of phonemic transfer to occur between two languages are aspects like phonetic similarity or differences in the phonemic systems. Learners make highly subjective interlingual identifications between structures in the languages they know and the TL they are acquiring. These are promoted, for instance, by whether the learner perceives some kind of resemblance between a potentially transferrable SL sound and its TL counterpart. Further, systemic differences between the SL- and TL-phonemic inventories facilitate interlingual identifications. This might result from differing categorisation patterns of TL phonemes by the learners using their individual L1-phonemic-system grids (e.g. Marckwardt, 1946; Scholes, 1968).

Regarding phonological and phonetic segmental as well as suprasegmental transfer, one has to consider production and perception combined with different directions of CLI (cf. Jarvis & Pavlenko, 2008: 67), i.e. forward, reverse and lateral transfer, as will be discussed in the subsequent paragraphs. Beginning with forward segmental transfer in production, influence from the L1 onto a non-native TL is undoubtedly the most common and most salient type of phonetic and phonological CLI (cf. Odlin, 1989: 112; e.g. Pyun, 2005; Ringbom, 1987). This type of CLI, though, "also interacts with important universal principles (e.g. markedness, overgeneralization, universal effects of phonetic environment) and learner variables (e.g., age, phonemic mimicry ability)" (Jarvis & Pavlenko, 2008: 67), and possibly with a confluence of more constraining factors. Regarding the latter, factors like language distance (e.g. Llama et al., 2010; Rivers, 1979), formal similarity (e.g. Chamot, 1973; Rivers, 1979), or even only subjectively perceived similarity between two languages (e.g. Aoyama, 2003), appear to interact with forward phonological CLI and promote its occurrence (see sections 3.2 and 3.3). Moreover, developmental and typological factors might also contribute to occasioning such forward transfer. An example of the influence of a developmental factor in the acquisition of an non-native sound system is the devoicing of word-final consonants, shown by cross-linguistic evidence from learners of different L1s with and without consonant devoicing (e.g. Eckman, 1981a, b) or by data from first language acquisition (e.g. Edwards, 1979; Hecht & Mulford, 1987). Typological and universal influences become evident, for instance, in differences in the degree of difficulty to acquire a certain non-native sound depending on how frequent this sound is across languages (cf. Odlin, 1989: 120). The more universal a phoneme is, the easier it will be to acquire in a new NNL; conversely, the rarer a sound is in the languages of the world, the more difficulties a learner will probably have to master it (e.g. Brière, 1968). Put in another way, a very rare sound is much more marked cross-linguistically than a common phoneme. Again, the more marked a sound, the more difficult it will likely be to acquire (see section 4.2.2.4).

Coming back to manifestations of forward segmental transfer in production, it has been attested in substitutions of whole segments (e.g. Eckman et al., 2003; Lombardi, 2003; Riney et al., 2000) as well as in the use of incorrect segmental properties (e.g. Cebrian, 2000; Flege & Eefting, 1987; Flege et al., 1998; Keys, 2002; Major, 1992). With regard to segmental substitutions in the non-native TL, Riney et al. (2000) found replacements of the TL-English phonemes /l/ and /ɹ/ in their L1-Japanese learners with the Japanese apical postalveolar flap /ɽ/. Interestingly, the TL liquids, which do not exist in Japanese, were substituted primarily in those phonetic contexts in which the Japanese flap could be used. Their study illustrates how several factors can interact in occasioning phonological CLI – in Riney et al.'s (2000) case, for instance, markedness and phonetic-context constraints. However, CLI can also affect only specific properties of segments, such as aspiration, voicing, palatalisation of phonemes or devoicing of word-final obstruents (cf. Jarvis & Pavlenko, 2008: 65). These again may moreover interact with further factors. Flege et al. (1998), for instance, examined aspiration rates in their adult L1-Spanish speakers' TL-English productions of the stop /t/, which is generally more aspirated than Spanish /t/ – in some phonetic environments even extremely more. Surprisingly, they found that their participants produced aspiration rates differing depending on the phonetic context. They further detected aspirations of varying accuracy, deviating from native-like VOTs. The authors attributed these to factors like age: they argued that, to individually varying extents, they were already unable to notice deviations across the phonetics of Spanish and English; consequently, they were not able anymore to then postulate new rules of phonetic realisation or to even alter such rules they had established previously (cf. Flege et al., 1998: 177).

Secondly, forward segmental transfer in perception refers to phenomena like being unable to perceive a specific non-native contrast or certain segmental properties that are only allophonic in the learner's L1 (cf. Jarvis & Pavlenko, 2008: 63). Occurrences of CLI in the perception of segmental contrasts were explored, for instance, looking at L1-Spanish learners' of English problems with phonemic vowel length in differentiating TL words like *peek* and *pick* (e.g. Escudero & Boersma, 2004). It has to be noted, though, that only some TL contrasts are difficult to perceive for a learner, which is moreover constrained by certain factors, as will be discussed further on. Apart from problems with determining non-native contrasts, learners also tend to draw on their L1 in trying to discern segmental properties of non-native sounds, such as duration, aspiration, voicing or formant frequencies (cf. Jarvis & Pavlenko, 2008: 63; e.g. Bohn, 1995; Curtin et al., 1998; Escudero & Boersma, 2004; Flege et al., 1997; Pisoni et al., 1982). In vowel length discrimination tasks with TL-English learners of different L1s, Escudera and Boersma (2004) confirmed such forward transfer of segmental properties from the L1 onto the perception of non-native TL sounds – although, once again, additional factors like TL proficiency also played a role. Curtin et al.'s (1998) study investigated how L1-English and L1-French beginners of Thai perceived voicing and aspiration contrasts, which are phonemic in Thai, in known TL-words using meaning discrimination tasks. They found both L1-French and L1-English learners to be superior judges of voicing contrasts in Thai, but not of aspiration. This led the authors to conclude that transfer from their L1s must have occurred in discriminating voicing contrasts as this feature is phonemic in English and French; aspiration, on the other hand, is only allophonic in both L1s, and thus also not rooted as mental representation in the L1-sound systems. Consequently, if there is no underlying phonemic representation, problems can occur in recognising unknown non-native forms.

Thirdly, segmental transfer has also been attested in the reverse direction. Williams (1979, 1980) investigated this type of CLI in perception in a case study: Two L1-Spanish learners of the TL English were exposed to an English native-speaker surrounding. In a discrimination task of aspiration in word-initial stops to designate the perceived transition from voiced to voiceless plosives, both subjects gradually shifted from an L1-Spanish-like discrimination pattern of VOTs to an L1-English-like pattern.

Reverse segmental transfer has been reported in production, too (e.g. Fischer-Jorgensen, 1968; Flege, 1987a, b; Flege & Eefting, 1987; Laeufer, 1997; Latomaa, 1998; Leather & James, 1996; Major, 1992, 1993; Williams, 1979, 1980). Apparently, a "restructuring of the acoustic-phonetic space" (Leather & James, 1996: 279) of the L1 as well as of previously acquired NNLs is not uncommon if a learner, for instance, immigrates to a country where the TL is spoken and receives continuous TL-input for an extensive period. After some time, such a restructuring may occur. Besides a potential shift in the non-native TL towards monolingual norms, it may also result in alterations of the learner's mental representations of his L1 so that he is not recognised as a native speaker anymore (cf. Jarvis & Pavlenko, 2008: 66). In general, reverse segmental transfer usually does not manifest itself as overt incorporations of non-native TL segments in the L1-sound system or substitutions of L1 phonemes. It rather involves modifications of certain properties of phonemes, like aspiration or nasalisation (cf. Jarvis & Pavlenko, 2008: 67). Major (1992, 1993), for example, investigated whether aspiration in the L1-American English of five immigrants learning Brazilian Portuguese in the TL country differed from the VOTs of monolingual American English speakers. Indeed, Major found in his recordings that the participants' productions clearly differed in the aspiration rates compared to the monolingual American English control group: they actually shifted towards VOT values of L1-Brazilian Portuguese speakers.

With regard to lateral segmental transfer, be it in production or perception, hardly any empirical evidence has been brought forth so far. Most studies show that the L1 has the greatest influence in L3/Ln phonology (e.g. García Lecumberri & Gallardo, 2003; Hammarberg & Hammarberg, 1993; Llisterri & Poch, 1987; Pyun, 2005; Ringbom, 1987), manifesting itself in a noticeable foreign accent. Regarding phonological CLI from a NNL onto another NNL, however, some even claim that it does not occur at all:

> But what is the extent of this LN influence (author's comment: LN = foreign languages), compared with L1 influence? (...) [Where] crosslinguistic influence is found, usually between two related foreign languages, this influence is generally confined to the area of lexis. Influence from languages other than the L1 seems to be insignificant in the area of grammar and non-existent in phonology.
>
> (Ringbom 1986: 156)

Yet, studies – though small in number – have shown that lateral phonological transfer actually *can* occur (e.g. Chamot, 1973; Gut, 2010; Hammarberg, 2001; Hammarberg & Hammarberg, 1993; Hammarberg & Williams, 1993; Llama et al., 2010; Ringbom, 1987; Rivers, 1979; Singh & Carroll, 1979; Tremblay, 2007; Wrembel, 2010, 2011, 2012; Wunder, 2011). In her self-report on the acquisition of her sixth language Spanish, the L1-English speaker Rivers (1979) with advanced French, Latin, basic German and a little Italian knowledge gives a meticulous account of the different kinds of transfer that affected her TL productions. As expected by Rivers, a very advanced and exceptional language learner, she found CLI in the TL Spanish from the related other two Romance languages already acquired, i.e. especially from the most proficient NNL French, as well as a little from Italian. For example, Rivers repeatedly substituted TL Spanish /u/ with French /y/, emerging, for instance, as incorrect pronunciation [yna] of *una* (= "a; one"), she used the French uvular /ʁ/ in Spanish, or applied a French pronunciation rule to <ll> instead of correctly pronouncing it as Spanish /ʎ/, resulting in pronunciations like *millón* (= "million") [mɪljɔn] (cf. Rivers 1979: 76). Despite her relatively limited knowledge, she also drew on her other Romance language Italian, though Rivers notes that only the pronunciation of phonetically similar items was affected.[15] Interestingly, her further NNL German also appears to have affected her TL-Spanish pronunciation, again in spite of her low proficiency therein. Rivers' explanation for her German-sounding Spanish accent, allegedly particularly audible in her vowels, is an intentional avoidance of transfer from her most proficient NNL French and from her L1, which leads her to draw on one of her other NNLs instead (cf. 1979: 70). Apart from Rivers (1979), already in 1973, Chamot conducted a study where she came across phonetic transfer in the form of double interference (see section 3.1.2.2); De Angelis classifies it as "a form of combined CLI" (2007: 53), i.e. simultaneous influence from two SLs on a TL. In her nine-month longitudinal case study, Chamot recorded a French-Spanish bilingual boy learning English in the US from age 10 on. She observed how the boy struggled to acquire TL phonetic features which either existed in his two previously learnt languages Spanish and French, or which only existed in English. If the features were present and very similar in French and Spanish but at the same time differed from English, he ended up replacing the target feature with the similar French-Spanish feature. This concurrence of CLI from French and Spanish resulted, for instance, in substituting the TL-English glides /ɪy/, /ow/, /ʊw/, /ɛy/ and /ay/, as transcribed by Chamot, with the French-Spanish cardinal vowels /i/, /o/, /u/ and the diphthongs /ei/ and /ai/, respectively (cf. Chamot, 1973: 244–245).[16] Similar to Rivers' findings, Chamot concluded that knowledge of already acquired, phonetically similar languages apparently has an effect on the acquisition of a further language. Another early study on lateral segmental transfer was carried out by Singh and Carroll (1979). Analysing oral productions of learners of French with different non-Indo-European L1-backgrounds who additionally knew English, they detected lateral transfer from the non-native SL English. One L1-Turkish participant, for instance, kept substituting TL-French /v/ with the sound /w/. As both phonemes, /v/ and/w/, exist in English, but only one of them, /v/, is also present in Turkish, it appears that the subject learnt about the existence of the contrast /v/ versus /w/ when he acquired English. Overgeneralising this knowledge, he then must have transferred it from

[15] This interesting fact, i.e. that phonetically similar words lend themselves to forward and lateral transfer, from high-proficiency to low-proficiency level languages and from related to unrelated languages, will be discussed in more detail in section 3.2.

[16] Examples: /ɪy/ vs. /i/ as in [w**i**dɪnts**i**əkæŋgəɹu], /ow/ vs. /o/ as in [aid**o**nn**o**], /ʊw/ vs. /u/ as in [deipʰeintwɪθbl**u**], /ɛy/ vs. /ei/ as in [st**ei**dɛɹ], and /ay/ vs. /ai/ as in [wɪlɪsm**ai**fɹen] (cf. Chamot, 1973: 245).

English into the TL French. With the intention of avoiding L1-interference he ended up producing solely /w/-sounds in all positions in the TL-words.

Originally designed to focus mainly on lexical-grammatical CLI (cf. Hammarberg & Hammarberg, 1993: 62), Hammarberg and Williams happened to actually come across CLI where they would not have expected it, i.e. in their L1-English subject's L3/Ln-Swedish phonology by her L2 German. In previous studies phonological CLI on an L3/Ln had been reported to come mainly from the learner's L1 (cf. Hammarberg & Williams 1993: 61; Ringbom, 1987; Llisterri & Poch, 1987). One of the very first recordings was made of their subject Sarah narrating a picture story, *Hunden 1*. Due to Sarah's then minimal knowledge of Swedish, Hammarberg provided some input by first narrating the story himself (cf. Hammarberg & Williams 1993: 64). *Hunden 2*, the same picture story, was recorded again a year later, yielding astounding results: comparing Sarah's Swedish pronunciation in both recordings, it seems as if she exhibited considerably distinct foreign accents in the two recordings, namely a German accent in the early *Hunden 1*, and an English one in the later *Hunden 2* (cf. Hammarberg & Williams, 1993: 64; see Appendix C3). On getting native speaker judgement of the two recordings, the Swedish judges were convinced they were assessing two different participants with distinct L1s because the recordings differed so significantly in sound segments, intonation as well as voice quality (cf. Hammarberg & Williams, 1993: 64). As can be seen, there seemed to be a predominant influence from the L2 in the early stages of Sarah's L3 acquisition. Later on, when she had become more proficient in the L3, the L2 influence was gradually replaced by L1 influence.

Wrembel (2010, 2011, 2012, 2015) sought to corroborate Hammarberg and Williams' (1993) findings in a series of experiments with the

> ultimate goal (...) to assess the influence of L1 and L2 in third language oral productions by comparing perceptual judgments of a foreign accent with an auditory and acoustic analysis of articulatory setting of L3 English.
>
> (Wrembel, 2010: 75)

In one of the earlier published studies of hers belonging to this extensive project, Wrembel (2010) was only concerned with exploring the dominance of L2 CLI on L3/Ln phonology in the initial stages of acquisition. At that primary stage of her research, this was investigated by way of foreign-accent ratings of the L3/Ln productions of 24 L1-Polish learners of L3 English with L2 German to monitor potential L1 or L2 influence. The perceptual judgements were performed by 27 native-speaker and non-native-speaker expert judges, the latter with a very high proficiency of the TL English. Wrembel decided to include non-native expert judges following Højen's (2000) finding that "non-native speakers are more sensitive to divergences from the target language phonetic norms than the natives, provided they have a distinct mental representation of the authentic pronunciation of L2 sounds" (Wrembel, 2010: 81).

For this study, Wrembel compiled a corpus of non-native English speech by her L1-Polish subjects with very good L2 German and for the most part rather low proficiency in the TL English. Additionally, a control group of five L1-German speakers was recorded. Each participant was assigned a proficiency level of English according to the results of a placement test (cf. Wrembel, 2010: 79f). Moreover, the individual learner histories were integrated with metadata elicited via a questionnaire. The analysed corpus consisted of 29 samples of the subjects reading a text and speaking freely, which were rated for overall degree of foreign accent by the expert judges on a scale from one to six. Besides that, the judges were asked to identify the subjects' L1 from an open list provided for them.

After applying statistical analyses, the results indeed corroborate previous findings. Wrembel identified correlations between correct identification of the subjects' L1 and their L3 proficiency, a correlation between proficiency level and mean points assigned in the foreign-accent rating, as well as correlations between the identification of the control speakers as L1 German, the proficiency level and the accent judgement. She then concluded that the L1 as well as the L2 have significant influence on the development of L3/Ln phonology. However, the strength differs according to the learner's proficiency in the L3/Ln, just as Hammarberg and Hammarberg (1993, 2005), Hammarberg and Williams (1993) or Williams and Hammarberg (1998) had concluded.

Usually, perceptual experiments seem to be less robust, but Wrembel also compared the expert ratings with the results of the assessment test. She thus arrived at the same proficiency level ratings of the subjects, as she claims. In general, however, it would be advisable to support perceptual ratings with evidence from acoustic analyses, which she does in the later examinations of the research cycle, as will be discussed later. Furthermore, despite the fact that her study is not linked to a specific feature, like VOT in

Tremblay's study (2007) or vowel reduction in Gut's (2010), to elicit what is actually transferred contrary to giving only an overall impression of L2-accented speech is good, as well as having more data available to corroborate the hypothesis of L2 CLI in L3/Ln phonology.

Wrembel's (2012, 2015) report on her long-term project yielded further results from a much wider empirical basis. In a series of three studies, i.e. foreign-accent ratings, VOT acquisition patterns and think-aloud protocols examining the participants' linguistic awareness, she investigated phonological CLI in TALA as well as various factors triggering it. To interpret the results, Wrembel resorts to different models of multilingualism, namely Flynn et al.'s (2004) Cumulative Enhancement Model, De Angelis' (2007) concept of Combined CLI, Bardel and Falk's (2007) L2 Status Factor Model and Rothman's (2011) Typological Primacy Model.

The first part of her investigations, the foreign-accent ratings, are also the first ones to be applied in a study on TALA after Hammarberg and Hammarberg (1993, 2005) and her own (Wrembel, 2010). For that, Wrembel compiled a small corpus of TL/L3 samples of her different subject groups, i.e. group one of 30 L1-Polish, L2-German and L3-English speakers (Wrembel, 2010), group two of 20 L1-Polish, L2-French and L3-English learners (Wrembel, 2012), group three of 20 L1-Polish, L2-English and TL/L3-French speakers (Wrembel, 2012), and finally a fourth group of 30 L1-German, L2-English and L3-Polish learners, some with knowledge of further NNLs. The corpus comprises TL-speech samples of a read-on-your-own task as well as of free speech of a picture story narration. These were evaluated online by expert judges for overall degree of foreign accent on a six-point Likert scale, for the learners' intelligibility and their acceptability. Moreover, the raters were asked to try and identify the respective learner's L1, to point out any phonetic or phonological features in single participants with speech rated as accented that enhance the raters' impression of this foreign accent, and finally to indicate the degree of confidence of their judgements. Besides, Wrembel also elicited biodata from the raters themselves to monitor whether any rater variables, such as their linguistic profile or experience with phonetic training, interacted with the assessments.

With regard to the results, Wrembel arrived at different values: For her first group with the related L2 and L3 TL, she came across both lateral as well as forward transfer from the L1. From that, she infers that typological similarity possibly facilitates LPT, as predicted by Rothman's Typological Primacy Model, as well as the common status as NNLs, like Bardel and Falk's L2 Status Factor Model claims. Wrembel's second group with all three languages unrelated, exhibits mainly CLI from the L1, hinting at a prevailing L1 constraint combined with a rather questionable status of the learners' L3. Group three, with the same unrelated language combination, but in a different order of acquisition, also shows LPT from the L2 (30%) besides primarily forward transfer (47%). Wrembel explains this drawing on Flynn et al.'s Cumulative Enhancement Model. She proposes that in both groups two and three, language learning in the L1 as well as the L2 a partially cumulative effect on the acquisition of the TL phonology is detectable (cf. Wrembel, 2012: 5). In her fourth group of learners with a related L2 and L3 TL as well as some with knowledge of further NNLs, Wrembel found influence from the L1, L2 and further NNLs onto TL productions, some even in the form of combined influence (De Angelis, 2007) from more than one language previously acquired by the learner. Wrembel takes these results once again as evidence for the cumulative effect of previous language learning in multilinguals (Flynn et al., 2004).

Besides, similar to Hammarberg and Williams' (1993) finding, 55% of the raters assigned the learners of the fourth group a different mother tongue compared to 21% of correct L1 identification and 16% identifying the L1 Germans as English native speakers, although English is their L2. Even more interesting, 40% classified learners of the first group with L2 German and L3 English as native speakers of German, whereas only 33% correctly guessed Polish as their L1. Looking more closely, it can be seen that the expert judges tended to correctly identify the learners' L1 if these had already reached an intermediate level of TL proficiency, whereas they leaned towards classifying the learners as native speakers of their actual L2 when they were still at a basic level of TL proficiency. Thus, it seems that the raters perceiving different L1s of learners is correlated with the TL proficiency level. This is consistent with Hammarberg and Williams' (1993) subject being attested different foreign accents at the very beginning of TL learning compared to after one year at an intermediate proficiency level.

However, there are also some studies exploring segmental lateral phonological transfer that arrived at mixed evidence (e.g. Gut, 2010; Tremblay, 2007; Llama et al., 2010; Wunder, 2011). Interestingly, several of them look at the segmental feature of voice-onset time[17] in their empirical studies of LPT, a fairly reliable feature to measure in order to determine possible LPT. To be able to pin down phonological CLI on the basis of a concrete feature, Tremblay (2007), Llama et al. (2010), Wrembel (2012) and Wunder (2011) decided to employ VOT and the acquisition of aspiration patterns for voiceless stop consonants /p t k/. Tremblay (2007) measured VOTs of her four L1-English subjects with L2 French and L3 Japanese, one of them an English-French bilingual. She intended to elicit which language exerts influence on L3 VOT values when VOT is produced differently in all prior languages. Moreover, she then wanted to find out whether the L3 VOT values resemble more L1 or L2 VOTs.

All participants had only very little knowledge of the L3. They were asked to read out a word list as well as perform a delayed-repetition task. Besides that, Tremblay collected metadata about the individual learner histories with questionnaires. Aspiration was measured with the Praat tool. Tremblay then applied statistical analyses to the results to find out whether there was a task effect on the delayed repetition versus the word list task. However, she found no statistically significant task relatedness.

Furthermore, Tremblay wanted to find out whether learners made a difference between their L1-English and their L2-French aspiration, as well as whether VOT values in L3 Japanese were more similar to the L1 or L2. In fact, a language effect was found for three subjects. Statistical analyses were significant for the L1 versus L2, as well as the L1 versus L3: Learners did differentiate between the L1 versus L2 and L3, as can be deduced from the longer VOT values in the L1. VOT in the L2 and L3 were found to be quite similar and consequently showed no statistical significance. However, looking at mean L2 and L3 VOT values also revealed shorter L2 values than in L1. Consequently, the approximated L3 values to L2, not L1, exhibit an influence of the L2 on the L3. So, as the learners produced L3 stops almost native-like, this L2 influence on the L3 seems to have been positive. Yet, the fact that the hybrid VOT values in L2 French were similar

[17] Voice-onset time is defined as “the interval (measured in milliseconds) between the release of the articulators (the opening of the lips, the dropping of the tongue, etc.) and the beginning of regular vocal chord pulses“ (Nathan et al., 1987: 205) when producing plosives. If the pulses substantially precede the release of the articulators, the sound is voiced and voice-onset time is negative; if the pulses start simultaneously or only a very short time after, the sound is voiceless and unaspirated, with a voice-onset time of around 0 ms; if the pulses start some time after, the segment is voiceless and aspirated and voice-onset time is positive.

to native VOT in the L3 Japanese then transferred positively from the L2 to the L3 could also simply be an artefact of the language combination or accidentally a shared characteristic of the three subjects' interlanguage VOTs. There certainly is the need for studies with more subjects and a wider range of language combinations to exclude such coincidences.

However, one of the four subjects showed similar VOT values in all three languages. This could be due to bidirectional influence (e.g. Pavlenko & Jarvis, 2002): the learner showing hybrid VOT for his L1, L2 and L3 means there is CLI not only on the L2 and L3, but also on the L1. Moreover, Tremblay noticed the existence of what she called a *nativeness effect*, i.e. learners were able to produce VOT in their L3 Japanese native-like. No statistically significant difference between L3-Japanese VOT and Japanese native speaker VOT values was encountered, contrary to other studies which normally found interlanguage VOT not near-native, but rather compromise values. This result might have something to do with her limited number of subjects. However, Tremblay also takes into consideration that the learners might have acquired the L3 stops already native-like, as L3/Ln learners may simply have a different approach to acquiring a new phonological system.

Another study operationalised on the basis of the measurement of aspiration that also yielded mixed results was conducted by Wunder (2011). She recorded eight L1-German beginners of Castilian Spanish with advanced L2 British English and several with some knowledge of further NNLs performing two read-on-your-own tasks, one in their L2 English and one in the TL Spanish. These were designed to elicit as many tokens of voiceless plosives /p t k/ as possible in potentially aspirated position (cf. Wunder, 2011: 113f). This type of task was expected to yield mainly non-L1 CLI. VOT reference values to compare the participants' productions to were not only taken from previous literature, but also established by analysing the recordings of one L1 speaker of British English and Castilian Spanish each, as well as of three L1 speakers of German. The subjects' data was then acoustically analysed for VOT using Praat, and the results of mean L2-English and L3-Spanish learner VOTs compared with the native speaker reference values.

Wunder's participants displayed primarily an underlying L1-influence on L2 and TL productions, and no unambiguous LPT from the L2 onto the TL, apart from a few individual exceptions. However, influence of the L2 was visible, though only together with the L1 in the form of combined CLI.

Overall, German-Spanish hybrid VOT values were produced in 50% of all tokens (cf. Wunder, 2011: 115f). Nevertheless, Wunder also hypothesised LPT in a few participants, but only of already hybrid German-English VOTs in the L2 which were then possibly transferred further into the TL to create another TL compromise value (cf. Wunder, 2011: 120). Calculations of the correlation between L2 English and L3 Spanish mean VOTs, though, showed only a relatively weak relationship. All in all, Wunder arrived at rather heterogeneous results with regard to the types and directions of phonological CLI occurring in her participants. She contradicts more than corroborates previous findings on the existence of LPT, which however may also be due to some limitations of her study, as she concedes (cf. Wunder, 2011: 122f).

Missaglia (2010) tried to provide evidence for LPT, though from the point of view of German-Italian sequential bilingual[18] infants acquiring the TL L3 English, i.e. pre-pubertal L3 acquisition before completing the critical period. In her study analysing TL-English vowel production, Missaglia specifically explores whether her three infant participants' high competence in the typologically related L2 German serves as source of LPT in the acquisition of the further Germanic TL English. The participants of this small-scale study preliminary to her more extensive longitudinal project – three female L1 speakers of Italian aged eight to nine – were attending the German school in Milan at the time of recording. They had been acquiring their L2 German from the age of three at the German kindergarten in Milan (cf. Missaglia, 2010: 64). Missaglia elicited three L1-Italian and three L2-German speech samples of a read-out-loud task in order to auditorily and acoustically analyse their vowel productions, using F1- and F2-frequency measurements of stressed monophthongs. Drawing on phonetic prototype theory (cf. Rosch, 1973, 1975; Boersma et al., 2003), the mean L1 and L2 formant frequencies for Italian and German vowels were calculated to establish such phonetic prototypes for vowels of both languages. These values were then compared to each other as well as to formant values of expected corresponding TL-English prototypes taken

[18] It is crucial here how one conceptualises the status of the languages of a sequential bilingual as opposed to those of a simultaneous bilingual. As discussed previously (see section 2.1.1), for the present purposes, the latter will be seen as the result of double first language acquisition having two L1s, whereas Missaglia's (2010) sequential bilinguals will be seen as multilinguals with an L1, an L2, which happened to be acquired at an early age, and an L3 TL. Consequently, it is possible for CLI to occur from the L2, i.e. the possibility of lateral transfer is given.

from previous empirical studies on American English (cf. Missaglia, 2010: 65).

Indeed, Missaglia found divergences particularly in terms of vowel height and place of articulation between Italian and German vowels (cf. 2010: 67). Her explanation for the phonetic variation between the Italian and German productions is that her participants relied on different phonetic prototypes for their L1 Italian compared to their L2 German, despite their balanced competence in both languages. When comparing these different prototypes, in addition to expected TL-English prototypes taken from previous empirical studies on American English (Hillenbrand et al., 1995), it became apparent that the learners' German prototypes resembled the English ones. Thanks to their heightened metalinguistic awareness developed in the course of their multilingual language acquisition, Missaglia hypothesises (cf. 2010: 70) the infant multilinguals are able to perceive similar phonological regularities across the related Germanic L2 and L3 which are non-existent in their L1, make use of this knowledge and thus their L3-phonetic acquisition is positively influenced. Without the facilitating knowledge of the typologically related NNLs, Missaglia presumes (cf. 2010: 71) the learners might fall back on their L1 and incorrectly transfer L1-phonological features onto the TL.

On the basis of both the segmental and suprasegmental features of vowel reduction and speech rhythm, Gut (2010) intended to examine potential phonological CLI in the L3/Ln as well as its direction. Gut's subjects comprised an L1 Polish and L1 Russian speaker, each with L2 German and L3 English, as well as an L1 Hungarian and L1 Spanish speaker, each with L2 English and L3 German. All were attending a university language course in their respective L3, i.e. in English or German. Besides these four L3 learners, data from four native speakers of Standard British English and Standard High German was collected for comparison with the learner values (cf. Gut, 2010: 25f). Recordings were made of the subjects' L2 and L3, consisting of reading out a text and retelling it, as well as producing free speech. Moreover, background information on the individual language learning histories was collected. As mentioned by Gut (cf. 2010: 35), none of the subjects had any prior theoretical knowledge concerning vowel reduction and speech rhythm of their respective L3. She then measured oral fluency on the basis of articulation rate, length of utterance and filled pauses, as well as duration of each vowel and speech rhythm on the basis of the syllable ratio, i.e. the "mean ratio of all durational ratios between adjacent syllables" (Gut, 2010: 27).

Her first research question asked whether CLI from the L1 in the L2 or L3 phonological system can be observed. The findings were negative. At least in the L3, unequivocal results did not show L1 CLI on either vowel reduction or speech rhythm in the L3, even if the subject's L1 exhibited vowel reduction. What is more, despite the completely different speech rhythms of English and Spanish, the L1 Spanish subject exhibited near-native rhythm in the L3 English. These findings utterly contradict Pyun (2005) or Hammarberg and Hammarberg (1993), who all found L1 CLI at least on some subjects' L3. Gut hypothesises that L1 CLI on L3 vowel reduction might only occur when the L1 shows more reduction than the L3. However, in her study, both L3s examined required more vowel reduction than the respective L1s. Consequently, this hypothesis yet remains to be verified by further studies.

With regard to CLI from the L2, the rather mixed results offer room for several interpretations. Firstly, judging from the subjects' heterogeneous values for vowel reduction and speech rhythm in both the L2 and L3, no positive L2 CLI can be indicated at all. An alternative explanation, however, would be to interpret the subjects' behaviour of producing some vowel reduction in L3, despite non-existent reduction in the L1, but existent one in the L2, all as positive L2 CLI. And thirdly, as all subjects produced more vowel reduction in English than in German, regardless of whether English was the L2 or L3, it could be seen as the result of inherent properties of English determining the degree of vowel reduction. This finding that all subjects displayed different vowel reduction in English than German as well as different speech rhythm, no matter whether as L2 or L3, was declared the "only stable finding" (Gut, 2010: 33) of the study.

Concerning another research question of whether CLI could be shown in vowel reduction and speech rhythm in trilingual learners despite the fact that the respective L1s showed differences with regard to these two features, Gut found hardly any phonological CLI at all on the basis of vowel reduction and speech rhythm. Furthermore, the data analysis also showed no correlation of fluency in the L2 as well as the L3 and phonological CLI. Despite all subjects being more fluent in their L2 than their L3, they exhibited hybrid values for vowel reduction and speech rhythm across both their L2 and L3.

All in all, and contrary to several other studies conducted in the area of L3/Ln phonology so far (e.g. Llama et al., 2010; Tremblay, 2007; Wrembel, 2010), no clear L2 CLI onto the L3 phonological system was found. Gut put forward the hypothesis that maybe no CLI occurred due to the lack of metalinguistic awareness of the phonological processes of vowel reduction or speech rhythm occurring in the L1, L2 and L3. So, perhaps a minimum of conscious knowledge of phonological processes and concepts is necessary for phonological CLI to be able to set in. Once again, this claim will have to be reviewed in further studies. As the author of the study herself says, it "has clearly raised more questions than it was able to answer" (Gut, 2010: 35). A similar study should be conducted with more subjects to either corroborate Gut's findings or revoke them.

On the suprasegmental level, for example syllable structuring, intonation patterns, rhythm or stress, including interaction of CLI with aspects like universal phonological constraints or phonetic context (cf. Jarvis & Pavlenko, 2008: 69), a differentiation can again be made between forward, reverse and lateral transfer in production and perception. However, studies exist only for certain types. Regarding forward CLI in the production of suprasegmentals, research has been undertaken investigating, for example, the consonant cluster production in onsets and codas of syllables in learners of varying L1-backgrounds and different TLs (cf. Jarvis & Pavlenko, 2008: 67; e.g. Abrahamsson, 1999; Broselow, 1992; Hancin-Bhatt & Bhatt, 1997; Hansen, 2001). Transfer arises in the form of consonant cluster reductions in the TL if the learners have difficulties due to the fact that their L1 (or even their L1-dialect, according to Broselow's study from 1992 of speakers of different Arabic dialects) does not allow specific consonant combinations as present in the TL. Besides, the production of rhythm with stress placement, regularity of beats and interstress intervals being influenced by the learner's L1 has also been examined (cf. Jarvis & Pavlenko, 2008: 68; e.g. Adams, 1979; Andrews, 1984; Celce-Murcia et al., 1996; Guion et al., 2004; Kaltenbacher, 1997; Ladefoged, 2006; Munro et al., 2003; Toivanen, 2001; Van Els & De Bot, 1987; Willems, 1982). It appears that particularly rhythm and pitch features might be crucial in causing a foreign accent, and may sometimes even lead to misperception or complete unintelligibility. For instance, Guion et al. (2004) compared TL-stress placement in late L1-Spanish learners of English with that of early learners as well as with a monolingual L1-English control group. Interestingly, Guion et al. indeed detected differences between the groups: The late TL-English learners favoured stressing the initial syllable compared to the other two groups. The authors attributed this to influence from the most frequent lexical-accent pattern of their L1 Spanish, i.e. on the penultimate syllable. Another area in which forward transfer could be crucial for the acquisition and eventually for the production of a further NNL is tone (e.g. Broselow et al., 1987; Chiang, 1979; Gandour & Harshman, 1978). According to Gandour and Harshman (1978), for instance, previous knowledge of a L1-tone language, in which pitch levels are phonemic, might transfer onto a non-native target tone language and thus facilitate acquisition.

For reverse or lateral suprasegmental transfer in production, however, there is hardly any empirical data available also far. Reverse suprasegmental transfer was attested, for example, in studies by Andrews (1999) or Mennen (2004). Andrews (1999) analysed the Russian speech from interview data of 10 L1-Russian learners of English, who had emigrated from the Soviet Union to the US as young adolescents. Compared to an L1-American English control group, Andrews discovered that the Russian native speakers exhibited numerous suprasegmental manifestations of reverse transfer from their L2 English. They were particularly obvious in intonation contours in Russian that were similar to English intonation and at the same time directly opposed to what one would expect from monolingual Russian speakers. Mennen (2004) did not only come across reverse CLI in the five L1-Dutch learners of Greek, but even found bidirectional transfer: the TL Greek influenced the L1 Dutch and Dutch simultaneously had an effect on Greek. In a read-on-your-own sentence task in the L1 and the TL, Mennen measured fundamental frequency in the recordings. He then compared these to monolingual control groups of Dutch and Greek and indeed identified forward transfer in the intonation contours of the TL Greek, as well as synchronous reverse transfer in Dutch intonation. Regarding lateral transfer, there is even less data available. In the above-mentioned self-report by Rivers (1979) monitoring the acquisition of her sixth NNL Spanish, she not only observed lateral CLI in segmentals, but also in suprasegmentals. For example, Rivers transferred stress patterns from her advanced non-native French, which tends to place stress on the ultimate syllable (Gut, 2009: 89; e.g. *manger* /mɑ̃ˈʒe/ = "to eat"), to all kinds of phonetic environments in the TL Spanish. Spanish usually also stresses the last syllable unless a word ends in /n/, /s/ or a vowel, which leads to stressing the penultimate syllable (e.g. *como* /ˈkomo/ = "I eat").[19] As a result, Rivers produced incorrect TL-Spanish-stress patterns as in *como* [*koˈmo].

So far, besides Gut (2010), all empirical studies have investigated LPT solely on the basis of segmentals, such as VOT measurements or vowel analyses. When it comes to exploring CLI between non-native phonologies

[19] Exceptions are marked with an accent (e.g. *comí* /koˈmi/ = "I ate").

on the suprasegmental level, there is an even greater dearth of research. Among a few relatively recently completed projects (e.g. Fuchs & Wunder, 2015), Gabriel et al. (2012) has yielded some results of their investigation primarily of positive LPT in the acquisition of L2 English and L3 French speech rhythm by adult sequential German-Mandarin Chinese bilinguals.[20] The participants had either acquired German as L1 followed by Mandarin as early L2, or vice versa, resulting in a balanced native-like proficiency in both languages; moreover, some had also learnt other languages before English and French. Consequently, this heterogeneity proves slightly challenging with regard to the interpretation of the recorded data. Gabriel et al.'s focus lies on potential rhythmic transfer between the learners' languages, particularly on possible influence of Mandarin on their further NNLs, and whether metalinguistic or phonological awareness has any influence on the process.

Despite the fact that Mandarin appears to be maximally unrelated from the L1 as well as both NNLs English and French with regard to various aspects, such as orthography (Latin script versus Chinese characters) or morphosyntax (inflecting languages German, English and French versus isolating language Mandarin Chinese), it shares the rhythmic properties of the similarly syllable-timed L3 French as opposed to the traditionally stress-timing of the learners' L1 German and L2 English (cf. Gabriel et al., 2012: 4; Lin & Wang, 2007; Ramus et al., 1999). To investigate whether this fosters any LPT, Gabriel et al. recorded 13 German-Mandarin learners of L2 English and L3 French, as well as control groups of 6 monolingual L1-German learners of English as French, 16 monolingual L1-Mandarin Chinese learners, and 12 French monolinguals; English native-speaker values were taken from the literature (Mairano & Romano, 2010). The participants were asked to perform read-on-your-own text tasks in all four languages, German, Mandarin, English and French: 13 sentences consisting of CV-syllables in addition to 10 pseudo-words, also consisting of CV-syllables, embedded in carrier phrases.

The speech data was segmented into vocalic and consonantal intervals to compute speech rhythm with the standard rhythm metrics %V (i.e. percentage of vocalic intervals) and VarcoV (i.e. variability within vocalic intervals; cf. Dellwo & Wagner, 2003; Ramus et al., 1999; White & Mattys, 2007; see sections 4.2.1.1 and 4.2.6.1). With regard to the results of the

[20] Gabriel et al.'s (2012) subjects are not seen as having two L1s, seeming they acquired German and Mandarin Chinese successively as an infant and not simultaneously.

analyses, Gabriel et al. hypothesised that (1) the German-Mandarin multilingual learners with knowledge of a stress-timed language would be better at producing target-like L2-English speech rhythm than the monolingual L1-Mandarin learners; (2) they would also produce more target-like L3-French speech rhythm thanks to their previous knowledge of syllable-timed Mandarin compared to the monolingual L1-German learners of French; and (3) productions by the German-Mandarin multilinguals diverging from the expected would be attributed to the influence of extra-linguistic factors (cf. Gabriel et al., 2012: 7).

With regard to the L2-English data, results show that in fact the monolingual L1-German learners performed better in terms of approximating native rhythm reference values. This is probably thanks to the shared rhythmic properties, as opposed to monolingual L1-Mandarin learners. Surprisingly, though, the German-Mandarin multilinguals did not attain much better results than the monolingual L1-Germans, though some still outperformed the monolingual L1-Mandarin Chinese. Overall, the multilinguals' results are rather disparate. Regarding the L3-French data, the majority of all learners exhibits rather high %V and VarcoV values typical for their beginner's proficiency level, attributed by Gabriel et al. to the effect of their variable speech rate as well as recurrent hesitations. As befits the rhythmic similarities between syllable-timed French and Mandarin, monolingual L1-Mandarin Chinese learners surpassed the productions by monolingual L1-Germans. Again, the multilinguals showed relatively inconsistent results overall.

A point of criticism of Gabriel et al.'s (2012) investigations with regard to LPT research, which proves slightly challenging with regard to the interpretation of the recorded data, is their heterogeneous group of participants: Although they give an overview of the individual linguistic profiles with the exact order of acquisition, including the age of acquisition of their languages (cf. Gabriel et al., 2012: 9), it is difficult to make generalisations about LPT with regard to speech rhythm based on the productions by all German-Mandarin participants. Looking closely at the table indicating the learners' languages and age of acquisition, it becomes obvious that Gabriel et al. recorded simultaneous as well as sequential bilinguals (see section 2.1.1). For explorations of lateral transfer, simultaneous bilinguals with two L1s are not suitable if influence from German or Mandarin is being investigated, as we would be dealing with forward transfer from one of the subjects' L1s. With regard to the remaining sequential bilinguals, i.e. with an L1 German or Mandarin, L2

Mandarin or German, L3 English and L4 French,[21] their productions should in fact be analysed separately: on the one hand those by the L1 German-L2 Mandarin group, on the other hand those by the L1 Mandarin-L2 German group in order to be able to pin down real lateral transfer from the L2 onto English or French. Thus, one would have to look again at Gabriel et al.'s analyses and extricate the learners' English or French productions that were indeed influenced by their L2 knowledge – which would thus validate Gabriel et al.'s explorations as a true LPT study – and those that were actually influenced by their L1 knowledge in the form of forward transfer.

The perception of suprasegmentals has been examined with regard to influence from the learner's L1 in a handful of studies (e.g. Leather, 1987, 1997; Levis, 1999). Apparently, learners tend to rely on their native-language perceptual system when listening to the non-native TL being spoken, and compare non-native TL intonation patterns with their L1 categories (cf. Levis, 1999). Moreover, Leather (1987, 1997) found that his participants of L1 English and Dutch – two intonation languages – drew on their respective L1 pitch patterns while trying to categorise the lexical tones of the tonal non-native TL, such as Cantonese or Yoruba (cf. Jarvis & Pavlenko, 2008: 68). There is, however, a considerable lack of studies on the reverse or lateral direction of perceptual suprasegmental transfer.

This dearth of studies notably pervades research on reverse and lateral phonological CLI – in production and particularly perception. Many more investigations are necessary to be able to have an informed discussion about these types of transfer. The present study aims to provide more empirical data for such a discussion, especially on lateral phonological transfer in production. Additionally, current knowledge of its triggering factors and its potential ontogeny will be reviewed in the subsequent sections.

To sum up, several points must be considered when exploring CLI on different linguistic levels. Firstly, manifestations of transfer differ in how easily detectable they are depending on the linguistic level. For instance, transfer on the phonological level is likely much more conspicuous and more clearly visible than CLI on the pragmatic level. Secondly, the linguistic level on which transfer occurs interacts with certain dimensions

[21] Gabriel et al. (2012) name their participants' languages *L2 English* and *L3 French*. However, if one conceptualises the languages of the German-Mandarin sequential bilinguals as proposed here, the subjects' English should correctly be termed *L3* and French *L4*.

of CLI, as discussed in the present sections, such as the number of languages involved, the directionality of transfer or the cognitive level it occurs on. For example, forward phonological CLI might be more common than reverse phonological transfer, or combined morphological CLI might be less pronounced than one-to-one morphological transfer. Thirdly, whether CLI occurs or not hinges on certain variables, which differ in their strength of being able to promote CLI dependent on the different linguistic levels (for a more detailed discussion, see sections 3.2 and 3.3). Constraining factors such as the distance between source and target languages, recency of use of a specific potential SL or proficiency levels in the respective source and target languages all may help trigger transfer (cf. Jarvis & Pavlenko, 2008: 61).

3.1.3 Working Definition of Cross-Linguistic Influence

As shown in the previous sections, transfer is complex in its appearance and kinds of influence. This is probably the main reason why rather different things are often examined in transfer studies claiming to investigate the same concept. Having looked at the multiple facets of CLI and the various dimensions along which lines types of transfer can be classified, an attempt will be made here to extract the essence of the previous sections (see sections 3.1.1 and 3.1.2). Besides, following Kemp's (2009) plead that for each study a clear working definition of the central concept(s) be given to avoid terminological confusion, a working definition of the kind of transfer central to the present study, i.e. lateral phonological CLI, will be presented subsequently.

Very generally, CLI (or alternatively *transfer*) can be summarised as interlingual influence in the widest sense. It can be viewed as influence on linguistic structures, from a psycholinguistic perspective as interlingual interactions within an individual, or as a sociolinguistic phenomenon between speakers of different languages in a speech community. The scope of transfer in the psycholinguistic sense comprises mainly its application either as a communicative strategy or as a learning strategy, which can alternatively be seen as conscious (or intentional) CLI or unconscious (or unintentional) transfer, respectively. The likelihood of transfer in general is promoted by certain factors, such as age, proficiency or language distance, which presumably stand in a hierarchy of strength as a catalyst of CLI (see also section 3.3.6). It can occur in different directions, i.e. as forward, reverse (or backward) or lateral transfer, or, seen from a slightly different point of view, as unidirectional, bidirectional or multidirectional CLI, resulting in a complex combination of angles of directionality. Further, CLI may vary with regard to the number of languages involved, either from one SL onto one TL as a one-to-one type of transfer, or from more than one SL onto a TL as a many-to-one kind of CLI, with positive or negative outcome, if a value judgement on the correctness of the output is required. Transfer occurs on different levels, either as conceptual CLI, as semantic transfer or as structural CLI. Concerning the latter, it appears on various linguistic levels, such as morphology, lexis, orthography or phonology.

The present study can only look at a small part of this rather multifaceted phenomenon of transfer, which will be defined in the following: The present work will focus on interlingual influences between NNLs (i.e. in the lateral direction), be it of a one-to-one or many-to-one type, particularly from a psycholinguistic standpoint. It will focus on the linguistic level of phonology, i.e. as the influence of previous knowledge of a SL sound system onto a non-native TL sound system that is being examined, segmentally as well as suprasegmentally. Additionally, the respective factors that tend to promote such a kind of CLI will be investigated.

What is crucial to consider when investigating CLI is the fact that not every interlanguage deviation can be traced back to transfer behaviour. Sometimes, universal and developmental processes and acquisitional universals have to be taken into account as potential triggers as well. Gass and Selinker (2008) also believe that besides previous linguistic knowledge from the L1 (for multilinguals also knowledge from all other acquired non-native languages), universal facts as well as developmental facts have to be taken into account if one wants to fully comprehend the characteristics of learner language – its structure, underlying aims and rules. Universal features and processes which may affect the occurrence of CLI can be, for instance, typological markedness of structures and forms (see also section 3.2), easier production of onset consonant clusters compared to coda clusters (e.g. Anderson, 1987) or simplifying syllable structures through deletion (e.g. Young-Scholten, 1995, 1997; Young-Scholten et al., 1999). The focus so far has been on segmental transfer and less on suprasegmental units.

In addition to universal processes, developmental processes can also interact with transfer and promote or hinder its occurrence. For instance, devoicing processes, consonant cluster simplification or epenthesis are such developmental characteristics (e.g. Altenberg & Vago, 1987; Major, 1987a). Interestingly, often CLI and developmental processes interact in such a way that transfer occurs at a point of a learner's linguistic development when the respective form or structure affected by transfer is usually acquired (cf. Jarvis & Pavlenko, 2008: 192; e.g. Andersen, 1983; Wode, 1978; Zobl, 1980). Besides affecting structures at their natural point of acquisition, transfer can also have an impact on acquisitional processes by influencing the rate of acquisition or causing particular errors. Especially simplification and overgeneralisation are examples of such universal developmental processes that result in certain errors (e.g. Meisel, 1980; Master, 1997; R. Ellis, 1994). Both simplification and overgeneralisation appear in the language production of learners with various L1s, which actually suggests a detachedness from transfer. However, studies exist that prove both of these acquisitional processes to interact with CLI, allowing for a direct connection with the respective learner's L1 (e.g. Schumann, 1986; Jarvis & Odlin, 2000).

3.2 Factors Evoking Cross-Linguistic Influence in Third or Additional Language Acquisition

When acquiring a new language, different factors can contribute to the triggering of CLI. The different types of CLI as discussed in section 3.1.2 appear to correlate with certain factors, as shown in various studies (e.g. Ringbom, 1987; Möhle, 1989; Vogel, 1992; Dewaele, 1998; Williams & Hammarberg, 1998; Piske, Flege & MacKay, 2000; Cenoz, 2001, 2005; Ecke, 2001; Fouser, 2001; Flynn et al., 2004; Odlin & Jarvis, 2004; Jessner, 2006; Llama et al., 2010; Bono, 2011; Sanchez, 2011). It seems that it mainly depends on the linguistic level whether a specific factor is significant and others not. But there is yet too little research to completely exclude certain factors as insignificant. As for the present work, it has been stated that the lateral type of CLI is focused on, and a closer look will be taken at a selection of various factors that tend to evoke such lateral transfer on different linguistic levels. These are age of acquisition, exposure to the TL, order of acquisition of the different languages, language distance and perceived linguistic distance, as well as formality of context in which a TL is used or the degree of metalinguistic awareness.

The question of whether age of acquisition[22] is significant with regard to occasioning CLI during the acquisition of a NNL is connected to the discussion about the existence of a critical period for language learning.

[22] Age of acquisition refers to the age when a learner first started acquiring a specific TL, not to the age at the time of the elicitation task for a study.

According to the Critical Period Hypothesis (e.g. Lenneberg, 1967), there is a certain period in our lives during which we are able to learn languages perfectly and arrive at native speaker competencies. The neurological basis for that is the still ongoing brain maturation. As long as the onset of learning a NNL takes place within this period, the Critical Period Hypothesis predicts a native-like attainment also in a NNL (cf. Guion et al., 2000: 205f). Such a prediction has been refuted by several studies on late learners of a NNL, though (e.g. Bongaerts et al., 1997; Flege et al., 1995). For instance, Bongaerts et al. (1997) showed that L1-Dutch late learners of English who were highly motivated were able to attain a native-like proficiency in the NNL even despite the onset of learning beyond the cut-off point of the critical period. Moreover, Flege et al. (1995) came across L1-Italian immigrants to Canada who had arrived there well under the age of six, i.e. within the critical period for learning English. They still showed strong Italian accents in English, whereas some had indeed achieved a native-like competence. The latter study suggests that there can be age-related differences in pronunciation (e.g. Fathman, 1975; Long, 1990; Patkowski, 1980, 1990), and that an early age of acquisition favours little transfer from the L1. But there are also – admittedly few – exceptions of highly successful learners who are somehow able to avoid CLI onto the non-native TL and achieve native-like proficiency.

Doubtlessly, age is an important factor when it comes to conditioning CLI, as has been investigated in studies on forward (e.g. Guion et al., 2000; MacKay & Flege, 2004), reverse (e.g. Laufer, 2003; Yeni-Komshian et al., 2000) or lateral transfer (e.g. Cenoz, 2001). It seems, however, that age of learning differs in its strength to trigger CLI depending on the direction of transfer and the linguistic level it occurs on: Forward transfer from the L1 onto a NNL appears to occur more frequently in older learners on the level of phonology (e.g. Flege, 1981; Flege et al., 2003; Singleton, & Ryan, 2004: 122–125), but not on the lexical or morphological level (e.g. Harley, 1986; Jarvis, 1998, 2000a). Regarding reverse transfer, it is exactly the other way round, i.e. younger learners tend to transfer more, particularly on the level of phonology (e.g. Williams, 1980; Yeni-Komshian et al., 2000). Finally, concerning lateral transfer, once again older learners transfer more, though primarily on the lexical level (e.g. Cenoz, 2001), which additionally seems to be restricted by the degree of similarity between the two NNLs involved in the lateral transfer process (cf. Slavoff & Johnson, 1995).

An explanation for differences in the amount of transfer in older versus younger learners depending on the direction – at least on the phonological level – can be given by Flege's (1995) Speech Learning Model: As Guion et al. (2000) found in their study on sentence duration of Italian-Korean native speakers learning English, "the L1 and L2 phonetic systems reside in the same phonological space and can exert a mutual influence on each other" (Guion et al., 2000: 206), implying that neither language can be completely deactivated (cf. Paradis, 1993). This suggests that there will always be the possibility of interlingual influence during the production of either the L1 or L2. Which one is possibly affected more by CLI can be answered by the Speech Learning Model: "[The] more established the L1 is at the time of L2 acquisition, the greater influence it will have on the L2" (Guion et al., 2000: 207). Thus, older learners with a more set L1 tend to transfer more in the forward and less in the reverse direction. However, also the inverse is true according to the Speech Learning Model, i.e. the less established the L1 is at the time of L2 acquisition (i.e. the younger the learner is), the less forward transfer onto the L2 and the more reverse transfer from the L2 will occur. Besides, higher metalinguistic awareness, language learning experience and generally more developed cognitive abilities as found in older learners can additionally contribute to more transfer when learning another NNL. With regard to age as a promoting variable particularly of lateral phonological CLI, unfortunately there are no specific empirical studies around.

The actual exposure a learner has to NNLs can also trigger CLI. Depending on whether TL-learners live in their L1-environment or whether they live in the TL-environment, their level of TL-knowledge is influenced by the length, frequency and intensity of exposure to the TL, or by the length of residence in the TL-environment (cf. Jarvis & Pavlenko, 2008: 199ff). Exposure is usually operationalised as the number of years of TL instruction (e.g. Jarvis, 2000a, 2002; Sjöholm, 1995), as the number of hours of instruction per week or even per day (e.g. Kecskes & Papp, 2000) or as the total number of hours of contact with the TL (cf. Jarvis & Pavlenko, 2008: 199; e.g. Cenoz, 2001). For the forward and lateral directions of transfer two studies on lexical choices were conducted by Cenoz (2001) and Sjöholm (1995), which seemingly arrive at contradicting findings: Cenoz's Spanish-Basque bilingual learners of English exhibited more transfer in their word choices the longer they studied English. Sjöholm's Finnish-Swedish learners of English, on the other hand, exhibited less CLI with increasing TL instruction. These findings can be explained by the fact that Cenoz's participants had only a very low beginner's level of English, whereas Sjöholm's learners had already a rather advanced TL-proficiency. So, the amount of TL-instruction possibly promotes especially forward lexical CLI in the beginning, and decreases then after a certain proficiency level has been reached (cf. Jarvis & Pavlenko, 2008: 200; also R. Ellis, 1994; Jarvis, 2000a). For reverse transfer, it appears that there is more and more positive CLI from the TL, particularly onto L1 writing with increasing intensity of TL instruction (cf. Jarvis & Pavlenko, 2008: 200; also Kecskes & Papp, 2000).

With regard to learners living in the TL-environment, it is hypothesised that a long period of residence in a non-native environment is correlated with the frequency of occurrence of CLI (e.g. Vildomec, 1963; Fouser, 2001).[23] Yet, whereas forward and lateral transfer usually decrease the longer a learner lives in the TL-environment (e.g. Hammarberg, 2001; Flege et al., 1995; Guion et al., 2000), it is exactly the opposite for reverse transfer: with increasing length of residence in the non-native environment the amount of CLI from the TL onto the L1 increases, as was found, for instance, in studies on morphosyntax and lexical semantics (e.g. Jarvis, 2003; Pavlenko, 2003; Pavlenko & Jarvis, 2000; Schmid et al., 2004; Laufer, 2003; Hutz, 2004).

However, linguists cannot agree so far as to whether exposure only has a temporary effect or whether it also exerts influence at a later stage, as Cohen (1995) reports with his findings on language of thought. These corroborate the hypothesis that exposure to a non-native language has a long-term – and not just an immediate or temporary – effect. As with most other variables, unfortunately not much is yet known about the effect of exposure to a non-native environment with regard to influence on L3/Ln phonology, particularly in the lateral direction. More research, especially longitudinal research, still has to be conducted.

There are also only very few studies investigating whether the order in which a learner acquires his languages and the amount and type of transfer correlate (e.g. Williams & Hammarberg, 1998; Hammarberg, 2001; Dewaele, 1998; Jarvis, 2002). However, the few previous studies, mainly examining the forward and lateral direction, hint at the fact that the chronological order of acquisition of non-native languages might have an impact on CLI (Jarvis & Pavlenko, 2008: 204). De Angelis argues that the order of acquisition is connected to the type of associations established during this process between two or more languages, and therefore also to the amount and type of CLI occurring in the TL (cf. De Angelis, 2007: 38f).

[23] Length of residence is supposedly an indicator of the level of TL knowledge (cf. Jarvis & Pavlenko, 2008: 200).

Particularly the language learnt just before the TL tends to become the SL for transfer (cf. Jarvis & Pavlenko, 2008: 204; also Dewaele, 1998; Williams & Hammarberg, 1998; Jarvis, 2002). The term *last language effect* mentioned by Murphy (cf. 2003: 11) refers to the same notion of the most recently acquired language before the TL as the preferred source of transfer (e.g. Cenoz, 2001; Hammarberg, 2001; Shanon, 1991; Williams & Hammarberg, 1998). It is an important nuance, however, that "most recently acquired language" here is understood as the most recent language immediately before the TL in the order of acquired languages, and not just any language acquired before (cf. Jarvis & Pavlenko, 2008: 185). A further word of caution is given by Murphy (cf. 2003: 11), who admonishes that falling back on the (chronologically) most recently acquired language might only constitute a transfer of training depending on how a NNL was acquired: if certain training techniques were used in the learning of NNL A as well as in NNL B, this could lead to an increase of transfer from language A into language B; and if by chance language B was acquired directly after language A, it might only look like a last language effect.

Some corroborating evidence for the impact of order of acquisition on CLI comes, for instance, from Williams and Hammarberg's (1998) case study of an L1 English learner of Swedish with a few other NNLs, who mainly showed CLI from her most recent – and also most proficient – NNL German, although she had been using her L1 more than German (cf. Jarvis & Pavlenko, 2008: 185). With regard to phonological CLI between NNLs, again, there is no empirical evidence yet on any potential impact of the order of acquisition of languages.

A further, commonly acknowledged variable of linguistic distance has already been investigated in numerous studies (e.g. Kellerman, 1977, 1995; Ringbom, 2001, 2007; Wode, 1976; Cenoz, 2001; Eckman, 2004; Jarvis, 2002), and has been referred to as *typological proximity, cross-linguistic similarity* or *language distance*. In general, one needs to look at language distance from two different perspectives: The first one sees it on the level of objectively measurable genetic distance, as in belonging to the same or a different language family or the same subgroup within one family, such as Swedish and Danish as North Germanic languages within the Indo-European group. So, if the L1 or a known NNL happen to be closely related in genetic terms to the NNL being acquired, thus sharing numerous congruent forms and structures, they are quite likely to influence each other, especially with respect to the lexis, as a number of studies has confirmed (e.g. Vildomec, 1963; Singleton, 1987; Ringbom, 1987, 2001, 2003; Möhle, 1989; Clyne, 1997; Dewaele, 1998; Williams & Hammarberg, 1998; De Angelis, 1999; Cenoz, 2001; De Angelis & Selinker, 2001; Ecke, 2001; Fouser, 2001; Rossi, 2006).[24] But also on other linguistic levels, such as that of morphology, CLI is promoted if languages share "favourable structural conditions" (Weinreich, 1953: 44) like a similar inflectional system; nothing stands in the way of any kind of morpheme to be possibly transferred from one language into another (e.g. Clyne, 1997; De Angelis & Selinker, 2001). With respect to L3/Ln phonology, Llama et al. (2010) conducted a study regarding the role of language distance as decisive factor in determining the SL for phonological CLI. They report on ambiguous results, which hint at "L2" status (see section 3.3.6) as stronger variable than language typology. However, there is a serious lack of research along these lines in L3/Ln phonology to either corroborate or refute Llama et al.'s findings.

What studies like those of Biskup (1992), for instance, convey is that apparently formal transfer tends to appear in typologically close languages like German and English, whereas semantic transfer is more likely in relatively distant languages. The first studies to systematically look at language distance as a decisive factor in triggering formal and semantic transfer, respectively, were conducted by Ringbom (1978, 1987, 2001). He took advantage of the ideal linguistic situation for such investigations in Finnish-Swedish bilingual communities in Finland. As all of his participants spoke Finnish, Swedish and English, he was able to investigate in the TL-English productions of his two groups (i.e. L1 Finnish – L2 Swedish versus L1 Swedish – L2 Finnish) the impact of Finnish as Finno-Ugric language. It is typologically completely different to the TL English in contrast to the Germanic language Swedish that is relatively closely related to the likewise Germanic English language. Surprisingly, Ringbom found "formal lexical errors of both Finnish speakers and Swedish speakers [which] overwhelmingly reflect influence from Swedish (…). Their

[24] Genetic relationship is taken up, for instance, in the *EuroCom*-projects, which try to take full advantage of the subsequent potential of positive transfer. A group of researchers is working on elaborating a method to aid fast acquisition of receptive competence of an L3/Ln genetically related to the learner's L2, the so-called *bridge language*. Their aim is to convey strategies promoting positive interlingual transfer to enable mutual comprehension of the three big language families in Europe, i.e. Germanic, Romance and Slavic languages (cf. http://www.eurocomprehension.eu/slav/indexslav.htm, accessed 14.12.2016).

semantic errors, on the other hand, overwhelmingly reflect influence from their L1s." (Jarvis & Pavlenko, 2008: 77). Thus, he had proven the assumption right that language distance is a constraining factor in transfer, with formal transfer in the TL English occurring predominantly from closely related Swedish, irrespective of its status as L1 or L2. Yet even if two languages are closely related genetically this does not automatically imply the occurrence of CLI (cf. De Angelis, 2007: 23).

Some researchers reported CLI from genetically distant or even completely unrelated languages (e.g. Rivers, 1979; Schmidt & Frota, 1986; Selinker & Baumgartner-Cohen, 1995; Dawkins, 1916; Jarvis, 2002; Jarvis & Odlin, 2000; Master, 1997; Orr, 1987; Ahukanna et al., 1981; Cenoz, 2001; Fouser, 2001). To account for such evidence of transfer from unrelated languages into a TL despite a speaker's knowledge of related languages (e.g. Rivers, 1979; Schmidt & Frota, 1986; Selinker & Baumgartner-Cohen, 1995), however, it is necessary to look at the second angle of language distance: on the narrower level of formal similarity, i.e. whether two or more languages share similar features on various linguistic levels, for example a similar grammatical mark-up of the past tense form that is not due to a genetic relationship at all. It appears that one kind of information tends to be transferred particularly frequently from genetically distant languages: phonetically similar elements. Schmidt and Frota (1986), for instance, found that a high phonetic resemblance of two or more languages facilitates transfer between them, be they closely related in genetic terms or more distant languages (e.g. also Chamot, 1973): They examined occurrences of CLI in the TL Portuguese by an L1-English learner fluent in Arabic with some knowledge of French, German, Dutch, Italian, Greek, Hebrew and Farsi. As assumed, CLI was detected from the closer related languages English and French, but also a great deal from the subject's Arabic, a completely different language from Portuguese in genetic terms. Selinker and Baumgartner-Cohen (1995) observed that from the NNL French, *tu as* was transferred into the TL German, replacing the phonetically similar *du hast*, and resulting in the utterance **Tu as mein Fax bekommen?*. It has to be noted, though, that we are still dealing with transfer of formally similar items, and not phonological CLI. After all, it is the lexis that is transferred due to the items sounding similar. Once again, there is also a dearth of studies explicitly of the effect of linguistic distance on lateral phonological transfer.

The concept of formal similarity is situated in between objectively measurable genetic distance and perceived language distance, the variable explored in the subsequent paragraphs. Ringbom's (2003) paper "If you know Finnish as L2, there will be no major problem learning Swahili" takes up the distinction between formal similarity and objectively measurable genetic distance. He emphasises this differentiation, demonstrating how Finnish and Swahili, despite not being genetically related at all, share certain formal similarities, such as both being agglutinative languages. Consequently, this offers possibilities for CLI if learners then perceive similarities that are actually non-existent, genetically speaking (cf. also De Angelis, 2007: 23), as will be argued in the following.

Even more likely to occasion CLI than objectively measurable genetic linguistic distance or formal similarity is the variable of *perceived language distance* or *psychotypology*, a term coined by Kellerman in the 1970s (cf. Kellerman, 1977, 1978, 1983, 2001; e.g. also Ringbom, 1987, 2001; Singleton, 1987; Möhle, 1989; Odlin, 1989; De Angelis & Selinker, 2001; Ecke, 2001; Bouvy, 2000; De Angelis, 2005a; Sanchez, 2011). As discussed before (see section 3.1.1.4), according to Kellerman, the two constraints of psychotypology and prototypicality interact and thus condition the transferability of linguistic material. This means that a close perceived or assumed subjective distance, or psychotypology, between two or more languages by the learner, regardless of whether it reflects the real genetic distance or not, makes transfer more likely between these languages. The even stronger constraint of the two, however, prototypicality, refers to the fact that the transferability of prototypical items is much higher than that of less representative, marked ones (cf. Kellerman, 1987: 65).

So, the effect of psychotypology too applies to unrelated languages, like it was also argued before on the impact of formal similarity, being the even stronger trigger for CLI between unrelated languages (cf. De Angelis, 2007: 23). A learner tends to draw mostly on those languages he judges as being close to the TL, irrespective of whether these source and target languages are objectively related. This sometimes even happens when the learner has knowledge of closely related languages (cf. De Angelis, 2007: 23; also e.g. Rivers, 1979; Schmidt & Frota, 1986; Selinker & Baumgartner-Cohen, 1995; Dawkins, 1916; Jarvis, 2002; Jarvis & Odlin, 2000; Master, 1997; Orr, 1987).

Especially in the area of lexis the effect of psychotypology was observed in several studies (e.g. Ringbom, 1987, 2005; Ecke, 2001; Fouser, 2001). To facilitate the acquisition process, learners look for formal similarities on different linguistic levels in their L1 or their other NNLs and the TL. If learners find such subjective similarities, they create interlingual identifications between the allegedly similar SL and TL. Believing the languages are closely related, additional purported similarities are detected, and accordingly the above-mentioned variable of genetic language distance CLI is more likely to occur (cf. Jarvis & Pavlenko, 2008: 179). Consequently, the extent of CLI varies from learner to learner, as it is determined by whether the languages in question are seen as closely related or not, and whether and to what extent existent as well as imagined cross-linguistic similarities are perceived.

What is interesting is that the factor of perceived language distance does not only hold for formal and semantic forward transfer, but also for the reverse and lateral directions (cf. Jarvis & Pavlenko, 2008: 81). Besides the different directionalities of transfer affected by psychotypology, it is also possible that learners see similarities only on a specific linguistic level, but none at all on another level. Therefore, transfer might perhaps only happen, for instance, on the lexical level, but not on the phonological (cf. De Angelis, 2007: 23f). Again, there is a considerable absence of research on psychotypology's effect on triggering phonological CLI in L3/Ln acquisition.

A further constraint on CLI that has been investigated in a few studies is the formality of context in which learners use a TL. As Murphy (cf. 2003: 13) says, the interaction of transfer and the variable of context can be looked at from different angles: firstly, from a sociolinguistic point of view, i.e. the kind of speaker community, with intentional code-switching (see section 3.1.1.2) being very common in a bi- or multilingual community (e.g. Grosjean, 2001; Odlin, 1989); secondly, from an empirical perspective, context is seen as task relatedness (see section 3.3.4), which can have an effect on the amount of CLI depending on the kind of task used for eliciting language production data (e.g. Kellerman, 1995; Poulisse, 1990); thirdly – and most relevant for the present section – from a pragmatic point of view, or a situational angle, as Jarvis and Pavlenko (2008: 207) call it, where context is operationalised as the level of formality in a production situation (cf. Murphy, 2003: 13). An increased level of formality can be observed, for example, in situations like having to perform public speeches, presentations or tests in class. When accompanied, for instance, by anxiety about failure, peer pressure, mental tiredness, stress or a noisy environment, this can have a negative impact especially on a NNL-learner's productions in a TL (cf. De Angelis, 2007: 39; e.g. Hamers & Blanc, 1989).

On the other hand, according to De Angelis, a language learner's TL-performance may also benefit from a "healthy dose of anxiety" (2007: 40).

With regard to transfer, this level of formality of a given situation can become a constraint on the amount of CLI because of its interdependence with the number of cognitive resources a learner has to supply for controlling his productions: the more formal a language production situation is for the learner, the more conscious an effort he will make to monitor his output, simultaneously increasing the amount of forward CLI (cf. Murphy, 2003: 13; e.g. Dewaele, 1998, 2001; Grosjean, 2001; Tarone, 1982). However, both Odlin (1989) and Jarvis (2003) in studies on forward and reverse transfer concluded exactly the opposite from their analyses, namely that actually there is an increase of the amount of transfer in *informal* situations, as if the learner focuses more on conforming to the TL norms (cf. Jarvis & Pavlenko, 2008: 208). This hints at the fact that the relationship between the level of formality of a production situation and the amount of CLI is a bit more intricate than a simple statement like "The higher the level of formality, the more transfer occurs", or the other way round. According to Jarvis and Pavlenko (cf. 2008: 208), the seemingly contradictory results of these studies can be reconciled with each other when taking the intentions of the NNL-learners in a respective communicative situation into consideration: Learners aim to conform to the norms of the TL. At the same time, they try to make use of linguistic forms and structures that accommodate the context's level of formality. Thus, while the learners endeavour to avoid violating the TL conventions, there are still TL-specific forms and structures marking the level of formality, prestige or politeness which impinge on the learners' TL output (cf. Jarvis & Pavlenko, 2008: 208; e.g. Schmidt, 1977). Consequently, the formality of a production situation is apparently interdependent with the amount of CLI. But it is associated with forces which can both promote or hinder transfer. Whether this also holds true for lateral phonological CLI is once again not known due to a dearth of empirical studies on whether the factor formality of context also specifically interacts with this kind of transfer.

Besides the variables triggering CLI in L3/Ln acquisition discussed so far, there are possibly further factors which also might have a transfer-inducing effect, maybe even with regard to LPT. However, the influence of these factors is not well researched yet and is sometimes even only based on speculations. Such further factors to potentially interact with the occurrence of CLI, possibly also with LPT, are typological markedness and protoypicality (e.g. Thomason & Kaufman, 1988; Dinnsen & Eckman, 1975; Kellerman, 1983; Anderson, 1987; Eckman, 1977, 2004; Stockman & Pluut, 1992; Liceras, 1985; White, 1987). Prototypicality refers to how central, typical or universal a certain linguistic structure or meaning appears to a NNL-learner (cf. Jarvis & Pavlenko, 2008: 187). Besides Kellerman's (e.g. 1978, 1983, 1986, 1989) investigations, there are only a few studies that specifically investigate the influence of prototypicality (e.g. Ijaz, 1986; Jarvis, 1998). Markedness is defined specifically for phonology as the degree of how common sounds or sound patterns are in the world's languages; sounds or sound patterns are classified as being unmarked if they can be found rather commonly across languages, whereas those that are less common are categorised as marked (cf. Jarvis & Pavlenko, 2008: 186). Unmarked features in the L1 as well as in NNLs are predicted to be easier and quicker to acquire than marked ones. This has been found to correlate with the occurrence of CLI (e.g. Anderson, 1987; Eckman, 1977, 2004; Stockman & Pluut, 1992). However, researchers have not yet been able to pin down the exact conditions neither of how and when markedness interacts with transfer nor with other variables, although some evidence exists, particularly in the field of morphosyntax (e.g. Liceras, 1985; White, 1987; Hyltenstam, 1984; Zobl, 1984; Bardovi-Harlig, 1987).

Markedness and protoypicality relate to how learners assess which L1 knowledge, or other NNL-structures or meanings, they can draw on when they acquire a new NNL (cf. Jarvis & Pavlenko, 2008: 188). This explains why certain linguistic information is more readily transferred than others, as well as why sometimes a learner transfers more from language A to language B than vice versa (cf. Jarvis & Pavlenko, 2008: 188; e.g. Eckman, 2004; R. Ellis, 1994). Eckman (1977) even proposed a theory of L2 phonological acquisition, the Markedness Differential Hypothesis, based on the concept of markedness, which aims at eliciting the principles a learner's use of forward CLI is based on (cf. Gass & Selinker, 2008; Eckman, 1991; Carlisle, 1997, 1999). With regard to phonology, it consists of hierarchies of phonological features, ranging from unmarked to marked ones, and predicts which are easy to acquire and which are difficult. This is reminiscent of the Contrastive Analysis Hypothesis (see section 3.1.1.1), but slightly modified with some added principles, allowing for more precise predictions with regard to the degree of difficulty to acquire certain features. Not surprisingly, there is a great lack of studies on a potential relationship between markedness, prototypicality and CLI, particularly for reverse or lateral transfer, for which no specific studies exist at all to date, to the author's best knowledge.

Further, frequency and salience have been speculated to constitute potential triggers of lateral transfer, but as yet without any empirical basis to prove their significance. Salience refers to the prominence of a word or structure, i.e. how noticeable or important it appears to a person. It can not only lead to forward transfer (e.g. Jarvis, 2002), but also to reverse or lateral CLI. If a certain non-native SL form or structure is very salient in the learner's eyes, it might lead to an increased likelihood of transfer and consequently to the incorporation of it in the TL. The dearth of studies on salience in connection with promoting lateral CLI leaves ample room for further inquiry.

With regard to the frequency of a certain item, it is quite likely that this factor interacts with some of the variables already mentioned in favour of the transfer of the respective more frequent form or structure as opposed to a different one, also from NNLs. Selinker (1969) and Andersen (1983) were the first to point out a potential relationship between the frequency of occurrence of a specific source or target language form and the likelihood of this form being transferred and incorporated into the interlanguage (cf. Jarvis & Pavlenko, 2008: 183).

The effect of frequency on CLI has been investigated in some studies relating to SLA (e.g. Larsen-Freeman, 1976; Kellerman, 1983; Faerch & Kasper, 1986; Poulisse & Bongaerts, 1994; Selinker, 1969; Poulisse, 1999). It was found to be significant due to higher activation levels of the more frequent L1 items, particularly for unintentional lexical CLI from the L1 at the early stages of TL acquisition. A few investigations about the impact of the frequency factor were also conducted in the realm of L3/Ln acquisition (e.g. Ringbom, 1986; De Angelis & Selinker, 2001; Hammarberg, 2001), but with different results: not the L1 was the primary source of transfer, as expected for its higher activation due to the proficiency level, but the L2 with respect to unintentional transfer, particularly of function words, into the TL (cf. Murphy, 2003: 15). Selinker (1969) proposed that the frequency of forms in both source and target language is somehow connected so that particularly frequently occurring L1 or L2 structures are more likely to appear in TL productions (cf. Selinker, 1969: 182).

Cognitive and attentional variables can also interact with the occurrence of CLI, although evidence stems only from a few studies mainly concerned with forward transfer in phonology or lexis (cf. Jarvis & Pavlenko, 2008: 190ff). As Jarvis and Pavlenko (cf. 2008: 190) point out, these variables usually concur with other factors, and together promote transfer. In the subsequent paragraphs, a closer look will be cast specifically at the effect of the level of cognitive maturity, attentional factors and awareness to language.

Regarding the interaction of transfer and a learner's level of cognitive maturity, some studies provide evidence (e.g. Weist, 2002; Weinert, 2004; Upton & Lee-Thompson, 2001) for the effect of the additional variable proficiency, with which that of cognitive maturity apparently concurs (cf. Jarvis & Pavlenko, 2008: 191). Interestingly, to explain transfer phenomena, researchers often rather rely on the explanatory power of age than on the learner's cognitive development, although constraining effects of both factors on transfer can be equally clearly discerned in the literature (e.g. Jarvis, 1998; Cenoz, 2002; Weinert, 2004). Results of this are visible, for example, in qualitative differences of transfer patterns in learners of different levels of cognitive maturity (cf. Jarvis & Pavlenko, 2008: 191).

With a view to attentional factors, various facets can be differentiated, such as attention to language in the narrow sense, awareness of language, exerting conscious control when using language, or analysing language metacognitively and metalinguistically (cf. Jarvis & Pavlenko, 2008: 194), whose interaction with CLI has been examined in a few studies (e.g. Herdina & Jessner, 2002; Jessner, 2006; Bono, 2011). Rather unusual, the emphasis here lies on the non-structural focus of a learner's explicit knowledge as well as his conscious control, attention and awareness of language, and on whether this interacts with the occurrence of CLI (cf. Jarvis & Pavlenko, 2008: 194; Odlin, 1989: 140). Jarvis and Pavlenko, for example, give a refined definition of "language awareness as explicit knowledge of language, regardless of whether it qualifies as metalinguistic or as a vague notion a person is conscious of and therefore able to verbalise" (cf. 2008: 194). The focus of Jarvis and Pavlenko's investigations lies on how often and in what ways a learner draws on this kind of explicit knowledge. Most commonly, such effects become visible in differences in transfer patterns contingent on whether a learner tries to use explicit knowledge or not when speaking.

Discussing the use of explicit knowledge in the sense of consciously controlling or monitoring one's output, related notions like intentionality or the effect of the learning environment force themselves on the beholder. The former constraint of intentionality was investigated in Williams and Hammarberg's (1998) case study, where they found intentional and unintentional language switches to serve different purposes in NNL production: recurring intentional switches in their participant's TL Swedish primarily came from the L1, for metalinguistic comments like clarifications, asking for feedback or as a repair strategy incorporating L1-English words into the TL Swedish to fill lexical gaps; unintentional switches mainly came from the subject's L2 German, resulting in unconscious TL lexical substitutions. Williams and Hammarberg thus did not only find evidence for the effect of intentionality on the choice of the SL, but also on what kind of information is transferred as well as the reasons underlying it (cf. Jarvis & Pavlenko, 2008: 195).

Researchers disagree on the effect of the learning environment or context on the occurrence of transfer: whereas some argue that a learning environment which fosters high language awareness and monitoring of one's linguistic output tends to promote an increased amount of CLI, particularly if the source and target language are typologically distant, others claim this is not always true (e.g. Odlin, 1989; Kasper, 1997; Jarvis, 2002, 2003). Some investigations showed that the use of explicit knowledge and conscious monitoring leads to decreased levels of CLI, particularly of negative transfer (e.g. Kasper, 1997; Jarvis, 2003; Odlin, 1989: 152).

Considering the effect of awareness to language on CLI, Jessner's (2006) work on metalinguistic awareness, particularly in multilinguals, including a synthesis of the existing literature on it, stands out. Jessner understands metalinguistic awareness as a cognitive advantage developed by bilingual (or multilingual) learners ensuing contact with another "language culture" (Herdina & Jessner, 2000: 93), as Jessner says. It can result, for instance, in consciously looking for similarities across languages, in a more frequent reliance on previous linguistic knowledge, in improved receptive strategies when it comes to deducing lexical meanings or generally in a higher likelihood of positive transfer when drawing on other languages than the TL (cf. Jarvis & Pavlenko, 2008: 196; Odlin, 1989: 152; Bono, 2011; Gibson & Hufeisen, 2011). From the results of her investigations she deduces that non-native language learning promotes a higher level of metalinguistic awareness in learners, which again leads to faster acquisition rates of further NNLs (cf. Jarvis & Pavlenko, 2008: 196). Interestingly, according to Jessner, this accelerated acquisition seems to be due to the increased metalinguistic awareness, inducing learners to draw on their prior languages. The subject of Hammarberg and Williams' (1993) case study exhibits a remarkable level of metalinguistic awareness. In an introspective comment, the L1-English learner of L3/Ln Swedish admitted to "foreignising" words from her other NNLs when lacking a suitable Swedish word, and adapting their pronunciation to what she considered to be the Swedish phonological system. This clearly shows an experienced language learner, who knows how to make use of prior linguistic knowledge and fearlessly applies all sorts of strategies learning a new L3/Ln. In addition to that, because of the learner's ability to very soon intuitively perceive possible TL-sounds and sound combinations, she developed a kind of phonological filter. This aided her to sort out sounds from her previously acquired languages fit to incorporate into the TL Swedish (cf. Hammarberg & Williams, 1993: 67). As an example, she gives an account for "Swedifying" a French verb:

> I was going to say something German but that just didn't seem right, because I didn't have any recollection of you saying something like *werfen* and so I looked around for some other foreign-sounding word, and the only other language I can speak is French, so I came up with *jeter*. And then I thought 'I'll try a Swedish version of that'. I didn't want to use my English as a back-up, because something like *throw* - *throwa*- that wouldn't be – *throware*, or whatever the Swedish people would say. – So I was looking round for possibilities of using foreign words that I know in a Swedish setting, and perhaps making them Swedish … (…).
>
> (Hammarberg & Williams, 1993: 66)

Once again, there are only very few studies specifically focusing on the interaction of transfer with a learner's use of explicit knowledge and conscious processes in the acquisition and use of a TL, although this phenomenon has begun to attract attention and empirical investigations (cf. Jarvis & Pavlenko, 2008: 196; e.g. Wrembel, 2012). A first step is being taken by Wrembel's (2012, 2015) investigations: As part of an extensive research project, she examined think-aloud protocols of two groups of multilingual learners (group one: 60 L1-Polish beginners of L3 French or German with advanced L2 English; group two: 35 L1-German beginners of L3 French or Polish with advanced L2 English) in order to explore multilinguals' metalinguistic – or more specifically metaphonological – awareness and multilingual processing. Indeed, apart from self-reported evidence for her participants' attention to and modification of TL phonological output, Wrembel shows with the learners' oral awareness protocols that their heightened metaphonological awareness across multiple languages promotes interlingual interactions, particularly between their L2 and L3.

3.3 Factors Evoking Cross-Linguistic Influence in L3/Ln-Phonology

All factors mentioned so far have been revealed in studies to trigger CLI in one way or the other. Yet, some of them appear to have a significant impact only on certain linguistic levels, such as lexis, or only in a specific direction. Others hitherto have not been explored thoroughly enough to be able to determine their entire scope with regard to the directionality or linguistic levels on which these variables might occasion CLI.

As was discussed above (see section 3.1.2.5), the present study focuses on the lateral phonological type of CLI. Since different types of CLI are correlated with different factors, in the following, factors that have been suggested to promote LPT –besides other types of CLI – will be discussed. Those factors include proficiency in the target and source language(s) (see section 3.3.1), recency of use (see section 3.3.2), "L2" status or foreign language effect (see section 3.3.3) and task relatedness (see section 3.3.4; e.g. Hammarberg & Williams, 1993; Hammarberg & Hammarberg, 1993; Pyun, 2005; Tremblay, 2007; Gut, 2010; Llama et al., 2010; Wrembel, 2010). Besides, orthography, which is likely to also promote LPT but which has not been investigated yet in connection with LPT, will be examined (see section 3.3.5).

3.3.1 Proficiency in the Target Language and Source Language(s)

Probably one of the most significant factors to interact with the type and amount of CLI is proficiency (cf. Murphy, 2003: 7). This factor requires further differentiation between proficiency in the SL(s) and proficiency in the TL. Since the focus of the present study is on interlingual influence between NNLs, particularly the proficiency level in the non-native source and target languages is of interest.

With regard to the former, it has been suggested that the more proficient learners are in a NNL other than the one they are acquiring at the moment, the more likely CLI will occur from this SL in general. So, to be able to serve as a source for transfer, the learner must have achieved a certain level of proficiency in the respective NNL (cf. Murphy, 2003: 8; e.g. Hammarberg, 2001). This has been corroborated in several studies by findings on lexical or syntactic CLI from NNLs the learner knows well (e.g. Dewaele, 1998; Hammarberg, 2001; Schmidt & Frota, 1986; Ringbom, 1987, 2001; Singleton, 1987; Williams & Hammarberg, 1998; Odlin & Jarvis, 2004).

Schmidt and Frota (1986), for example, came across lexical CLI onto their subject's TL Portuguese from his most proficient NNL Arabic. For reverse CLI, a high proficiency level in the non-native SL similarly increases the amount of transfer (cf. Jarvis & Pavlenko, 2008: 201; e.g. Major, 1992, 1993; Tao & Thompson, 1991; Van Hell, 1998). On the other hand, particularly with regard to lexical borrowings, Shanon (1991) claims that his participants drew most frequently on the language they had acquired most recently and in which they thus usually had the lowest proficiency (cf. Murphy, 2003: 8; e.g. Ringbom, 1986). Moreover, concerning semantic transfer, in Pavlenko and Jarvis' (2002) study, the transfer errors in their L1-Russian adult learners' of English productions in both Russian and English also demonstrated that it "can originate from any language through which a person has acquired a new or modified semantic representation for one or more words" (Jarvis & Pavlenko, 2008: 81), although, generally, a high level of SL-proficiency definitely facilitates meaning transfer.

Whereas overall findings on the relationship between SL-proficiency and CLI are comparatively straightforward, with more evidence of an increased amount of transfer the higher the competence level, it is not so unequivocal regarding proficiency in the TL (e.g. Jarvis, 2000a). Accounts in the literature range from an increase of transfer, the same amount, a decrease, to even a fluctuation of CLI with increasing TL proficiency. Proof especially for a decrease of CLI is given by several studies which have discovered that CLI is most likely to occur in the initial stages of acquisition: the learner's command of the TL is still only very rudimentary and many knowledge gaps have to be filled with previously acquired linguistic information (e.g. Singleton, 1987; Odlin, 1989; Williams & Hammarberg, 1998; Poulisse & Bongaerts, 1994; Fuller, 1999; Ringbom, 1986). This is the case not only for forward transfer, but also for the reverse and lateral direction (e.g. Dewaele, 2001; Fuller, 1999; Hammarberg, 2001; Williams & Hammarberg, 1998).

Yet, counterevidence for claims about CLI only occurring in situations of a low TL proficiency (cf. Jarvis & Pavlenko, 2008: 80; e.g. Krashen, 1983) is provided, for example, by anecdotal evidence as well as by several studies on reverse lexical and semantic transfer from a NNL onto the L1 (e.g. Jarvis, 2003; Pavlenko & Jarvis, 2002). Proof comes, for instance, from the above-mentioned study by Pavlenko and Jarvis (2002) on errors in L1-Russian adult learners of English. Apart from them finding reverse transfer not only of formal structures but also of semantic properties, Pavlenko and

Jarvis were able to show that CLI onto the L1 can occur from NNLs the learner has acquired fully as well as from those he is not very proficient in yet. However, for reverse transfer, some studies also found that specific areas of TL acquisition and use require at least a certain level of proficiency for CLI to occur at all (e.g. R. Ellis, 1994; Jarvis, 1998; Odlin, 1989; Ringbom, 2007). Furthermore, it has to be borne in mind that CLI is not restricted to the initial learning stages, but can also occur at a more advanced TL level.

According to Jarvis and Pavlenko (cf. 2008: 202f), there are several reasons for these contradictory findings particularly about the relationship between TL proficiency and CLI: For example, further factors could interact with competence in the TL, which might impact the analyses. Secondly, the lack of consistency in terms of proficiency assessment across studies, measuring length of residence in the TL environment, with differing tests of proficiency, or months and years of TL instruction as benchmarks, could also be responsible for differences in the results. Thirdly, with regard to the quality of the occurring transfer, some studies might only consider negative transfer, which tends to decrease with increasing TL-proficiency, and others may investigate both negative and positive CLI, the latter of which apparently increases the higher the TL-proficiency. The variation in transfer studies' results may also stem from differences in the impact of proficiency, depending on the linguistic level investigated. So, overall, TL- as well as SL-proficiency definitely have an influence on the occurrence of transfer; however, it varies especially subject to what is understood by proficiency as well as to whether and which further factors also play a role.

Nevertheless, several studies do find that transfer decreases overall with increasing TL proficiency (e.g. Dewaele, 1998); apparently, lateral and reverse CLI weaken much quicker than a relatively persistent forward influence from the L1 (cf. Murphy, 2003: 8; e.g. Hammarberg, 2001). Thus it appears that Ringbom's differentiation of transfer of form versus transfer of meaning indeed makes sense. In the above-mentioned (see section 3.2) studies by Ringbom (1978, 1987, 2001) of Finnish-Swedish learners of English, it was found that there was more formal lexical transfer between the more closely related languages Swedish and English than from the linguistically distant Finnish. However, it seems that proficiency overruled the impact of language distance between the SL and TL English when it comes to semantic transfer. Ringbom's L1-Finnish participants, for instance, also transferred meaning from their L1 onto the

L2, regardless of any observed similarities: This overruling factor of proficiency constraining the transferability of semantic – but also formal – properties is also corroborated in further studies (e.g. Chandrasekhar, 1978; Clyne, 1997; Clyne & Cassia, 1999; Möhle, 1989; Schmidt & Frota, 1986; Singleton, 1987; Wei, 2003). Apparently, transfer of meaning tends to come from the most fluent and most automated language a learner knows, often the L1, and regardless of the typological distance to the TL. This is possibly due to the fact that L1-words are the preferred source for semantic transfer – at least until the learner has reached a certain proficiency level in a NNL and has managed to acquire TL-specific semantic representations and the underlying concepts (cf. Jarvis & Pavlenko, 2008: 81–82), which then allows for it to also become the SL for meaning transfer (cf. Jarvis & Pavlenko, 2008: 78; e.g. De Angelis, 2007: 43; Murphy, 2003: 8; De Angelis & Selinker, 2001; Ringbom, 1986, 2001). For formal transfer to occur, however, already a relatively low proficiency suffices, although usually further factors, such as language distance, additionally play an important role.

Despite the fact that some studies have found that transfer tends to come from languages the learner knows well, others have also observed CLI from languages in which the learner is not so proficient (e.g. Vildomec, 1963; Rivers, 1979; Selinker & Baumgartner-Cohen, 1995; De Angelis, 1999, 2005a). This consequently suggests that only a relatively low level of proficiency suffices to have an impact and become a SL for CLI. In Rivers' (1979) study about an L1-English learner of Spanish with very good knowledge of French, a little German and a little Italian, for example, the learner exhibited CLI from both the other two Romance languages, as expected according to the variable of language distance, especially from the most proficient non-native language French. However, she also showed CLI from her little knowledge of Italian, as well as, surprisingly, a considerable amount of CLI from the learner's low-level German. De Angelis (2005a) conducted a study on syntactic CLI with two groups of subjects, one of them L1-English speakers with low proficiency French or Spanish as L2 who were learning Italian as L3; the other L1 speakers of Spanish only with L2 English, or additionally with rudimentary knowledge of L3 French, learning Italian as L3 or L4 respectively. All participants read a text in their L1 and wrote a summary of it in the TL Italian. After comparing the summaries of learners with and without French, De Angelis noted a significant difference in the use of overt or covert subjects: learners with previous knowledge in French, although only very basic, inserted more subjects than the ones without French.

Concerning the role of proficiency occasioning phonological CLI in L3/Ln acquisition, though, only very scarce data are available to corroborate its impact (Hammarberg & Williams, 1993, 1998). Hammarberg and Williams showed that phonological CLI is only very likely at the early stages of acquisition of a new language, i.e. when the TL proficiency is still only very rudimentary. CLI is then employed as a coping strategy due to the missing familiarity with the new target phonological system.

What is common to all these studies are three questions: How are we to determine both SL and TL proficiency? How proficient must multilingual learners be before their acquired prior knowledge actually has an effect on TL productions? And, as according to Hammarberg and Williams (1993, 1998) lateral phonological transfer is only likely at early acquisition stages, how long does it take before the learners become too proficient in their L3/Ln for lateral phonological CLI to still occur? Most commonly, there are only arbitrarily set threshold levels due to the absence of experimental studies on how and when to set a proficiency cut-off level. This variable doubtlessly still offers plenty of scope for research on its impact on CLI in L3/Ln phonology.

What must also not be overlooked are the two points of concern Jarvis and Pavlenko (cf. 2008: 203) raise with regard to the interdependence of proficiency level and amount of CLI: Firstly, generalising findings on the impact of proficiency on transfer from a single study necessarily oversimplifies the intricate relationship between proficiency and further factors, and overlooks the potential lack of consistency in proficiency measurements across different studies. Secondly, the association of proficiency and CLI should not only be assessed in terms of the amount of overt transfer, with a high number of occurrences equalling low TL proficiency and few cases of overt transfer tantamount to a high TL proficiency. After all, covert transfer manifested, for instance, in transfer of training or avoidance behaviour ideally should also be taken into consideration. The operationalisation indeed poses a challenge for sound empirical studies, though.

From the point of view of language processing, the most common connection between an increased amount of transfer at a low TL proficiency level and at the same time an advanced SL competence can be accounted for by its correlation with frequency: the higher the SL proficiency and the more frequently the SL is used, the more active it is in learners with a low TL proficiency. Thus, when trying to use the TL, the more active forms and structures from the speaker's SL interfere and are often involuntarily selected (e.g. Poulisse & Bongaerts, 1994). On the other hand, Odlin (1989) provides evidence for some kinds of transfer which tend to occur also when the learner has a high proficiency level in the TL (cf. Murphy, 2003: 7). Overall, when examining the relationship between proficiency and transfer, the proficiency level in all of the learner's languages has to be considered in order to cover all potential sources of influence, as CLI can come from any direction on any linguistic level, regardless of the proficiency level (cf. Murphy, 2003: 8).

3.3.2 Recency of Use

The factor of recency can again be understood in two different ways: either as recency of acquisition of a language (see paragraphs on factor order of acquisition in section 3.2), or as recency of use of a language, the focus of the present section. Approaching the relationship between recency of use and transfer from a language processing perspective (e.g. Grosjean, 2001), a tendency becomes apparent: CLI is more likely to occur from languages the learners have made use of recently and therefore are still fresh in their mind. In other words: the linguistic information from the language which is in a state of high activation and thus still vivid in a learner's mind is accessed more easily (e.g. Poulisse, 1999; Vildomec, 1963; Dewaele, 1998; Hammarberg & Williams, 1998; Flynn et al., 2004; Fuller, 1999). As Poulisse (1999) says, high mental activation levels of certain SL information can lead to the intrusion of this SL material into the TL (cf. Jarvis & Pavlenko, 2008: 186). Thus, there seems to be a correlation between the amount of interlingual transfer, particularly the lexical kind, and the learner's language mode, i.e. "the state of activation of the bilingual's [author's comment: or multilingual's] languages and language processing mechanisms at a given point in time" (Grosjean, 2001: 2).

However, counterevidence for this claim was also found (e.g. Rivers, 1979; De Angelis, 1999; De Angelis & Selinker, 2001). Rivers (1979), for instance, discovered CLI from a dormant NNL in her L1-English subject: surprisingly, she exhibited a great deal of primarily lexical CLI in the TL Spanish from her long unused L2 German.

Corroborating evidence so far for this hypothesis on the role of recency of use regarding phonology was delivered by Hammarberg and Hammarberg (1993, 2005) as well as by Hammarberg and Williams (1993). The subject of their longitudinal case study, a native speaker of English with L2 German learning Swedish, showed phonological CLI on the L3 from her L2, which was still very vivid to her due to a recent stay abroad and using her L2 in day-to-day life for six years. It is obvious that significantly more studies are necessary to explore the scope of this factor more extensively and to put it on a broad empirical basis. Besides, a rough cut-off point remains to be established – if one exists – as to what defines "recency of use"; perhaps "recent" use even has to be set individually for each learner.

3.3.3 "L2" Status or Foreign Language Effect

Similar to the factor recency of use discussed in the previous section, the factor of "L2" status or foreign language effect also interacts with the occurrence of transfer. The rather inaccurate term *"L2" status* employed, for instance, by Cenoz (2001) refers to the fact that a certain language is categorised by the speaker as a NNL. Contrary to the term *L2*, it actually does not only refer to the first acquired NNL, but also to any NNL learnt afterwards (see also section 2.2.1 on bilingual bias). Meisel (1983) alludes to this concept of "L2" status as foreign language effect, which is also taken up by several researchers as foreign language mode (e.g. Selinker & Baumgartner-Cohen, 1995; De Angelis & Selinker, 2001).

In her study on lexical CLI, De Angelis (2005b) discusses two cognitive processes acting as constraints on the L1, namely perception of correctness and association of foreignness. The first constraint is responsible for blocking forward transfer, and refers to the fact that L1 information is regarded in principle as incorrect, so the L1 is blocked as SL; the second constraint means that the languages favoured as SL over the L1 share the status of being mentally associated by the learner as NNLs, and thus are perceived as closer to the non-native TL than the L1 and favoured as SL (cf. De Angelis, 2007: 29; e.g. also Rivers, 1979; Schmidt & Frota, 1986; Cohen, 1995; Selinker & Baumgartner-Cohen, 1995; Clyne, 1997; Dewaele, 1998; Williams & Hammarberg, 1998; Bono, 2011; Sanchez, 2011; Llama et al., 2010). Consequently, both constraints can lead to increased transfer of non-native information into the TL.

In accordance with De Angelis' concept of association of foreignness, several linguists believe that similar mechanisms in acquiring and accessing later-learnt languages exist (e.g. Cenoz, 2001; De Angelis & Selinker, 2001; Hammarberg, 2001; Schmidt & Frota, 1986; Cohen, 1995). Apparently, the type of association established between two or more NNLs in a learner's mind enables the learner – often not consciously (cf. Murphy, 2003: 10) – to activate a prior NNL, i.e. a language with "L2" status, more easily than the L1 when acquiring a new language. Thus, influence onto a non-native TL frequently comes from an equally non-native SL due to the fact that learners seem to have difficulties compartmentalising languages learnt after their L1, enabling more interlingual interactions than with the L1 (cf. Jarvis & Pavlenko, 2008: 184f). This hypothesis is corroborated, for instance, by Cenoz (2001) in her study on lexical CLI. She found that her subjects, consisting of L1-Basque speakers with L2 Spanish, L1-Spanish speakers with L2 Basque, as well as L1 speakers of Spanish and Basque – all beginners of the TL English – tended to employ a NNL as SL for CLI into the TL English. Overall, every subject favoured Spanish as SL; however, the L1-Basque speakers exhibited an even stronger preference for Spanish than the Spanish native speakers themselves. These in turn transferred more lexical terms from their L2 Basque than the Basque native speakers. Evidence for the fact that the L1 seems to be more easily deactivated than a NNL when acquiring another non-native TL is also given by Fuller (1999): in her case study of an L1-Spanish learner of English with L2 German, she came across much more lexical transfer from the non-native German than from the L1 Spanish in TL productions.

Concerning phonology in L3/Ln learners, a number of studies have found evidence for the impact of foreign language effect (e.g. Hammarberg & Williams, 1993, 1998; Tremblay, 2007; Gut, 2010; Llama et al., 2010; Wrembel, 2010). Following the hypothesis of similar acquisition processes of NNLs, it is speculated that L2 mechanisms might also be reactivated during the acquisition of a new L3/Ln phonology, resulting in the suppression of the L1, and simultaneously enabling easier access to the NNLs. A study to corroborate this is that of Llama, Cardoso and Collins (2010), who examined the acquisition of aspiration patterns of voiceless plosives in adult learners of Spanish. They compared the results of TL word list recordings of the first group of nine subjects with L1 English and L2 French with those of the second group, consisting of nine L1 speakers of French with L2 English. Although Llama et al. observed quite balanced CLI from both English and French, they argued that their mixed findings still imply foreign language effect as a stronger factor in predicting phonological CLI than language distance. Wrembel (2010) also came across corroborating evidence in her study on determining the degree of CLI from the L1 and L2, using foreign-accent ratings by expert judges. Her 60 L1 Polish subjects with very good L2 German and different proficiencies in the TL English were recorded reading out a text as well as speaking freely, and the samples were then rated for overall degree of foreign accent. Like Hammarberg and Williams, Wrembel discovered CLI from the L1 and the L2, with their strength depending on the speaker's proficiency level in the TL. Likewise, Rivers (1979) reports on influence from her previously acquired non-native German sound system onto the TL-Spanish vowels. Instead of drawing on her L1 English or the more closely related non-native French, she falls back onto another NNL, German (cf. Rivers, 1979: 70).

Besides a potential reactivation of similar acquisition mechanisms promoting lateral phonological transfer, psycho-affective factors also have to be taken into account, as Hammarberg and Williams (1993) report: their subject actively suppressed her L1 English in favour of the L2 because she did not want to sound English in the TL Swedish. As the subject says, she "would rather prefer to approach the sound of Swedish from the basis of another foreign language such as German" (Hammarberg & Williams, 1993: 66). This also points to a high linguistic awareness of an expert learner. Hammarberg (2001) or Hammarberg and Hammarberg (2005) are of the opinion that this conscious suppression is a coping strategy employed – at least in the initial stages – to override the L1 constraint. However, it too must not be overlooked that Hammarberg and Williams' (1993, 1998) participant, who exhibited much transfer from her NNL German but near to none from her further NNLs, firstly had a near-native proficiency level in German; and, secondly, she was learning the closely related TL Swedish, which surely also added to CLI being triggered (see section 3.3.6). Once again, more empirical research is required on the intricate interactions between transfer and foreign language effect.

3.3.4 Task Relatedness

As already mentioned when discussing the impact of formality of context (see section 3.2), the factor of context cannot only be seen from a sociolinguistic or pragmatic point of view, but must also be considered from an empirical perspective, i.e. as task relatedness (cf. Murphy, 2003: 13). Depending on the type of task used in data elicitation, the amount of transfer might vary (e.g. Kellerman, 1995; Poulisse, 1990; R. Ellis, 1994; Gass & Selinker, 2001). Poulisse (1990), for instance, observed increased CLI in interview tasks compared to story retellings. Kellerman (1995) accredits this phenomenon to a strong focus on content in the free speech of an interview task compared to semi-elicited speech in story retelling. Thus, the cognitive resources usually required for the learner to monitor his output are engaged otherwise. Put in other words, if the learner's attention is diverted from the forms and structures of the TL because he needs to focus more on the content, the likelihood of transfer increases. The findings of several investigations point to the fact that the type of task interacts with the amount, direction and type of CLI occurring (cf. Jarvis &

Pavlenko, 2008: 209). Some studies, however, have shown that even in task types which appear to demand a comparable amount of linguistic awareness and level of formality, like elicited production tasks and acceptability judgements, learners sometimes exhibit transfer to a varying extent (cf. Jarvis & Pavlenko, 2008: 209; e.g. Gass, 1980; Hyltenstam, 1984; Jarvis, 2000a, 2003).

Regarding lateral phonological transfer, task relatedness has also been found to constitute a significant factor in triggering this kind of transfer in some studies (e.g. Hammarberg & Williams, 1993; Rivers, 1979; Wrembel, 2010). Rivers (1979), in her autobiographic diary of learning her L6 Spanish, relates that "[in] early learning [she] [likes] to repeat the correct version of an exercise item after the tape model to get correct intonation and pronunciation" (1979: 79); otherwise, her productions are only approximations of the TL sounds (cf. 1979: 70). Unfortunately she fails to report what these approximations consist of – perhaps of amalgamations of previously acquired sound systems, i.e. phonological transfer.

It has also been shown in the Hammarberg and Williams (1993) study that phonological CLI could possibly be related to the type of task the L3/Ln learner has to perform. Their subject with L1 English, L2 German and L3 Swedish showed different influences depending on the task. In an imitative read-after-me task, in which she had to repeat chunks read out to her by a native speaker of Swedish, the subject showed significant influence from her L1 English. In the next, more complex read-on-your-own task of a Swedish text without native speaker model, however, her speech seemed distinctly influenced by her L2 German. The reason for this curious fact was hypothesised to be a specific dominance pattern concerning the choice of SL for CLI: In the initial stages, when the learner still has only very little knowledge of the L3/Ln phonological system, the L1 is blocked in favour of L2 influence, which seems to be more consciously controllable and therefore is transferred to L3/Ln phonology. Later on, as the insufficiency of this coping strategy of relying on the L2 is realised, it is abandoned and more attention is paid to direct production of the L3/Ln. This in turn removes the blocking of L1 phonological CLI and leads to an unconscious increase of L1 influence.

The aforementioned study by Wrembel (2010) also looks at task relatedness as a potential trigger of CLI. In her subjects' samples of a read-on-your-own task as well as free spontaneous speech, Wrembel observed task-related variability in the speech of L3 English learners with very low proficiency. In a foreign accent rating, 38% were incorrectly identified as L1-German speakers performing the reading task, with the percentage almost doubling at 61% for spontaneous speech, which corroborates Hammarberg and Williams' findings. However, the scarcity of research on task relatedness and its interaction with lateral phonological CLI certainly calls for further studies applying a research design with several different task types.

3.3.5 Orthography

As stated in the section on the relationship between the different types of CLI and linguistic level (section 3.1.2.5), the orthography of a language may also evoke phonological transfer and consequently affect the pronunciation in the TL. That means, there are specific permitted grapheme combinations in individual languages, which often correspond to different sound values, however. If a learner associates a certain grapheme combination in the TL with the sound value attributed to this combination in the SL, orthographically triggered transfer would occur. A prerequisite for the occurrence of this kind of transfer, of course, is (partial) literacy of the learner in both the SL(s) and the TL.

Although ample anecdotal evidence, especially from language teachers, as well as studies in the field of SLA exist about the role of orthography in the acquisition of an L2 phonology (e.g. Steele, 2005; Erdener & Burnham, 2005; Escudero et al., 2008; Escudero & Wanrooij, 2010; Young-Scholten, 2002; Young-Scholten et al., 1999; Hayes-Harb et al., 2010; Rafat, 2011; Bassetti, 2007), the impact of orthography as a factor in triggering particularly lateral phonological CLI has not been investigated empirically yet. Modest beginnings of pointing out the potential impact of orthography for TL pronunciation can be found in the L1-English speaker Rivers' (1979) account of her learning a sixth language: Trying to pronounce TL-Spanish *ciento* /ˈsjento/[25] (= Engl. "a hundred") she relates resorting to the sound-grapheme correspondence of <ci> as /tʃi/ that she knew from her previously acquired non-native Italian, and thus ending up producing the incorrect Spanish form [ˈtʃjento] (cf. 1979: 69f). Another study engaging specifically with the effect of orthography as a conditioning

[25] The given IPA-transcription indicates the American Spanish pronunciation with the alveolar fricative /s/ for <c> in this phonetic environment instead of the interdental fricative /θ/ used in Peninsular Spanish, because Rivers acquired the TL Spanish in a five-week intensive course and immersion programme in South America.

factor in L2 phonological transfer is that of Rafat (2011).[26] She investigated whether the exposure to TL-orthographic input in her 45 adult native speakers of Canadian English learning the TL Spanish led to L1-based phonological transfer and consequently to incorrect TL productions elicited in a picture-naming task. Her findings suggest that this is indeed the case; however, particularly frequent at the very early stage of acquisition. Moreover, Rafat infers that certain phoneme-grapheme correspondences tend to provoke phonological transfer much more easily than others. As an explanation for her findings, Rafat argues for the importance of salience of acoustic-phonetic differences between the L1-SL phonemes and the TL sounds: the less salient these sound differences are for a shared source and target language grapheme or grapheme combination, the higher the likelihood of L1-induced phonological transfer. Besides salience, she adduces frequency of the L1 sound-spelling combination as a decisive aspect: in L1s with no one-to-one sound–grapheme correspondence, the orthographically triggered phonological transfer in the non-native TL will be based on the most frequent L1 realisation.

So, learners often fall back onto their L1 sound-spelling correspondences when trying to pronounce unknown words in a non-native TL (cf. Jarvis & Pavlenko, 2008: 70). However, it is conceivable – and also confirmed again by anecdotal evidence – that a multilingual with more previously acquired linguistic information available to him might also draw on sound-letter combinations of one of his previous NNLs. This occurs in addition to – or instead of – transferring those combinations of the L1 in learning the pronunciation of the non-native TL, possibly in interaction with further factors like psychotypology or proficiency. For instance, an L1-Turkish learner of German with L2 Spanish learnt in his L2 that the grapheme combination <ge> in *geografía* (= Engl. "geography") is rendered as the velar fricative /χ/. During the acquisition of the TL German he reads the word *Geografie*, and might transfer his association of the grapheme combination <ge> with the sound /χ/ he knows from the L2 Spanish on seeing the German spelling of *Geografie*. Inadvertently, he ends up pronouncing it [χeɔɡɹaˈfiː] instead of correctly /ɡeɔɡɹaˈfiː/. Though in the case of the given example negative transfer would result, it is also possible, especially for closely related languages with a similar phonological system

[26] In fact, looking more closely at the linguistic profile of Rafat's (2011) participants, this is a study conducted with multilinguals (see also section 2.2.1), as the L1-Canadian English speakers learning the TL Spanish also had a low proficiency in French and possibly other languages (cf. Rafat, 2011: 70).

or languages which otherwise share quite a number of phonemes, that this drawing on already acquired sound-spelling correspondences may yield positive transfer effects. Obviously, there are many unresolved questions and ample room for investigating the impact of the factor orthography on triggering lateral phonological transfer, for which the present study also aims to raise awareness and help initiate such studies.

3.3.6 Summary of Variables: Outlining a Hierarchy of Factors

According to previous research, the variables age of learning, exposure to the NNL, order of acquisition, as well as language distance, perceived language distance and the formality of context were found only to trigger lexical or morphosyntactical CLI. The scope of transfer potentially promoted by hypothesised further factors like markedness and prototypicality, frequency and salience or cognitive and attentional factors such as cognitive maturity, intentionality, learning environment and metalinguistic awareness still needs to be examined thoroughly. Whether these constraints as well as the aforementioned factors also have an impact on L3/Ln phonology remains to be investigated and put on a firm empirical basis. In studies on L3/Ln phonology, so far only proficiency in the source and target language(s), recency of use, foreign language effect and task relatedness have been empirically found to be significant in occasioning CLI; besides, orthography is presumed to have an impact on triggering LPT.

In general, all factors must always be considered in relation to the specific individual learner as well as their individual learner profile and language learning history, like it was said before (see section 3.2). Moreover, a very crucial point is that a hierarchy appears to exist between the single factors. Depending on the linguistic level, it is hypothesised that the various factors can accumulate until, for instance, a variable high up in the hierarchy comes into the equation and CLI is triggered. According to some studies, language distance, for example, seems more important in occasioning lexical CLI than foreign language effect (cf. Cenoz, 2001: 18), whereas Llama et al. (2010) found foreign language effect to be more significant than typology with regard to phonological CLI. Murphy (cf. 2003: 10) also came across contradicting evidence in the literature – though rather undifferentiated with regard to the linguistic level – for the strength of the individual variables. Jarvis and Odlin (2000) declared "L2" status to be weaker than objective linguistic distance; whereas Stedje (1977) found stronger influence from a typologically unrelated L2 onto the non-native TL, i.e. CLI between two languages with "L2" status, compared to from the typologically related L1. Several studies corroborate this effect of "L2" status particularly at a low TL proficiency level to override frequency of use (cf. Murphy, 2003: 15; e.g. Ringbom, 1986; De Angelis & Selinker, 2001; Hammarberg, 2001). This impact of foreign language effect in turn contradicts Poulisse and Bongaerts (1994), who argue that transfer usually comes from the most frequently used and thus most activated language, i.e. the L1.

In addition, the factors seem to be intertwined and interacting (e.g. Bono, 2011); for example, with increasing age, a higher metalinguistic awareness arises, which in turn raises the awareness for typological distance (cf. Cenoz, 2001: 16). Further, it seems that the so-called *last language effect*, i.e. the learner drawing on the language acquired most recently (see also paragraphs on order of acquisition in section 3.2), converges with the variable of "L2" effect in order to promote more transfer (cf. Murphy, 2003: 10f; e.g. Cenoz, 2001; Hammarberg, 2001; Shanon, 1991; Williams & Hammarberg, 1998). This obviously should be taken into consideration when examining the productions of individual learners, although it might complicate the research design considerably.

As can be seen, at the moment, the intricate relationships between transfer and its conditioning factors as well as the relationships between the factors themselves are still rather confusing. In order to establish a proper hierarchy of these factors, various aspects have to be taken into consideration: firstly, all factors should be assessed in relation to the individual learner; secondly, probably depending on the linguistic level, variables differ in their strength to trigger transfer; and thirdly, variables interact and can converge, resulting in their combined strength to evoke CLI, and thus raise the likelihood of transfer. Unfortunately, currently there is solely ambiguous evidence available from the literature. But this hierarchy can only be established on the basis of such high-quality studies like the one conducted by Cenoz (2001): Her L1-Spanish subjects transferred more Basque terms from their L2 onto the TL English than the L1-Basque speakers, but overall used Spanish as their main SL. From this it can be deduced that language distance might be a stronger variable on the lexical level and would consequently be situated higher up in the hierarchy than "L2" effect. The L1-Spanish speakers were confronted with these two opposing factors, and as a result transferred more terms from their L1, a language typologically closer related to the TL English than Basque. Nevertheless, as mentioned before, only little research has been carried out so far on eliciting the real scope of potential influence of the single factors on the various linguistic levels, especially with regard to eliciting significant factors for phonological CLI, not to mention LPT. With one of its secondary research questions, the present study also aims to contribute to how such a hierarchy could look like for LPT.

The body of existing research on LPT so far yields rather varied results, which unfortunately do not really allow for generalisations and commonly valid conclusions about the nature of CLI in L3/Ln phonology. The study conducted in the present study aims to help fill the gap of empirical evidence on a wider empirical basis to enable a more thorough understanding of the phenomenon of LPT.

4. An Empirical Study of Non-Native Phonological Cross-Linguistic Influence: Investigation of the Existence of Lateral Phonological Transfer in Multilingual Language Production

As demonstrated in the discussion of the current state of the art, due to a considerable dearth of studies that provide a solid empirical basis, the research community is still torn as to whether the lateral type of phonological transfer even exists or not. To help fill this gap, the present work aims to investigate this question in an empirical cross-sectional study. Thus, it hopefully contributes to answering the question of the existence of phonological CLI between NNLs and enlightens the nature of such a kind of transfer a little bit more. In the following, the research questions of the study are outlined (see section 4.1), and subsequently the methodology and data are dealt with (see section 4.2). Section 5 presents the results, which are discussed with a view to answering the research questions in section 6.

4.1 Research Questions

As the previous discussion of the existing literature has shown, there are still numerous gaps in research on lateral phonological CLI (see sections 3.1.2.5 and 3.3). The few studies that exist have often not applied a stringent methodology fit for investigating this phenomenon in multilinguals. Moreover, the number of participants, starting from solely one in a single case study, was always rather low and undifferentiated regarding the subjects' linguistic background. Most did not even take every potential SL for lateral phonological CLI into consideration, and instead simply disregarded a learner's knowledge in a NNL that was considered insufficiently advanced.

One fundamental gap that the present study tries to fill is the question of whether lateral phonological CLI exists at all, and, if it does, whether it occurs on both the segmental and the suprasegmental level. The question then is also whether it is possible to somehow capture this lateral phonological transfer (LPT) in segmentals and suprasegmentals in a valid empirical investigation. In addition, this study also explores the factors that influence lateral phonological CLI, about which absolutely no consensus exists so far. In particular, the present work will address the following research questions:

1. Does lateral CLI on the level of phonology exist?
2. If it does exist, does lateral phonological CLI manifest itself in both segmental and suprasegmental features?
3. Given LPT exists, is it promoted by certain factors?
4. Do these factors differ in their strength of being able to trigger LPT because they stand in a hierarchy?
5. If they do, what does this hierarchy look like?
6. How does this compare to the factors identified in the vanguard LPT study by Hammarberg and Williams (1993)?

These research questions will be investigated in detail in the subsequent empirical study, beginning with the description of the data and methodology applied (see section 4.2).

4.2 Data and Methodology

In order to try to answer the research questions just raised, an empirical cross-sectional study of learners of German was conducted for the present study. Subsequent to a description of the examined segmental and suprasegmental features (see section 4.2.1), the languages investigated will be outlined (see section 4.2.2), as well as the profile of the recorded participants (see section 4.2.3). This is followed by a delineation of the technical aspects of the recording procedure (see section 4.2.4) and the elicitation material (see section 4.2.5) before the data analysis process is described in detail (see section 4.2.6).

4.2.1 The Segmental and Suprasegmental Features Investigated

The three languages examined in the present empirical study – Mandarin Chinese, British English and German – differ regarding certain phonological properties, which lend themselves to investigate potential CLIs. Consequently, the three features of speech rhythm (see section 4.2.1.1), vowel reduction (see section 4.2.1.2) and coda consonant cluster realisation (see section 4.2.1.3) will be described in detail in the following to be applied to examine the existence of LPT.

4.2.1.1 Speech Rhythm

The traditional approach to classifying the world's languages according to their prosodic property of speech rhythm is primarily a bifold one into stress-timed languages on the one hand and syllable-timed languages on the other hand[27] (e.g. Pike, 1945; Abercrombie, 1967). This differentiation is based on the observation that in the former stress-timed languages, such as Arabic, Germanic or Slavonic languages, syllables with a high prominence purportedly occur at a certain regular interval: i.e. the prosodic unit of the foot, comprising the length of a stress beat plus all subsequent unstressed syllables up to the next stress beat, always takes the same amount of time (= isochronous foot). An acoustic basis for including varying numbers of syllables in one isochronous foot is claimed to be the reduction of vowels in said syllables. In syllable-timed languages like Mandarin Chinese or the Romance languages, it is the duration of the syllable itself that is supposedly equal (= isochronous syllable), with stress beats occurring only irregularly (e.g. Dascalu-Jinga, 1998; Rossi, 1998). Consequently, contrary to stress-timed languages, there is no reduction of vowels.

However, some researchers put this dichotomous differentiation of rhythm classes into question recently (e.g. Barry, 2007; Couper-Kuhlen, 1993; Dauer, 1983; Gut, 2012; Nazzi et al., 1998; Ramus et al., 2003). Agreeing that the traditional, strictly binary classification of rhythm classes is not tenable anymore, they lean more towards speech rhythm as a concept that subsumes different phonological dimensions. To take this presumably multidimensional nature of speech rhythm into consideration, it is propounded that languages should rather be arranged along a continuum of "more or less" stress- or syllable-timing (e.g. Gut 2009: 162; White & Mattys, 2007: 520; Grabe & Low, 2002).

To assess whether a language is situated more towards the syllable-timed end or more towards the stress-timed extreme of said scale, and to account for the durational differences in speech rhythm across languages, several rhythm metrics have been proposed. Generally, one has to differentiate between two main kinds of speech rhythm measurements, depending on which phonological domain it is measured in: Existent metrics are available for the segmental and syllabic level as well as on the level of the

[27] Later on, a third category of speech rhythm, the so-called *mora-timed rhythm*, was established, such as in Japanese or Tamil (e.g. Ramus, 1999: 266), which will be neglected for the present paper, though.

foot (cf. Gut, 2009: 159ff). These, in turn, can be distinguished again as to whether phonetic correlates of speech rhythm, such as vowel reduction, are measured locally or globally.

For the latter global measurements, Ramus et al. (1999) put forward the segment-based metrics %V, ΔV and ΔC. To compute these, Ramus et al. (1999) divide the speech string into consonantal and vocalic intervals. Then they proceed to calculate the proportion of vocalic parts of the total utterance duration (%V), as well as the standard deviation of these vocalic intervals (ΔV) and the standard deviation of all consonantal intervals (ΔC) to investigate the durational variability within both the vocalic and consonantal parts. Interestingly, their cross-linguistic comparisons of %V and ΔC, which they found to be statistically significant, correlated to a considerable extent with the traditional grouping of languages into "syllable-timed" and "stress-timed": of their investigated eight languages, Ramus et al. (1999) were able to group English, Polish and Dutch together with low %V and high ΔC-values corresponding to the "stress-timed" end of the continuum; the Romance languages Spanish, Catalan, Italian and French clustered together with higher %V-values and lower ΔC towards the opposite "syllable-timing" extreme; and Japanese as a mora-timed language was positioned separately with the highest %V and the lowest ΔC-values.

When it was discovered that both ΔV and ΔC are significantly, or near-significantly, inversely correlated with speech rate (e.g. Barry et al., 2003; Dellwo & Wagner, 2003; White & Mattys, 2007), Dellwo (2006) proposed a modification to Ramus et al.'s (1999) metrics to normalise them for speech rate variation, and thus suggested VarcoC and VarcoV measurements. However, White and Mattys (2007) in their study assessing different rhythm metrics for their ability in quantifying speech rhythm in the L1 as well as in NNLs evaluated only VarcoV and %V as suitable to also capture typological differences between languages with regard to speech rhythm (cf. White & Mattys, 2007: 510).

Coming back to the second type of measuring phonetic correlates of speech rhythm, i.e. local rhythm metrics (e.g. Low & Grabe, 1995), also various metrics were put forward: the segment-based Pairwise Variability Indeces (PVI; Grabe & Low, 2002; Low & Grabe, 1995) and Rhythm Ratio (Gibbon & Gut, 2001), as well as the syllable-based Variability Index (Deterding, 2001). All of these measurements rest on the presumption of a correlation of speech rhythm and local durational contrasts, i.e. between successive events. Hence, Low and Grabe's (1995) PVI or raw Pairwise Variability Index (rPVI) computes the durational variability of adjacent intervals (PVI). They also extended it to calculating specifically variation in the durations of either adjacent vocalic intervals (PVI-V) or of successive consonantal intervals (PVI-C) (cf. Grabe & Low, 2002: 519). To control for speech rate, Low et al. (2000) later put forward a normalised version of the PVI, the normalised Pairwise Variability Index (nPVI):

$$nPVI = 100 \times \left[\sum_{k=1}^{m-1} \left| \frac{d_k - d_{k+1}}{(d_k + d_{k+1}) : 2} \right| : (m-1) \right]$$

(m = number of intervals in an utterance; k = index; d = duration)

The nPVI calculates the mean of the difference in duration between successive intervals (vocalic and/or consonantal) divided by the mean duration of the same intervals. The normalisation for variations in the speech rate is ensured by the latter step. To avoid the fractional values produced by the normalisation, the result is multiplied by 100.

In their study on durational differences between vowels and consonants, respectively, Grabe and Low (2002) examined reading passages by speakers of various native languages. Performing nPVI-measurements, they detected a cluster of languages with high durational variation in vowels (British English, German, Dutch, Thai, Tamil and Malay) and one with low variation (Mandarin and Spanish). With regard to consonantal durational variation, British English, Polish, Catalan, Tamil and Malay grouped together with the highest consonantal nPVI, whereas French, Romanian, Estonian, Luxemburgish and Welsh showed the lowest variation values for consonantal duration (cf. Grabe & Low, 2002: 531).

The most crucial influence on speech rhythm, though, comes from its interaction with speech rate: For instance, Barry et al. (2003), applying %V, ΔC and PVI measurements in their L1-Italian, Bulgarian and German speakers, came across a decrease of durational variability the faster their participants' speech rate. As an explanation, they suggested a general tendency for languages to shift towards syllable-timing the higher the speech rate, due to a simplification of syllable structures by reduction and deletion processes occurring during fast speech. The least affected metrics by speech rate, according to several researchers, and thus the most reliable ones particularly for investigating non-native speech, appear to be %V, VarcoV and VarcoC (e.g. Dellwo & Wagner, 2003; White & Mattys, 2007: 509).

However, variations in speech rhythm are not only influenced especially by speech rate, but also by the participants per se, the kind and amount of stimulus materials and the speaking style (cf. e.g. Gut, 2009: 163). To account particularly for fluctuations in said articulation rate, White and Mattys (2007) in their study assessing various speech rhythm metrics for native and non-native speakers in fact found rate-normalised metrics like VarcoV and nPVI-V most suitable. Moreover, they showed that the computation of %V, the relative proportion of vocalic intervals, was not affected by speech rate variation and reliably discriminated between stress- and syllable-timed languages. Thus, White and Mattys especially judged combining the metrics of %V and VarcoV as most positive (cf. White & Mattys, 2007: 520). Wiget et al. (cf. 2010: 1566), in a similar investigation of the reliability of various acoustic speech rhythm metrics across languages calculated on the basis of vocalic and consonantal interval durations, recommend applying %V, VarcoV and nPVI-V. Besides being found to compensate for speech rate, all three metrics were also able to differentiate between language groups with regard to their rhythm class. According to Wiget et al., it is advised to triangulate speech rhythm measurements by using %V either with VarcoV or with nPVI-V. Knight (cf. 2011: 279) corroborates the robustness particularly of %V, which she claims is not only able to differentiate between languages, but allegedly also remains constant across time. Consequently, following White and Mattys (2007), Wiget et al. (2010) and Knight (2011), as well as following available reference values from the literature (see section 4.2.6.1), the present work will make use of %V plus nPVI-V in order to investigate non-native speech rhythm and potential interlingual influences between Mandarin Chinese, English and German.

As regards speech rhythm of the present study's main languages, Mandarin Chinese on the one hand is traditionally classified as a syllable-timed language, whereas English and German are judged to be stress-timed languages (see section 4.2.2). In terms of measurements with the discussed speech rhythm metrics, this has been tested empirically for English and German (e.g. Grabe & Low, 2002; Ramus et al., 1999; Williams & Hiller, 1994; Fant et al., 1991; Campbell, 1989; Hoequist, 1983; Dauer, 1983; Gut, 2003a). Although there are considerably more studies measuring the phonetic correlates of speech rhythm available for English compared to German, it becomes evident from the results that they are rather similar with regard to their rhythmic features: In terms of the proportion of vocalic parts of the total utterance duration and of durational variations of adjacent vocalic intervals, %V as well as PVI-V are somewhat lower in English. This presumably goes back to the higher amount of reduced or deleted vowels in English compared to German (cf. Gut, 2009: 170; e.g. Grabe & Low, 2002; Ramus et al., 1999). When it comes to comparing the standard deviation across all consonantal intervals, no significant differences can be found for ΔC, but durational variations of adjacent consonantal intervals, PVI-C, are slightly more pronounced in English (cf. Gut, 2009: 170; e.g. Grabe & Low, 2002).

Particularly interesting for the present study are also empirical investigations of speech rhythm in non-native English and German, which seems to be a rather difficult feature to master especially in English (e.g. Adams, 1979; Bond & Fokes, 1985; Faber, 1986; Wennerstrom, 2001). As various studies have confirmed (e.g. Kaltenbacher, 1998; Moyer, 1999; Van Els & De Bot, 1987; Anderson-Hsieh et al., 1992), an inappropriate rendering of a language's speech rhythm is one of the main reasons learners' speech is perceived as accented. According to Faber (1986), it effects an even higher degree of incomprehensibility than an incorrect pronunciation of TL words. To date, the most frequently adduced reason for such rhythmic differences in L1 speakers compared to learners is influence resulting or deriving from structural differences between the L1 and the non-native TL (e.g. Adams, 1979; Wenk, 1985; Kaltenbacher, 1998; Gut, 2003a, b; Lee et al., 2006). Any other potential sources of influence have largely been neglected or have not been thoroughly explored. These include the structures of a previously acquired NNL as constraint on the production of non-native speech rhythm, influence of the speaking style, or a potential correlation of the degree of accented non-native speech rhythm with other linguistic and non-linguistic factors such as the learners' proficiency level.

Thus, as the above discussion of the existing literature has demonstrated, despite the fact that there are various metrics around, there is still much left to be explored with regard to investigations of non-native speech rhythm in general, and particularly with a view to the present work, especially concerning influences on non-native speech rhythm acquisition (see also section 4.2.6.1). This will also be done exploring the acoustic correlate of speech rhythm focused on in the majority of existent studies, i.e. vowel reduction, which will be described in the subsequent section.

4.2.1.2 Vowel Reduction

Speech rhythm will also be looked at from a different angle, investigating its acoustic correlate vowel reduction. In the previous subsection, it was mentioned that the local rhythm metric nPVI used in the present empirical study has different advantages compared to the other, global metric applied, %V. However, nPVI has the drawback that it is unable to account for potential covariations with speaking style or sentence types (see section 4.2.1.1). This is because, seeming nPVI views speech rhythm as long and short (or strong and weak, respectively) alternating segments, only durations of immediately successive units are measured. These can vary depending on speaking style or sentence types, for example (cf. Gut, 2009: 163).

Gut (2003a) tries to remedy this fallacy and propounds the syllable-based local rhythm metric of the Syllable Ratio (henceforth *SR*). As a starting point she takes the binary differentiation of characteristic syllable types of English. According to Bolinger (1981), these delineate basic English speech rhythm as a sequence of a specific syllable pair, i.e. a long, full-vowelled syllable with a succeeding short, reduced-vowelled syllable containing /ə/, /ɪ/ or /ɐ/. Bolinger further claims that syllables that contain a full vowel followed by another such syllable are considerably longer than the aforementioned pair of a full-vowelled plus a reduced-vowelled syllable. From this, Gut (2003a) concludes that only specific syllable pairs are relevant for measuring speech rhythm, namely those of two full-vowelled syllables as well as units consisting of an adjacent full-vowelled and a reduced-vowelled syllable (cf. Gut, 2009: 164). This is captured in the two manifestations of the SR metric, which is calculated as follows:

$$SR_1 = \frac{1}{n}\sum_{k=1}^{n}\frac{durNR_k}{durNR_i}$$

(n = number of syllable pairs; k = index; *dur* = syllable duration; NR_k, NR_i = full-vowelled syllable)

SR_1 calculates the average syllable ratio between successive full-vowelled syllables (e.g. NR_k and NR_i) by computing the sum of the quotients of all full-vowelled syllable pairs averaged by their number n.

$$SR_2 = \frac{1}{n}\sum_{k=1}^{n}\frac{durNR_k}{durR_k}$$

(n = number of syllable pairs; k = index; dur = syllable duration;
NR_k = full-vowelled syllable; R_k = reduced-vowelled syllable)

SR_2 is computed analogously, dividing the duration of each full-vowelled syllable (e.g. NR_k) by the duration of the respectively adjacent reduced-vowelled syllable (e.g. R_k); at the end, the sum of all quotients is divided by the total number of full-vowelled/reduced-vowelled syllable pairs (cf. Gut, 2009: 164). To avoid any bias of the results by final-syllable lengthening, no syllables followed by a pause are included in the calculation of the SR (cf. Gut, 2003a).

For the present study, vowel reduction will firstly be calculated analogously to Gut's (2003a) study, using $SR_1$and SR_2 in order to enable comparability of results with this previous work. Additionally, the mean durational ratio will also be computed with a slightly modified version of SR_2: seeming vowel reduction in native German only occurs in post-stress syllables as opposed to native English, where reduction or vowel deletion appears in post-stress as well as in pre-stress position (cf. Delattre, 1969), it makes sense to look at the syllable ratio SR_3 of adjacent reduced-vowelled and full-vowelled syllables. The SR_4 of successive syllables with a deleted vowel followed by one containing a full vowel is further examined, as the most crucial differences between English and German will appear in this position:

$$SR_3 = \frac{1}{n}\sum_{k=1}^{n}\frac{durR_k}{durNR_k}$$

(n = number of syllable pairs; k = index; dur = syllable duration;
R_k = reduced-vowelled syllable; NR_k = full-vowelled syllable)

$$SR_4 = \frac{1}{n}\sum_{k=1}^{n}\frac{durD_k}{durNR_k}$$

(n = number of syllable pairs; k = index; dur = syllable duration;
D_k = syllable with a deleted vowel; NR_k = full-vowelled syllable)

Similar to SR_2, SR_3 and SR_4 are computed by dividing the duration of each reduced-vowelled syllable (R_k) or syllable with a deleted vowel (D_k) by the duration of the adjacent full-vowelled syllable (NR_k); the sum of all quotients is then divided by the total number of reduced-vowelled/full-vowelled syllable pairs, or respectively by those with a deleted vowel followed by a full vowel (cf. Gut, 2009: 164). Every syllable followed by a pause is also excluded from calculations for fear of biasing the results by final-syllable lengthening.

Looking at the results of the SR_3 and SR_4 measurements, the L1 Mandarin Chinese can further be examined as potential source of influence: Firstly, in Mandarin, syllables are neither marked for duration nor do they contain reduced or deleted vowels, so that the SR should lie around 1 : 1;[28] secondly, although the schwa /ə/ is part of the Mandarin phoneme inventory and can possibly be articulated in the L2 English and TL German, it does not necessarily signify that L1-Mandarin speakers produce this schwa as a reduced vowel, as is the nature of the English and German schwa /ə/. Further, in both the TL as well as in the L2, vowel length is phonemic, and long and short vowels are able to occur in stressed syllables resulting in durational variability of vowels. Hence, with calculations of SR_3 and SR_4 in German and in English, it can be determined in the present study's participants whether the TL-productions are influenced either by the L1 Mandarin, the L2 English or by both at the same time. Alternatively, it can also be seen whether the TL-productions are idiosyncratic interlanguage forms or correctly acquired.

With regard to empirical explorations of vowel reduction in the three languages focused on in the present study – Mandarin Chinese, English and German – there exist several, particularly on English or varieties of English as TL (e.g. Grabe & Low, 2002; Low et al., 2000; Setter, 2003). For instance, Grabe and Low (2002) examined durational variability of vowels in speakers with various L1 backgrounds reading out loud a short text. With their measurements of PVI-V, they grouped British English, Dutch, German, Malay, Tamil and Thai together, which share a rather high variability of vowel length, as well as Mandarin and Spanish on the other hand, exhibiting a low variation in vowel length.

In Mandarin (see also section 4.2.2.1), which is situated towards the syllable-timed end of the rhythm continuum, all syllables tend to be of the

[28] Mandarin Chinese is seen as a non-accentual language (e.g. Fox, 2001; Archibald, 1997), although prominence of a certain syllable, usually the one carrying the tone, exists. It is usually conveyed via an increase in loudness, pitch height or pitch movement rather than longer syllable durations (e.g. Kratochvil, 1998; cf. Gut, 2003a: 141).

same length, with no phonemic vowel length and thus negligible vowel reduction. The two more stress-timed languages English and German, on the other hand, show durational variability of syllables between stressed and unstressed syllables, which is among others due to the two phonological processes of vowel reduction and deletion (cf. Gut, 2009: 168).

In general, vowel reduction occurs in L1 English in various positions, whereas in L1 German, only post-stress syllables contain reduced vowels (cf. Gut, 2009: 169; e.g. Helgason & Kohler, 1996; Kohler, 2001). Besides, the frequency of vowel reduction, or even deletion, in unstressed syllables is higher in English compared to German (cf. Delattre, 1969). Particularly in pre-stress position, vowel reduction or deletion can only be found in English. Consequently, L1-English stressed syllables are on average 1.5 times longer than unstressed ones (e.g. Hoequist, 1983; Fant et al., 1991; Campbell, 1989; Williams & Hiller, 1994), and even a mean 1.87 times longer in German (cf. Gut, 2009: 169; e.g. Gut, 2003a; Hoequist, 1993; Dauer, 1983).

To what extent a vowel is reduced in either English or German covaries once again with speech rate and speaking style (cf. Gut, 2009: 168; e.g. Deterding, 2001; Engstrand & Krull, 2003; Barry et al., 2003; Richter, 2008). Regarding the former, with increasing speech rate also more reduction, or even deletion, is used (cf. Richter, 2008: 243). Trouvain et al., (2001), for example, who investigated potential patterns of vowel reduction or deletion in learners of German performing a read-out-loud task at slow, medium and fast speech, detected a higher percentage of schwa deletion the faster the learners read. Suprasegmentalia like speech rhythm tend to be influenced by the learner's reading rate and comprehension, which effects a different rhythm compared to relatively free speech like story retellings. Similarly to the speech rhythm metrics related above, the SRs will also be computed in the present study for two different speaking styles, i.e. read-out-loud-text style and semi-spontaneous story retelling, to account for a potential covariation (see section 4.2.6.2).

Analogously to the already discussed further speech rhythm metrics (see section 4.2.2.1), particularly relevant for the present study are also investigations into rhythmic variations covarying with non-native vowel reduction. As mentioned above, only very few studies exist that explore non-native speech rhythm. The majority of them dealing with English identify its acoustic correlate vowel reduction as rather difficult to master for learners (cf. Gut, 2009: 172; e.g. Wenk, 1985; Bond & Fokes, 1985; Mairs, 1989; Flege & Bohn, 1989; Lee et al., 2006; Zborowska, 2000).

As regards non-native German speech rhythm, as shown in section 4.2.1.1, there are even fewer studies, which too primarily measure the degree of vowel reduction (e.g. Kaltenbacher, 1998; Gut, 2003a, b). A relatively recent exploration of phonetic reduction in non-native German is that of Richter (2008). In the acoustic-auditive analyses of her L1 Russian, Polish and Chinese learners of German performing a map task as well as imitative reading of sentences and words, Richter found group-specific reduction patterns (cf. Richter, 2008: 241). Overall, the learners generally reduced less than the native speakers. Looking more closely at the single L1 groups, Richter found that the Chinese native speakers produced the least vowel reduction in German, followed by the Polish group, and finally by the L1-Russian learners with the comparatively highest amount of vowel reduction (cf. Richter, 2008: 242). Kaltenbacher (1998) found strong variability in the amount of vowel reduction as well as a rather prominent L1 influence in her 15 learners of German, i.e. five native speakers of English, Russian and Japanese each. Interestingly, although the L1-English and Russian learners shared the stress-timed speech rhythm with the TL German, making transfer of vowel reduction likely, they also exhibited difficulties in the acquisition of TL-German vowel reduction.

The only corpus-based comprehensive study systematically investigating non-native English and German speech rhythm and its acoustic correlate vowel reduction is that of Gut (2009). In her analyses, the amount of reduction in non-native German turned out to be greater than in learner English, which Gut (cf. 2009: 192) attributed to potential NNL influence (e.g. also Major, 2001). Further, she also detected influence from the L1 on both NNLs in terms of vowel length. Overall, comparing acoustic correlates of speech rhythm in non-native speakers of English with those of German, she came across much interindividual variation, which was most prominent in learner English (cf. Gut, 2009: 193). Similarly, Gut also found numerous rhythmic differences in the native speakers as opposed to the non-native speakers of English or German, such as generally longer syllables in learner speech. The amount of produced vowel reductions or deletions, though, was the same across L1-speakers and learners of German, unlike in non-native speakers of English. However, the distribution of syllables containing reduced vowels differed in native and learner German.

The most widespread explanation for this variability in vowel reduction in NNL production as found by Kaltenbacher (1998) or Richter (2008), however, still is L1 CLI, as already mentioned in some studies (e.g. Gut, 2009). Nevertheless, an effect of lateral influence (e.g. Gut, 2009; Major, 2001) or speaking style (e.g. Wenk, 1985) is also postulated to explain learners' reduction behaviour. Whether vowel reduction, calculated with the means of the SR, in the TL-productions of the present study's multilingual participants are affected by any of these kinds of influence – be it from the L1, a NNL, speaking style or other linguistic or extralinguistic factors such as proficiency – will be examined in the subsequent empirical study.

4.2.1.3 Coda Consonant Cluster Realisation

The third phonological feature investigated for potential LPT from the L2 English onto the TL German is the realisation of coda consonant clusters (henceforth *CCCs*). With regard to the permissible syllable structures, the three languages investigated in the present study vary, particularly when it comes to CCCs (see also section 4.2.2.4): Mandarin Chinese allows only one consonant in coda position, whereas English permits up to four and German even up to five coda consonants, but with differing realisations. These deviances lend themselves rather well to investigate potential mutual interlingual influences concerning coda cluster realisation.

As in the present study's participants' L1 Mandarin no CCCs are allowed at all, a closer look will be cast primarily at consonant cluster production in the learners' L2 English and L3/Ln German. Firstly, regarding English, coda cluster reduction is a common process, which has been investigated in several studies, for example in terms of plosive /d/- and /t/-deletion in CCCs (e.g. Labov, 1972, 1989; Neu, 1980; Guy, 1991; Bybee, 2002). Contrary to English, no comparable, large-scale explorations on coda cluster reduction are available for German, although there are studies describing the same process (cf. Gut, 2009: 119; e.g. Kohler, 1995). Further, previous literature (e.g. Bybee, 2002) lists different factors that constrain the production of consonant clusters, namely stress, phonetic context, morphosyntactic properties or frequency of the concerned word (cf. Gut, 2009: 118).

With regard to CCC realisation, there are numerous studies on non-native English and German, too (e.g. Tarone, 1980; Weinberger, 1987; Broselow, 1984; Broselow et al. 1998; Major 1996; Hancin-Bhatt, 2000; Hansen, 2001, 2004; Hodne, 1985; Sato, 1984; Kløve & Young-Scholten, 2001).

From these investigations, particularly five phonological processes emerged as the most common differences between native and non-native consonant cluster productions: (1) cluster reduction due to the deletion of one or more consonants (e.g. Tarone, 1980; Weinberger, 1987; Broselow et al., 1998; Major, 1996; Hancin-Bhatt, 2000; Hansen, 2001, 2004), (2) breaking up a consonant cluster into one or more syllables by way of inserting a schwa or /ɪ/, the so-called *vowel epenthesis* (e.g. Broselow, 1984; Weinberger, 1987; Major, 1996; Hancin-Bhatt, 2000; Hansen, 2001), (3) the addition of a schwa to the end of the word-final coda cluster, named *paragoge* (e.g. Tarone, 1980; Hodne, 1985; Hansen, 2001, 2004), (4) the devoicing of obstruents at the end of coda clusters (e.g. Sato, 1984; Weinberger, 1987; Broselow et al., 1998; Hansen, 2001), and (5) the reversion of two consonants within a cluster, the so-called *metathesis* (e.g. Kløve & Young-Scholten, 2001).

For explanations particularly of these five central processes with regard to consonant cluster realisations researchers adduce various reasons: Whereas some claim simplification based on universal principles to be responsible (e.g. Tarone, 1980; Hodne, 1985; Anderson, 1987; Eckman, 1991; Major, 1996), others attribute them to L1 influence (e.g. Sato, 1984; Anderson, 1987). For example, Anderson (1987) compared TL-English consonant cluster productions in L1 Chinese with those of L1 Egyptian Arabic. Although he found that both L1 groups simplified consonant clusters more by deleting than by vowel epenthesis, he came across significant differences in how frequently they simplified coda clusters, namely almost in 50% of the cases for the Chinese native speakers as opposed to solely 17.4% for the L1-Arabic learners, which he ascribed to their different L1s.

Others, however, attributed the differing frequency of coda cluster simplification as found by Anderson (1987) not to L1 influence, but to the length of the respective consonant cluster (e.g. Hansen, 2001, 2004; Weinberger, 1987). Hansen's (2001) L1-Mandarin learners of English, for example, tended to reduce three-consonant clusters more frequently, mainly by deletion, than shorter two-consonant clusters, which they then simplified using paragoge.

Besides cluster length, Bayley (1996) or Major (1996) also adduce the coda clusters' segmental makeup as constraint on their realisation. Bayley (1996), for instance, explored the production of clusters ending in /-t, d/ in her 20 L1-Mandarin learners of English, where she came across different patterns of deletion compared to L1-English speakers: Contrary to the native speakers, L1-Mandarin English learners deleted /-t, d/ more often in the segmental composition nasal + /-t, d/ or obstruent + /-t, d/ than in the combination liquid + /-t, d/. However, L1-English speakers' /-t, d/ deletion is even more likely when following an obstruent compared to following a nasal. Thus, it can be seen that although the segmental composition has an impact in both native and non-native English, the order of /-t, d/ deletion frequency diverges. Bayley (1996) found said order of deletion frequency of /-t, d/ + consonant > glide > pause > vowel in her L1-Chinese learners, whereas the English native speakers rather delete more readily in the order /-t, d/ + consonant > glide > vowel > pause. When it comes to similar inquiries on the same subject of how German learners produce CCCs, there are only very few studies (cf. Gut, 2009: 127; e.g. Lleó & Vogel, 2004; Tropf, 1987).

In addition to a cluster's segmental composition, non-linguistic constraints like the amount of L1 use compared to that of the TL can also have an effect on the reduction rate of consonant clusters (e.g. Bayley, 1996; Hansen, 2001, 2004; Abrahamsson, 2003). In her extensive analyses of learner data from the LeaP-corpus (**Lea**rning **P**rosody corpus), which investigates exactly this CCC realisation behaviour in native compared to non-native English and German, Gut (2009) observed a whole range of cluster variations across various speaking styles as well as interaction with further non-linguistic factors. Thus, she wanted to explore potential influences either of the structural differences of her learners' L1s, of the non-native TL itself or of universal processes on coda cluster realisations in their non-native L2 German or English (cf. Gut, 2009: 129f). Overall, Gut came across a higher retention rate than simplification of CCCs in both learner English and German (cf. 2009: 155). In both TLs the learners deleted only one consonant in about a third of all clusters, whereas cluster simplification by complete deletion, epenthesis, paragoge or metathesis occurred only very sparsely. The crucial difference between the two TLs English and German was how often these latter rare simplification processes occurred. With regard to the interdependence with various constraints, Gut (cf. 2009: 155) found that cluster length and the affected word's functional status had an effect on coda cluster realisations in both TLs: the longer three- and four-consonant clusters tended to be simplified more frequently than the shorter two-consonant clusters. Besides, the clusters' position also affected the TL-German productions in that word-final clusters were usually retained more often than in word-medial position (cf. Gut, 2009: 155f). Further, the clusters' segmental composition also influenced their retention rate differently in non-native German compared to non-native English (cf. Gut, 2009: 156). Similar divergences were detected comparing consonant cluster realisations in native versus non-native English and German (cf. Gut, 2009: 157). However, potential influence of the learners' L1 structural properties, i.e. whether the L1 permits coda clusters or not, on their retention rates in the NNL as the sole reason for these divergences was refuted (cf. Gut, 2009: 157). Corroborating evidence for this fact that the L1 appears to be only one of various constraints on cluster realisation in a NNL comes from comparing coda cluster productions in multilingual learners of both English and German, which differed in the L2 as opposed to the L3, as well as from the high variation of retention rates found within learners of the same L1 (cf. Gut, 2009: 158).

4.2.2 Description of the Languages Investigated: Mandarin Chinese, British English and German

As was described in chapter 3, the occurrence of lateral transfer is promoted by certain factors, such as objective linguistic distance (see section 3.2). To control for this variable of typological distance, it was decided on a linguistic profile of all recorded participants that would enable interlinguistic influence between their more related NNLs, namely British English as L2 and German as the TL, as opposed to the unrelated L1 Mandarin Chinese. In the following brief portraits of each language with a focus on the phonological system, it will become apparent that the L1-Mandarin Chinese phonology is completely different in terms of linguistic features compared to the L2 British English and the TL German.

4.2.2.1 Mandarin Chinese

The Sino-Tibetan language Chinese is not a homogeneous construct, but comprises numerous related dialects. The most widespread variety, Mandarin, is the L1 of the present study's participants. This northern Chinese dialect with the phonological system of the capital Beijing's variety as the norm of pronunciation was declared the standard form (also Chin. *pǔtōnghuà* = Engl. "common speech"). It is thus the official language of the People's Republic of China and of Taiwan, as well as one of four official languages in Singapore (cf. Norman, 1988: 133ff). Besides, there are various dialects that minority groups learn as L1, which all differ with regard to lexical, syntactic and especially phonological specifics. However, as Mandarin Chinese is the official medium of education, usually all minority-dialect speakers also learn Mandarin very early on so that they are diglossic or speak the *pǔtōnghuà* with a regional accent (cf. Norman, 1988: 138). With over one billion native speakers, among them around 800 million L1 speakers of Mandarin, and a further few million speakers in the Chinese diaspora, it has the highest number of native speakers in the world (cf. Lewis, http://www.ethnologue.com, last accessed 12.06.2016).

Furthermore, with around 4,000 years, the Chinese writing system is one of the oldest in the world (cf. Hunold, p.14: www.phonetik-international.de). Chinese characters are the same across all dialects and consist of an element indicating the pronunciation and an element referring to the meaning of the character. To establish a fixed common standard pronunciation, a transcription system of the Chinese characters based on the Roman alphabet was developed in the 1950s, the so-called *pīnyīn* (Engl. "to spell, to transcribe") (cf. Zhang, 2007: 16). A specific phonetic value is attributed to each pinyin-letter so that a word's pronunciation is conveyed unequivocally (cf. Ching, 2006: 53).

Table 1. Example of a pinyin-transcription of a Chinese character.

Chinese character	Pinyin-transcription	IPA-transcription	Translation
不	bù	/bu˥˩/	Engl. "no, not"

The Chinese syllable structure is relatively simple, consisting of an initial, final and a tone, the latter of which pertains to the entire syllable. Every syllable's initial is a consonant, which can also be dropped. Then, the main vowel of the obligatory final, either a monophthong or a diphthong, follows. This nucleus can sometimes be preceded by a medial, /i, u, y/, and might be followed by a nasal consonant, /n/ or /ŋ/, the only two exceptions to otherwise open syllables (cf. Norman, 1988: 138f). Consequently, no consonant clusters are allowed in Chinese, neither in the initial nor in the final (cf. Hunold, p.5: www.phonetik-international.de; Ching, 2006: 10). Moreover, seeming the final with its vocalic nucleus is mandatory, also no syllable types with deleted or reduced vowels exist, even if the syllable is unstressed (cf. Gut, 2003: 141; Hunold, p.6f: www.phonetik-international.de).

This aspect ties in with the fact that Mandarin Chinese is commonly classified as a syllable-timed language (see also section 4.2.1.1), i.e. each syllable has approximately the same length (e.g. Rossi, 1998; Dascalu-

Jinga, 1998; Chiao & Kelz, 1985). So no category for durational differences between syllables exists in Mandarin. Instead of such durational differences to indicate the prominence of a syllable, Chinese rather applies a higher voice pitch or greater loudness (cf. Hunold, p.6: www.phonetik-international.de; Kratochvil, 1998), which characterises the tone of each syllable of this four-tone language[29] (cf. Norman, 1988: 139; Gut, 2003: 141).

As opposed to intonation languages like English and German, pitch movements (or tones) are in fact distinctive in the tone language Chinese. Whereas the meaning of a word in intonation languages is not interdependent with changes of pitch height, pitch changes in tone languages are linguistically relevant and thus distinctive. In Mandarin, each syllable can be pronounced with one of the four tones, and each time a different meaning is thus expressed. There are around 420 syllables in standard Mandarin Chinese. Multiplied by the four tones, this results in about 1,680 tone syllables. However, solely three quarters of these tone syllables are also associated with meaning (cf. Hunold, 2009: 70f; Gut, 2009a: 117).

Contrary to, for instance, German, vowel length, though, is not distinctive in Chinese. The duration of a vowel depends on the lexical tone the entire syllable carries in whose final the vowel occurs, as well as whether it is followed by a nasal or not, i.e. whether the syllable is open or closed (cf. Hunold, p.8: www.phonetik-international.de; Zee, 1999).

4.2.2.2 British English

The L2 of the present study's participants, English, has been taught as a mandatory subject in most schools and universities of China since 1979. English, the most important lingua franca of the present time, belongs to the West-Germanic language family and has the highest number of native speakers in the world after Chinese; the numbers given in the literature vary from around 300 million to 380 million (cf. e.g. Reinke, p.2: www.phonetik-international.de; Baugh & Cable, 2002: 4). The English language is also a rather heterogeneous construct, with numerous national and regional varieties. For the present study, the British English standard, which is taken as the model for teaching in the Chinese educational system besides American English, and its specifics are especially relevant.

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29 For a detailed description of Chinese phonology, see Norman (1988), Lin (2001) or Ching (2006).

One such specific is the conspicuous differences between spelling and pronunciation in English, i.e. there is not a one-to-one correspondence between a letter and a sound, and vice versa. For example, the sound /f/ appears in spelling as <ff> as in *riff*, <f> as in *leaf*, <gh> as in *enough* or <ph> as in *phenomenon*. On the other hand, the letter-combination <ea> can be pronounced /eə/ as in *bear*, /ɪə/ as in *beard*, /ɜː/ as in *learn*, /ɑː/ as in *heart*, /e/ as in *head* or /iː/ as in *heat*.

With regard to the English syllable structure, it is much more elaborate than the Chinese one. It consists of an optional consonantal onset and the rhyme, which comprises the obligatory, usually vocalic nucleus[30] and an optional consonantal coda (cf. e.g. Gut, 2009a: 75). As mentioned, the rather complex English syllable structure allows for up to three consonants in the onset and up to four consonants in the coda position: (C) (C) (C) V (C) (C) (C) (C) (C = consonant, V = vowel) (cf. e.g. Gut, 2009a: 77; Giegerich, 1992). That is to say, also in contrast to Chinese, consonant clusters of sometimes even four consonants in the coda (e.g. in *te**xts*** /ksts/) are very common in English (see also Table 2).

Contrary to Mandarin Chinese, the syllable structure is not only more complex in English, but there are also two different types of syllables, i.e. non-reduced syllables containing a stressed or full vowel, and reduced syllables with an unstressed or weak vowel (cf. Gut, 2009a: 85). However, only certain syllables may be stressed in English. A V-syllable comprising only a short vowel or a CV-syllable consisting of a consonant plus a short vowel are generally unstressed in connected speech. This means either one of the reduced vowels /ə/ or /ɪ/ may appear in it, or the vowel is completely deleted (cf. e.g. Gut, 2003: 140; Gut, 2009a: 84; Giegerich, 1992; Delattre, 1969; Kaltenbacher, 1998). How much a vowel is reduced or maybe even deleted depends on the person's speaking rate and speaking style (cf. e.g. Kohler, 1990; Rehor & Paetzold, 1996). All syllable structures other than V or CV may contain a full, long or short vowel in connected speech; if they carry stress the vowel tends to be lengthened. Still, differences between unstressed and stressed syllables may not only be accompanied by greater vowel length, but also by increased pitch height or intensity and a difference in vowel quality (cf. Gut, 2009: 168).

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30 Sometimes the nucleus position may be filled by a nasal or a liquid (cf. Gut 2009: 167).

The durational differences between stressed and unstressed syllables which result from vowel reduction or deletion processes, though, are correlates of the rhythm class assigned to British English, i.e. stress-timed rhythm (cf. e.g. Gut, 2003: 140; Roach, 2004: 243). Stress-timing means the interval between two stressed beats is always similar, regardless of how many unstressed syllables intervene (see also section 4.2.1.1).

Regarding the British English phoneme inventory, it comprises short as well as long discrete vowels. So, contrary to Chinese, vowel length is in fact phonemic in English (cf. e.g. Gut, 2009a: 64; Gut, 2009: 167); for example, *bead* and *bid* are a minimal pair, although they only differ in the length and also slightly in the quality of the vowel /iː/ and /ɪ/ (cf. e.g. Giegerich, 1992: 99; Gut, 2009: 168). Due to the fact that not only long but also short vowels can occur in stressed syllables, which results in vowel lengthening as pointed out above, a variable vowel length is characteristic for English in general (cf. Gut, 2009: 168).

4.2.2.3 German

German functions as the L3/Ln or target language of the present empirical study. It is becoming increasingly popular in China as a second NNL after English[31] or even as a first NNL at schools or universities (cf. Wannagat & Gerbig, 2003: 7). Often motivated particularly by Germany's economic strength and better job prospects, many Chinese learners of German go on student exchanges to German-speaking states or even for their complete studies. For the latter, a huge sector of preparatory language courses for admission tests to German universities, such as the German Language Proficiency Examination for Admission to Higher Education for Foreign Applicants (*Deutsche Sprachprüfung für den Hochschulzugang ausländischer Studienbewerber* – DSH) or the Test of German as a Foreign Language for Foreign Applicants (*Test Deutsch als Fremdsprache für ausländische Studienbewerber* – TestDaF), is prospering (cf. Wannagat & Gerbig, 2003: 7). Native-speaker numbers of this West-Germanic language, which is related to English, are estimated in the literature ranging from 90 to 110 million (e.g. Dieling, p.2: www.phonetik-international.de; Bußmann, 1990: 173; Baugh & Cable, 2002: 4). It is an official language in Germany, Austria, Switzerland and Liechtenstein (cf. Dieling, p.2: www.phonetik-international.de).

[31] According to Wannagat and Gerbig (2003: 7), there are around 25,000 learners of German as a second foreign language in China.

With regard to the relationship between spelling and pronunciation in German, it neither corresponds completely nor diverges to the extent as English does. For example, *Bett* (Engl. “bed”), pronounced /bet/, shows a phonemic spelling with almost a one-to-one correspondence between graphemes and phonemes; whereas *Bad* (Engl. “bathroom”) is pronounced [baːt], with the German characteristic syllable-final obstruent devoicing of the usually voiced stop /d/, which is not evident from its spelling.

Like English, German exhibits a rather complex syllable structure with potentially three consonants in the optional onset, a mandatory vocalic nucleus consisting of a monophthong or diphthong, as well as up to four consonants in the optional coda: (C) (C) (C) V (C) (C) (C) (C) (C = consonant, V = vowel) (cf. e.g. Dieling, p.4: www.phonetik-international.de). So, consonant clusters of three (e.g. ***Spl****itter* /ʃpl/), or even four consonants (e.g. *du rü****mpfst*** *die Nase* /mp͜fst/) exist, like in English. Despite the same phonotactic restrictions regarding permissible syllable structures, German and English differ concerning the combination allowed of the specific consonants. For instance, there is no consonant cluster match in English for the German combinations /p͜f/ as in *To****pf*** (Engl. “pot”) or /ʃl/ as in ***Schl****ange* (Engl. “snake”) (cf. e.g. Yavaş, 2006: 190; Reinke, p.8: www.phonetik-international.de) (see also Table 2).

Just like in English, there are also non-reduced as well as reduced types of syllables in German (cf. e.g. Carson-Berndsen, 1998); the former contain either a short or a long full monophthong or diphthong as nucleus, whereas the latter reduced syllables comprise one optional onset consonant, a weak vowel /ə/, or word-finally also /ɐ/, as nucleus, optionally followed by another single coda consonant (cf. Gut, 2009: 167; Kohler, 2001: 87). These two reduced vowels /ə, ɐ/ may only occur in post-stress syllables like inflectional suffixes (cf. Gut, 2009: 169; e.g. Kohler, 2001). Helgason and Kohler (1996) in their corpus-based study of native German speech detected almost 60% deletions of vowels in these post-stress syllables; even more frequently in 93% of all tokens of verbs or nominal, inflected lexemes the vowel in consonant + <-en> syllables was deleted[32] (e.g. *beten* [ˈbeːt.n], Engl. “to pray”). Such syllables with a reduced or even deleted vowel can never carry the syllable stress (cf. Gut,

[32] This deletion of the vowel in a syllable like C+<-en> illustrates a progressive assimilation process common in German, i.e. the preceding consonant C influences the successive sounds in such a way that the vowel is not only reduced but even deleted (cf. Dieling, p.10: www.phonetik-international.de).

2009: 167). Although the degree of vowel reduction or deletion in unstressed syllables varies with the speaking rate and speaking style both in German and English (cf. e.g. Kohler, 1990; Rehor & Paetzold, 1996), it is even more frequent in English than in German overall (cf. Gut, 2003: 140; e.g. Delattre, 1969; Kaltenbacher, 1998). Acoustic correlates of the two important speech processes in German of vowel reduction or deletion can be observed in the vowel quantity of unstressed syllables in connected speech (cf. Gut, 2009: 168). The same as in English, greater vowel length, a difference in vowel quality, increased pitch height and intensity differentiate stressed from unstressed syllables in German (cf. Gut, 2009: 168). Especially durational differences discriminate prominent from non-prominent syllables, with stressed syllables 1.87 times longer on average (cf. Gut, 2003a). Such durational differences between stressed and unstressed syllables are reflected in the stress-timed rhythm class German also shares with British English: stress intervals can contain varying numbers of unstressed syllables, with reduced or deleted vowels, as long as they are of the same length (cf. e.g. Gut, 2003: 139; Dieling, p.5: www.phonetik-international.de).

Analogous to English, German too distinguishes different long and short vowels. Hence, vowel duration is also phonemic in German, thus enlarging the monophthong inventory considerably compared to Mandarin Chinese. Both types of vowels, short and long, may appear in stressed syllables; this stress is responsible that vowel lengthening occurs, which illustrates the durational variability of German vowels like in English (cf. Gut, 2009: 168).

4.2.2.4 Problematic Areas for L1-Mandarin Learners of German with L2 English

As for the present study especially certain phonological processes are relevant, i.e. vowel reduction, speech rhythm and CCC retention (cf. also section 4.2.1), a look at the areas which are expected to be problematic for L1-Mandarin learners of German with L2 English is useful. Hence, a contrastive overview juxtaposing relevant correlates of these specific differences in Mandarin Chinese, British English and German is given in Table 2.

Table 2. Overview of the differences in vowel quantity, syllable structure, consonant clusters and speech rhythm class between Mandarin Chinese, British English and German.

Feature	Mandarin Chinese	British English	German
Vowel quantity:			
Phonemic vowel length	---	✓ (cf. Gut, 2009: 168)	✓ (cf. Gut, 2009: 168)
Vowel reduction	---	✓ /ə, ɪ/ • In V and CV syllables with short vowel (cf. Gut, 2009a: 84) • In pre-stress and post-stress positions (cf. Gut, 2009: 169)	✓ /ɐ, ə/ • Only in post-stress syllables (cf. Gut, 2009: 169) → reduction to schwa (cf. Kohler, 2001)
Syllable structure: (C = consonant, V = vowel)	(C) V (C) (Modified from Hunold, p.5: www.phonetik-international.de)	(C) (C) (C) V (C) (C) (C) (C) (Modified from Gut, 2009a: 75ff)	(C) (C) (C) V (C) (C) (C) (C) (Modified from Dieling, p.4: www.phonetik-international.de; Ternes, 1999: 186; Gut, 2009: 167; Mingren, 1984: 87f)
Consonant clusters:			
Onset clusters	---	✓ (up to 3)	✓ (up to 3)
Coda clusters	---	✓ (up to 4)	✓ (up to 4)
Speech rhythm:	Syllable-timed (cf. Hunold, 2009: 85; Chiao & Kelz, 1985: 30)	Stress-timed (cf. Gut, 2003: 140)	Stress-timed (cf. Gut, 2003: 139)

With regard to the vowel quantity, vowel length is not phonemic in Mandarin Chinese in contrast to both English and German, which additionally also exhibit modifications in vowel quality, increased pitch height and intensity (cf. Gut, 2009: 168). Vowel reduction does not occur in Mandarin, whereas it exists in British English, manifested as /ə, ɪ/ in syllables consisting only of a vowel or of a consonant plus vowel (cf. Gut, 2009a: 84) in pre-stress and post-stress positions (cf. Gut, 2009: 169). In German, vowel reduction can be found only in post-stress position (cf. Gut, 2009: 169), where vowels are reduced to one of the schwas /ɐ, ə/ (cf. Kohler, 2001). All three languages also vary with regard to permissible syllable structures and consequently concerning occurring consonant clusters: Mandarin allows only up to one consonant in onset (e.g. Chin. *guó* /gʊo/ = Engl. "country") and coda position (e.g. Chin. *zhōng guó* /ˈtʂʊŋˈgʊo/ = Engl. "China"), thus prohibiting any consonant clusters. This often leads to vowel epenthesis phenomena in Mandarin native speakers learning a NNL with more complex syllable structures (e.g. cf. Wang, 1988: 78f). The English syllable, however, can consist of up to three consonants in the onset (e.g. *strength* /stɹeŋθ/) and up to four in the coda (e.g. *texts* /teksts/). German also allows up to three consonants in onset position (e.g. *streng* /ˈʃtreŋ/ = Engl. "strict") and up to four in coda position (e.g. *impfst* /ɪmp͜fst/ = Engl. "you vaccinate"). Besides, Mandarin and English both permit nuclei with one, two or three vowels, while German only accepts monophthong or diphthong nuclei. Regarding the affiliation to a specific speech rhythm class, Mandarin Chinese once again differs from English and German in that it is traditionally classified as a syllable-timed language (cf. Hunold, 2009: 85; Chiao & Kelz, 1985: 30) as opposed to the other two stress-timed languages (cf. Gut, 2003: 139f). To keep up a syllable-timed rhythm, L1-Mandarin learners of a stress-timed language tend to insert vowels into consonant clusters in order to create the typical syllable-timed stress on each syllable (cf. Dieling, 1992: 72).

Hence, obviously the phonological systems of British English and German are much more similar – though not the same (cf. Gut, 2003: 140; e.g. Flege, 1995) – compared to Mandarin Chinese phonology. As was discussed previously, such typological and structural closeness of course lends itself rather well to transfer. In the subsequent section, the participants of the present empirical study whose productions were examined for potential LPT will be looked at more closely.

4.2.3 Participants

For the study, 18 participants[33] with L1 Mandarin Chinese, L2 English and the TL L3/Ln German were recruited through various ways, from poster advertisements to e-mailing and personal contacts. Their age range lay between 21 to 39 years (mean age = 26.7 years). At the time of recording, all participants were enrolled at university. 17 participants were students of various subjects at different German universities, ranging from bachelor to PhD-level; one male participant was a master student from China at an Australian university at the time of recording. As regards the subjects, the group was rather heterogeneous, but with a recognisable concentration of philologies (German: n = 4; English: n = 4; Japanese: n = 1).

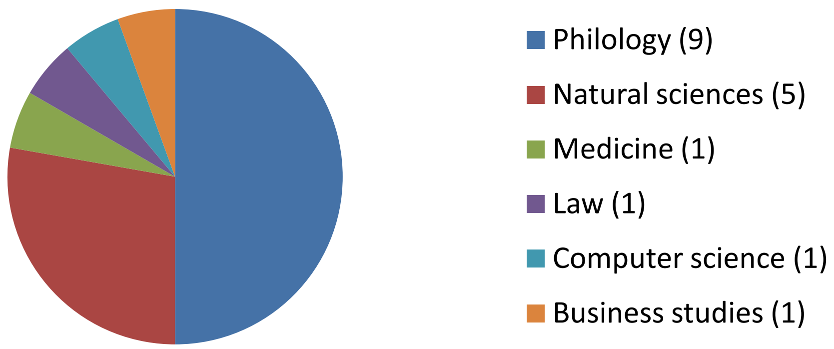

Figure 1. Participants' range of subjects of study.

The fact that 50% of all participants were students of a philology has to be kept in mind regarding the analyses, of course: it might have an effect on the occurrence of transfer in that, for instance, their metalinguistic awareness is higher compared to the non-philology students, or in that they have received special phonetic training, maybe even in the TL German. However, specific questions in the interview aimed to counteract any bias of the results due to such differences in linguistic knowledge, metalinguistic or metaphonological awareness, and intended to elicit all participants' degree of metalinguistic or metaphonological awareness.

[33] This number was chosen particularly for reasons of operationalisation. According to Richter (2008), for example, the maximum number of participants for a phonetic study being conducted by one researcher should not exceed 30. Due to the fact that not only one feature is investigated but three, 18 participants was considered a sufficiently high number for significant results that is still manageable to be annotated by the author.

Moreover, it has to be considered that the present test population cannot be claimed to represent a true random sample, as it was rather a self-selection of those participants who consented to be recorded. Thus, they possibly also share certain character traits or exhibit greater interindividual differences which may have an effect on their transfer behaviour (e.g. Richter, 2008: 147f). To further avoid any bias of the results, the participants were only told after the recordings that these would be used for phonetic analyses of the occurrence of potential CLI, so they would not be inhibited in their NNLs or focus too much on the form of their productions, for instance.

With regard to a more detailed linguistic profile of the participants, all of them were adult native speakers of Mandarin Chinese with overall advanced knowledge of their L2 English and beginner's proficiency in the non-native TL German. Additionally, some learners had knowledge of further languages (French: n = 3; Japanese: n = 3; Spanish: n = 1) or of a different Chinese dialect than Mandarin (n = 3). Only participants with the same order of acquisition of their languages, i.e. L1 Mandarin Chinese[34], L2 English and L3/Ln German, were recorded. As regards the individual number of previously acquired languages and language combinations, the sample group was rather homogeneous.

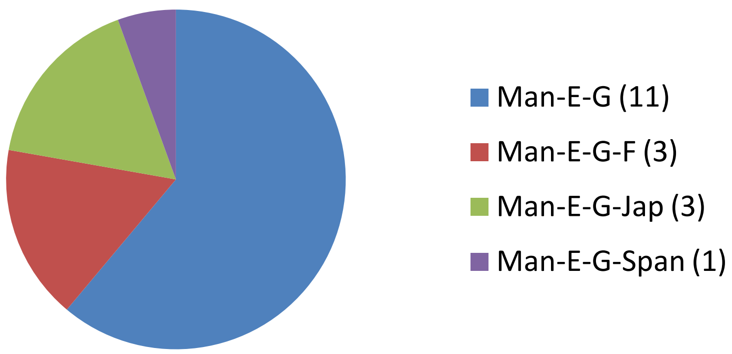

Figure 2. Participants' number and combination of languages.

Three learners grew up bilingually with a Chinese dialect and Mandarin Chinese, which were consequently counted as two L1s. Thus, 11 participants knew only the target language combination of the two NNLs

[34] Three participants acquired Mandarin Chinese only from kindergarten on and spoke another Chinese dialect at home with the family, which will be subsumed here under bilingual first language acquisition. Thus, potential diatopic variation from said dialects can be assumed to be almost non-existent in the present data, as all participants had native competence in the standard dialect Mandarin.

L2 English and L3 German, whereas seven had acquired an additional NNL: P1_m and P12_f knew French as L4, whereas P17_m had learnt French as L3 before the L4 German. P2_f, P4_m and P6_m had further acquired Japanese after the L2 English before German, and P3_m additionally knew Spanish as L4.

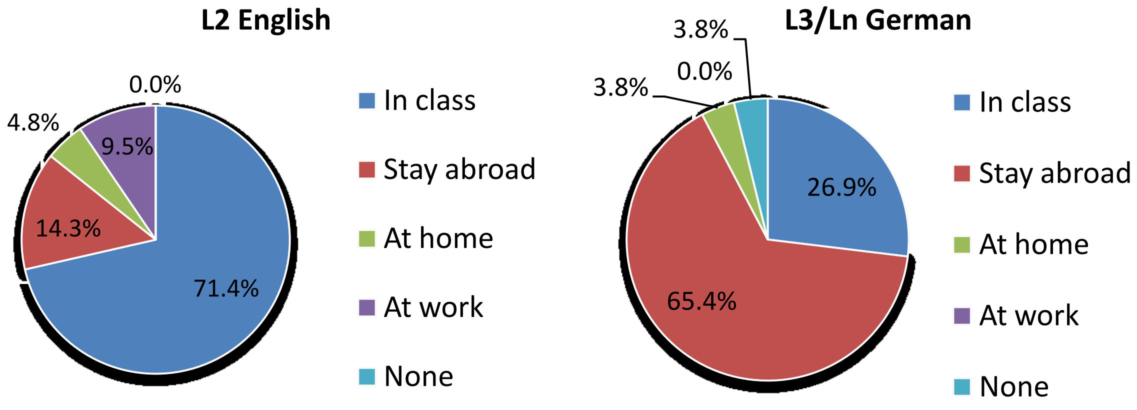

Figure 3. Participants' contact with L2 English and L3/Ln German.

For most participants, contact[35] with their L2 English was limited to a formal-instruction situation in school or at university (71.4%), followed by being immersed in the L2 during a stay abroad in an Anglophone country (14.3%). A few used English also at home (4.8%) and at work (9.5%). Interestingly, every participant still was in contact with their L2 English in one way or the other. With regard to the TL L3/Ln German, it is intriguing that 65.4% of the contact situations were in fact a past or current stay abroad, and only 26.9% in class. Apart from at home (3.8%), a few learners did not come into any contact at all with German (3.8%), not even at work (0%).

When asked about the use of their NNLs English and German, 13 participants indicated that they were using English actively and passively, whereas the other five stated only passive use. The TL German was also declared to be used both actively and passively by 13 participants, only actively or passively by two learners each, and not at all by one participant.

All in all, nine female and nine male subjects participated in the empirical study. On average, they had had their first contact with their L2 English at

[35] Multiple mentions of contact situations were possible and are consequently displayed in per cent.

12.2 years (age range: 9–16 years), whereas they first encountered the TL German at an average age of 21.5 (age range: 18–32 years). Moreover, they had been residing in Germany an average of 3.6 years. Before that or even during their stay in Germany they had been receiving formal instruction in the TL for a mean of 18.9 months, one partaking in no instruction at all and one in some up to five years. In the L2 English, which children usually start to learn very early on in the Chinese educational system, participants had been taught English for an average of 9.6 years (range: 3–17 years).

According to the previously mentioned factors of source and target language proficiency (see section 3.3), LPT most likely tends to occur only at the initial stages of TL acquisition at a low proficiency level, usually from the non-native SL the learner is most proficient in. To control for this factor of proficiency with a view to the focus of the present study, it would make sense to assess the participants' proficiency level particularly with regard to the prospective source and target language phonologies. Unfortunately, to date there are no standardised, valid tests around which reliably and efficiently assess phonological proficiency. Hence, due to time constraints and workload efficiency, it was decided to refer to the learners' amount of source and target language contact, use and formal instruction as parameters of assessment of their respective L2-English and L3/Ln-German proficiencies.

In line with the prerequisite for an advanced proficiency in the prospective non-native SL, the 9.6 years on average all participants had been learning English for suffice in order for it to become the envisaged SL for LPT. German, on the other hand, had been learnt on average for 18.9 months, which in view of the relative difficulty to acquire for Mandarin Chinese native speakers can still be viewed as a relative beginners' level of the TL German. However, looking closely at the individual participants, it is of course possible that particularly those who could only rely on their German knowledge acquired via immersion in the TL environment during their relatively short stay abroad (e.g. P8_m, P18_m) or those with solely up to a year of formal instruction (e.g. P6_m, P10_f) are more prone to exhibit LPT, if the proficiency hypothesis is correct (Hammarberg & Williams, 1993). The reason for this could be their thus possibly restricted proficiency level compared to those participants who had received longer formal education in the TL German or who had been residing longer in a German-speaking environment.

Regarding the participants' amount of contact with the two NNLs, 15 out of 18 still used their L2 English in some kind of formal instruction situation at the time of recording, and all but one learner were exposed to their L3/Ln German in a native speaker environment. Besides, a self-assessment of each subject's proficiency as beginner, advanced beginner, advanced or near-native of their three core competencies – speaking, writing and reading – in their individual languages was carried out:

Table 3. Results of the participants' self-assessments of proficiencies in writing, reading and speaking in L2 English and L3/Ln German (in %).

Skill	**Proficiency**	**L2 English (in %)**	**L3/Ln German (in %)**
Writing:	None	0	5.9
	Beginner	0	23.5
	Advanced beginner	41.2	29.4
	Advanced	52.9	35.3
	Near-native	5.9	5.9
Reading:	None	0	0
	Beginner	0	17.6
	Advanced beginner	11.8	29.4
	Advanced	70.6	47.1
	Near-native	17.6	5.9
Speaking:	None	0	0
	Beginner	11.8	29.4
	Advanced beginner	29.4	29.4
	Advanced	52.9	41.2
	Near-native	5.9	0

Overall, for the L2 English, most participants classify their proficiency across the three skills writing, reading and speaking as that of advanced beginners to near-native. For the L3/Ln German, the majority assesses their proficiency ranging from beginner to advanced level. Regarding the required high proficiency in the potential SL English, P5_f and P16_f judged their level very conservatively as that of beginners, whereas P4_m confidently stated a near-native competence in his English speaking abilities. Over half of them indicated an advanced oral proficiency (52.9%), complying with the desired linguistic requirements of the participants, and the rest (29.4%) an advanced beginners' level. Looking at the learners' TL-German speaking abilities, none claimed neither a near-native nor no competence at all. They mostly judged their speaking skills as that of beginners or advanced beginners (29.4% each), but 41.2% also stated an advanced proficiency. In the analyses, it will be determined whether this latter fact has an impact on the occurrence of LPT.

Thus, as can be seen from the amount of contact, use and formal instruction in the L2 English and the L3/Ln German as well as from the self-assessments, more or less homogeneous competence levels across the participants were ensured: the required high proficiency in the prospective SL L2 English, and a lower proficiency in the TL L3/Ln German.

4.2.4 Recordings

Most recordings were performed in a quiet office at the University of Augsburg, Germany,[36] with a handheld Edirol R-09 24-bit wave/mp3 recording device at a sampling rate of 44 kHz; they were carried out in uncompressed *.wav-format[37], using the inbuilt stereo condenser microphone. The raw stereo *.wav-files were transformed into mono-channel files with the open-source audio editor Audacity (version 1.2.6), thereby reducing the size of the files and thus making them easier to process. Finally, the ends of the recordings were cut, resulting in ready-to-analyse files. Afterwards, the pruned mono *.wav-files were fed into the speech analysis software Praat (version 5.2.30), with which all acoustic measurements were carried out in a text-to-tone alignment environment, as described later on in detail (see section 4.2.6).

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[36] The recordings of participant P3_m were carried out in the quiet zone of a university library; the three recordings of participants P5_f, P15_m and P16_f were carried out in a recording cabin at the Department of Phonetics of the LMU, Munich, Germany; and participant P18_m was recorded in a medical laboratory.

[37] The uncompressed *.wav-format, which also displays prosodic elements, was chosen for reasons of accurate text-to-tone alignment in the speech analysis software Praat (cf. Boersma & Weenink, 2014; Institute of Phonetic Sciences, University of Amsterdam, The Netherlands), contrary to the compressed *.mp3-format.

To keep an overview of all analysed files, an unambiguous coding system was developed to be able to attribute every file to a specific anonymised participant. Hence, to convey information on the participant, his/her gender, the target language of the recording as well as the type of task performed, the files were coded according to the formula "participant number (Pn)_gender (m = male/f = female)_language (L1Man, L2E, L3G) task (text, picture story, sentences1, sentences2)" (e.g. "P16_m_L3G picture story").

4.2.5 Data Elicitation and Materials

Data collection comprised stimulus materials[38] aimed at eliciting different speaking styles, and simultaneously tried to control for various factors that possibly interact with the occurrence of LPT. Said LPT is investigated exploring the phonological features of speech rhythm, vowel reduction and CCC realisation. Firstly, to what extent a vowel is reduced in either English or German covaries among others with speaking style (cf. Gut, 2009: 168; e.g. Deterding, 2001; Engstrand & Krull, 2003; Barry et al., 2003; Richter, 2008). Gut's (cf. 2009: 174, 180ff) German learners' syllable ratios, for instance, differed depending on the speaking style (see section 4.2.1.1), just like Wenk (1985) found more normative pronunciations of single segments during reading tasks and more reduction in spontaneous speech (e.g. also Kohler, 2001). Speaking style has also been found to interact with the realisation of CCCs, with the least amount of reduction in controlled tasks like the read-out-loud texts, increasing proportionally the less controlled the stimulus material is, like in informal free speech elicited in an interview (e.g. Weinberger, 1987; Major, 1994; Bayley, 1996; Hansen, 2004). For example, in Bayley's (1996) study of L1-Mandarin learners of English, she found increasing cluster deletion rates from careful, controlled speech to read-out-loud style to storytellings to free conversational speaking style. Further, Gut (2009) detected in her TL-English learners a lower retention rate in free speech for consonant clusters, with numerous instances of substitutions and devoicing (cf. 2009: 156; e.g. also Major, 1994; Bayley, 1996; Hansen, 2004). In the TL-German realisations, she found variation of cluster retention across all three speaking styles, ranging also from the lowest rates in free speech, increasing in story

[38] Being part of the pilot study, P3_m received slightly different stimulus material, i.e. an L3/Ln-German read-on-your-own task *Der Nordwind und die Sonne*, an L2-English lexical set, followed by the same L2-English read-on-your-own text all other participants received, as well as the same L1-Mandarin read-on-your-own task, and finally an interview about P3_m's linguistic background held in English due to his very basic proficiency in German.

retellings to the highest rates in the read-out-loud task (cf. Gut, 2009: 157). In accordance with these findings, the types of stimulus materials to be analysed acoustically were chosen: read-on-your-own tasks as well as retelling a given picture story, thus producing semi-spontaneous speech.

As regards the constraining factors, the recordings were always carried out in the same order to avoid the overactivation of a specific language and also to control for the factor of recency of use. Thus, all 18 participants were first recorded performing a read-on-your-own task in the TL German. For this recording, a German text from the online children's magazine *GEOlino* of about 1.5 minutes' length (cf. Appendix A1) was used. It was chosen because it offers several potential loci for the aspects investigated with regard to lateral phonological CLI. According to the variable of task relatedness discussed in the above theoretical part (see section 3.3.4), this reading task is supposed to elicit non-L1 influence: The learners have to rely more on their prior linguistic knowledge than only try to imitate in a read-after-me task with a native speaker model, which in turn is assumed to elicit L1 CLI. So, they were expected to show influence from their strongest NNL, which from self-evaluation and the proficiency assessment described was English.

Secondly, all participants (apart from P3_m) were asked to narrate a short picture-story in the TL German (cf. Appendix A2). Similar to the read-on-your-own text, this complex task is also believed to promote lateral phonological CLI – even more so because the learners have to focus mainly on the content of the story narration rather than on their pronunciation when telling the story (e.g. Hammarberg & Williams, 1993).

The third stimulus were 13 TL-German sentences (cf. Appendix A3). Similar to the first task, they had to be read out loud by the participants. The sentences were devised specifically to elicit numerous realisations of phonological features that exist in German and English, but not in the learners' L1 Mandarin, i.e. particularly CCCs as well as specific syllable pairs with pre- and post-stress vowel reduction or deletion. Hence, the potential loci for lateral phonological CLI from the L2 to the TL were provided.

To ensure that no feature was transferred either from the L2 or from the L1 which itself had already been influenced by another language or been acquired incorrectly, recordings were also made from the participants' L2 English and L1 Mandarin. Therefore, the learners performed a read-on-your-own text task first in their L2 English taken from the online edition of *National Geographic* (cf. Appendix A5) followed by the same task type in their L1 Mandarin (cf. Appendix A6), reading out the Mandarin version of Aesop's fable *The North Wind and the Sun*. Additionally, they were asked to produce two phonetically rich sentences in their L1 that contain an unusually high number of discrete phonemes of Mandarin.

After this, the participants additionally were asked to reproduce further TL-German and L2-English sentences. All sentences in both languages had been devised to contain numerous tokens of the same language-specific phonological features as in the third stimulus. All subsequent analyses will be based on the described data sets by each of the 18 participants.

The core tasks were followed by an interview in German[39] (cf. Appendix A7) of about 20 minutes on average in order to collect non-linguistic information about the individual learners' linguistic background, language learning experience, their psychotypology or metalinguistic and metaphonological awareness, etc. They were further asked to fill in a questionnaire, containing questions, for instance, on their contact with a specific NNL, their age of learning or the above-mentioned self-assessment of their proficiency in the single NNLs (see section 4.2.3). Admittedly, as some researchers have pointed out previously (e.g. Richter, 2008: 165–170, Hahn, personal communication), questionnaires have to be analysed with caution due to issues like ambiguities of questions or usually the impossibility to enquire about given answers retrospectively. Thus, for the present study, the questionnaire was only chosen to complement the interview data. Finally, all participants also gave their written official consent for the recorded data to be used in anonymised form for research purposes. As said, to avoid any bias, the participants were not told beforehand that the recordings would be used to investigate CLI, and were informed only afterwards that this would be done by analysing their TL-German pronunciation.

4.2.6 Data Analysis

The recordings were first subjected to an auditory pre-screening process by two expert listeners: The present author screened all L2-English and TL-German recordings for a conspicuous accent that could be attributed to

[39] Due to his very low proficiency in the TL German, the interview was conducted in English for participant P6_m.

some kind of CLI. Besides, an L1-Mandarin native speaker[40] first analysed all Mandarin recordings auditorily. She thereby paid attention to any audible foreign-sounding productions potentially influenced by the L2 English or the TL German, and secondly listened to all English and German recordings screening for potential Mandarin phonological influence.

This admittedly rather subjective, peripheral method was completed by the main acoustic analyses of the recordings with the speech analysis software Praat, which allows a text-to-tone alignment of the *.wav-files with the corresponding Praat-specific annotation *.TextGrid-files. Using a modified Praat script[41] to enable the automation of certain mechanical routine analysis steps, a *.TextGrid-file containing the necessary tiers was created for each *.wav-file. A further Praat script[42] was applied to detect pauses in the signal between utterances, the correct positioning of which was checked and adjusted manually afterwards. Especially for the read-on-your-own tasks consisting of scripted texts, another Praat script[43] helped fill the gaps on the respective TextGrid-tier in between these pauses automatically with the utterances corresponding to the recorded speech signal.

Moreover, the Web-based CLARIN-D segmentation and labelling system WebMAUS (**M**unich **Au**tomatic **S**egmentation) was used, developed at the Bavarian Archive for Speech Signals (BAS) hosted by the Institute of Phonetics and Speech Processing (IPS) at the LMU, Munich. WebMAUS enables a rough automated segmentation amongst others of German *.wav-files using phonemic forced alignment. For that, the speech signal is uploaded in *.wav-format onto the IPS-server, as well as a *.txt-file containing a detailed orthographic transcription[44] of the uploaded sound file. Due to the fact that WebMAUS is based on Hidden Markov Modelling,

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[40] The expert listener studied German as a Foreign Language and English Linguistics at the University of Augsburg, Germany, for six years.

[41] Praat script by Kevin Ryan: "Grid-maker" available on http://www.linguistics.ucla.edu/faciliti/facilities/acoustic/praat.html (last accessed 12.06.2016).

[42] Praat script by Mietta Lennes: "Mark-pauses" available on http://www.linguistics.ucla.edu/faciliti/facilities/acoustic/praat.html (last accessed 12.06.2016).

[43] Praat script by Mietta Lennes: "Label-from-text-file" available on http://www.linguistics.ucla.edu/faciliti/facilities/acoustic/praat.html (last accessed 12.06.2016).

[44] All line breaks and punctuation have to be deleted; repetitions or mispronunciations have to be reproduced orthographically as precisely as possible (e.g. *Kä Kän Kängoru*).

which generates a set of pronunciation hypotheses and subsequently selects the most probable hypothesis based on the speech signal, it is able to segment and label exactly what was spoken – even if it deviates significantly from the canonical pronunciation given by the inbuilt pronunciation dictionary. The output is a *.TextGrid-file consisting of three tiers: a rough segmentation into words with orthographic transcriptions on tier one, the canonical citation form in the machine-readable phonemic transcription symbols SAM-PA on tier two, which is deleted because it is not necessary for the analyses, and a rough phonemic segmentation as close to the speech signal as possible in SAM-PA on tier three (cf. Figure 4).[45]

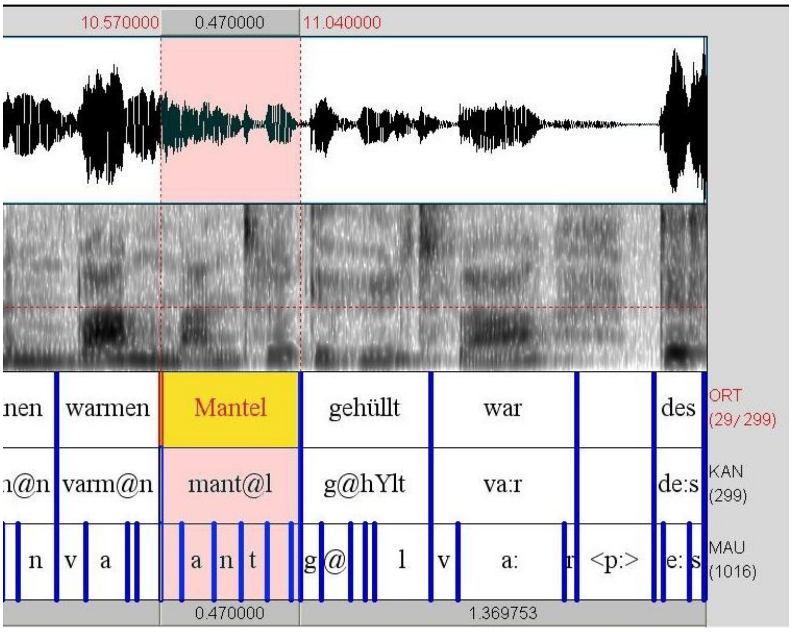

Figure 4. Example of the automatic output of the WebMAUS segmentation and labelling system, consisting of three tiers of orthographic and phonemic transcriptions.

Afterwards, the two-tier WebMAUS-TextGrid is merged with the previously created three-tier TextGrid, and the tiers are brought into the correct order.

To enable the subsequent analysis, a multi-level annotation was carried out for the three read-out-loud text tasks, L3G_text, L3G_sentences1 and L3G_sentences2, for the retelling of the TL-picture story, as well as for the

[45] The segmentation quality achieved is comparable to that of a human transcriber, although some slight modifications have to be executed along the manual analysis process (cf. Schiel et al., 2011).

L2-English reading task, L2E_text. An overview of the annotated files can be found in the subsequent Table 4.

Table 4. Multi-level annotations carried out for the reading and retelling tasks in the TL German and the L2 English.

Task	Number of annotated files
Reading tasks:	
L3G_text	3
L3G_sentences1	14
L3G_sentences2	8
L2E_text	18
Retelling task:	
L3G_picture story	16
Total:	**59**

All in all, only annotations necessary for the subsequent feature analysis were added on five interval tiers in the TL recordings (cf. Table 5) to enable the analysis of the above-mentioned three segmental and suprasegmental features, speech rhythm, vowel reduction and CCC realisation, on evoking LPT (see section 4.2.6).

Table 5. Overview of all annotations of the TL-German recordings on five interval tiers, including the number and name of the respective tiers.

Tier	Name of tier	Annotation on tier
1.	Utterance	Canonical orthographic transcription of sound signal in utterance length; pauses (*xxx*; silence longer than 100 ms)
2.	Word	Canonical orthographic transcription of the single words; pauses (*xxx*; silence longer than 100 ms)
3.	Syllable type	All syllables containing a full, reduced or deleted vowel (→ *sfv*, *srv*, *sdv*); pauses (*xxx*; silence longer than 100 ms)
4.	C/V	Length of consonantal and vocalic intervals (→ *C*, *V*); pauses (*xxx*; silence longer than 100 ms)
5.	Cons. cluster	Canonical SAM-PA transcriptions of consonant clusters

The first two tiers contain canonical orthographic transcriptions of the single utterances and the single words, respectively, as well as pauses (marked *xxx*) if the silence is longer than 100 milliseconds (cf. Gut, 2003b: 144). On tier three, three different syllable types, i.e. syllables containing either a full vowel (*sfv*), a reduced vowel (*srv*) or a deleted vowel (*sdv*), as well as pauses of more than 100 milliseconds in between were annotated phonetically. The fourth tier comprises annotations of the vocalic and consonantal intervals (*C, V*) including pauses, followed by the markup of all consonant clusters in their canonical form in the speech signal, annotated in SAM-PA on tier five.

In the L2-English reading task, annotations on three interval tiers were added solely when required for the further data analysis (cf. Table 6).

Table 6. Overview of all annotations of the L2-English recording on three interval tiers, including the number and name of the respective tiers.

Tier	**Name of tier**	**Annotation on tier**
1.	Utterance	Canonical orthographic transcription of sound signal in utterance-length; pauses (*xxx*; silence longer than 100 ms)
2.	Cons. cluster	Canonical SAM-PA transcriptions of consonant clusters
3.	Syllable type	All syllables containing a full, reduced or deleted vowel (→ *sfv*, *srv*, *sdv*) ; pauses (*xxx*; silence longer than 100 ms)

Like in the TL-German recordings, the first tier contains canonical orthographic transcriptions of the single utterances in English, as well as phonological transcriptions of all consonant cluster tokens on the subsequent tier. The third tier comprises phonetic annotations of the three different syllable types (*sfv, srv, sdv*), similar to the TL-German files, including pauses of more than 100 milliseconds (*xxx*).

All annotations on the multiple tiers in the TL-German and L2-English recordings serve as the basis for the quantitative and qualitative investigation of LPT. In the following, the analysis process of the single aspects, i.e. speech rhythm, vowel reduction and CCC realisation will be described.

4.2.6.1 Analysis of Speech Rhythm

The first aspect to be examined in the productions of the TL-German learners is the suprasegmental feature of speech rhythm. As mentioned above, there are different metrics with which to measure such speech rhythm, each with different advantages and disadvantages (see section 4.2.1.1). In order to triangulate measurements and receive valid as well as reliable results, following Wiget et al.'s (cf. 2010: 1566) recommendations on the robustness of metrics to variation, two segment-based rhythm metrics were applied to the learner data: the interval measures %V and a normalised Pairwise Variability Index for vocalic intervals (nPVI-V).

To prepare the data basis for the segment-based rhythm calculations, firstly all annotations on the C/V-tier, i.e. pauses of 100 milliseconds or more (*xxx*), consonantal (*C*) and vocalic (*V*) intervals and their durations (in milliseconds) were extracted automatically from each annotated *.TextGrid-file with a Praat script[46]. The resulting *.txt-file with a list of all C, V and xxx durations was imported into an Excel-file. According to standard practice, to avoid any bias of vowel lengthening on the calculations (e.g. Gut, 2003a), all pre-pausal vocalic intervals were deleted as well as all pauses. The remaining 4,817 vocalic durations were used for the speech rhythm calculations with the above-mentioned segment-based metrics.

In order to be able to compare results of these rhythm calculations of the learner data to native speaker reference values for the single languages, it was drawn on previous studies (e.g. Grabe & Low, 2002; White & Mattys, 2007; Ramus et al., 1999). Various native speaker reference values are available for the relatively widely applied rhythm metric %V, ranging from 41.7% (Russo & Barry, 2008) to 46.4% (Grabe & Low, 2002) of the proportion of total utterance duration comprising vocalic intervals as opposed to consonantal intervals for German. Analogously, several %V-values are given in the literature for British English, ranging from 38.0% (White & Mattys, 2007) to 42.0% (Dellwo & Wagner, 2003). For Mandarin Chinese, only one study by Grabe and Low (2002) yields the average reference value of 55.8% for %V. With regard to the second rhythm metric, nPVI-V, applied in the present study, values of between 52.5% (Russo & Barry, 2008) and 59.7% (Grabe & Low, 2002) are given for German; for

[46] Praat script by Mietta Lennes: "Calculate-segment-durations" available on http://www.linguistics.ucla.edu/faciliti/facilities/acoustic/praat.html (last accessed 14.06.2016).

English a rather wide range of between 57.2% (Grabe & Low, 2002) and 73.0% (White & Mattys, 2007) is indicated; and for Mandarin Chinese once again only one reference value of 27.0% (Grabe & Low, 2002) exists.

For the present study, considering the values from the mentioned previous studies, the speech rhythm metrics calculated with the recorded TL-data will be compared to the given native speaker reference values and be attributed to the respective native speaker range. Depending on which range the measured value falls into, CLI from the same language (or correct acquisition) will be assumed. Hybrid values in between two native speaker values will be attributed to combined CLI. The following Table 7 illustrates the native speaker reference value ranges (in ascending order) from the literature and the measured potential TL-German values including the possible sources of influence:

Table 7. Overview of the native speaker reference value ranges for %V and nPVI-V taken from the literature across Mandarin, English and German including possible TL German measurements and attribution to potential sources of transfer.

Speech rhythm metric	**Native speaker reference values**	**TL-German values**	**Potential source of CLI**
%V	E → 38.0–42.0	38.0–41.0	→ L2E CLI
		41.1–41.9	→ Hybrid E/G
	G → 41.7–46.4	42.0–46.4	→ Correct TL G acquisition
		46.5–47.5	→ Hybrid G/Man
	Man → 55.8	47.6–55.8	→ L1Man CLI
nPVI-V	Man → 27.0	27.0–37.0	→ L1Man CLI
		37.1–52.4	→ Hybrid Man/G
	G → 52.5–59.7	52.5–57.2	→ Correct TL G acquisition
		57.3–59.6	→ Hybrid G/E
	E → 57.2–73.0	59.7–73.0	→ L2E CLI

Further, the same analysis procedure, i.e. calculating %V and nPVI-V and attributing the computed values to one of the postulated reference ranges, was used firstly for different speaking styles to elicit whether any covariation exists with speech rhythm. Secondly, the rhythm calculations of the single participants were looked at in more detail to explore any significant idiosyncracies.

4.2.6.2 Analysis of Vowel Reduction

As was mentioned in section 4.2.1.2, vowel reduction is also going to be examined separately in the L1-Mandarin learners of German as well as in their L2 English, using four different Syllable Ratio (SR) metrics. To be able to compute these ratios, firstly phonetic annotations of the length of the three different syllable types on tier three in the TL-German and L2-English recordings were carried out: *sfv* (= full-vowelled syllable), *srv* (= reduced-vowelled syllable) and *sdv* (= syllable with deleted vowel), excluding pauses (*xxx*) of more than 100 milliseconds. These were then extracted automatically with a Praat script, and their durations (in milliseconds) saved as a *.txt-file, ready to import into an Excel file. Similarly to the above-mentioned segment-based speech rhythm metrics %V and nPVI-V, all pre-pausal syllables were deleted to counteract any potential distortion of results due to final-syllable lengthening (cf. e.g. Gut, 2009: 164). This left a total of 6,550 syllables of non-native L2-English productions and 4,701 syllables of non-native L3/Ln German to be analysed with the SR metrics.

For the syllable-based SR-measurements, seeming only specific adjacent syllables are relevant, all full-vowelled/full-vowelled syllable pairs (SR_1 sfv+sfv; n_G=1,763, n_E=2,168), full-vowelled/reduced-vowelled syllable pairs (SR_2 sfv+srv; n_G=752, n_E=1,335), reduced-vowelled/full-vowelled syllable pairs (SR_3 srv+sfv; n_G=595, n_E=1,157), as well as all deleted vowel/full-vowelled syllable pairs (SR_4 sdv+sfv; n_G=42, n_E=53) were extracted in order to calculate the respective SR. Using these four different SR measures, the postulated potential durational differences between these specific syllable pairs were computed for the TL L3/Ln German as well as for the L2 English.

For this rather seldomly applied metric of SR only reference values for SR_1 (sfv+sfv) and SR_2 (sfv+srv) are available from Gut (2009). For SR_1, there are unfortunately even only statistically non-significant values. SR_1 (sfv+sfv) of subsequent syllables with a full vowel each is 1.12 : 1 for German, i.e. the successive full-vowelled syllables are nearly of the same length, and 1.18 : 1 for English, i.e. similarly to German, the full-vowelled syllables are almost equally long. Concerning the SR_2 (sfv+srv), however, the statistically highly significant reference value from Gut's study is 1.76 : 1 for German, i.e. full-vowelled syllables tend to be 1.76 times longer than reduced-vowelled syllables on average, and the English value of 2.45 : 1 signifies that the average English full-vowelled syllable is 2.45 times longer than syllables containing a reduced vowel. Unfortunately, no comparable values are available from empirical studies for Mandarin Chinese. However, as there is no vowel reduction or deletion in the syllable-timed Mandarin Chinese, there should be no durational differences between syllables either (see also section 4.2.2.1). Hence, the syllable ratio SR_1 (sfv+sfv) for Mandarin should ideally be 1 : 1.

With regard to assessing whether SR_1 and SR_2, for which empirical reference values for English and German exist, were potentially influenced in the TL German for instance by the L1 Mandarin, the L2 English or perhaps by both at the same time in the form of combined CLI, the measured mean TL ratios were compared with the following cut-off values:

Table 8. Assessment grid for classifying potential influence on the computed SR_1 (sfv+sfv) and SR_2 (sfv+srv) for TL-German productions.

Syllable Ratio	**L1-reference ratios per language**	**Ratio cut-off ranges for CLI**	**Source of CLI**
SR_1 (sfv+sfv)	Man → 1 : 1	0.5–1 : 1	→ L1Man CLI
		1.01–1.05 : 1	→ Hybrid Man/G
	G → 1.12 : 1	1.06–1.14 : 1	→ Correct TL G acquisition
		1.15–1.17 : 1	→ Hybrid G/E
	E → 1.2 : 1	1.18–1.2 : 1	→ L2E CLI
SR_2 (sfv+srv)	[Man → 1 : 1]	[0.5–1 : 1]	→ L1Man CLI
		1.01–1.49 : 1	→ Hybrid Man/G
	G → 1.7 : 1	1.5–1.79 : 1	→ Correct TL G acquisition
		1.8–2 : 1	→ Hybrid G/E
	E → 2.43 : 1	2.01–2.95 : 1	→ L2E CLI

If TL-German vowel production is influenced by the L1 Mandarin, which only has full vowels, no durational variability between syllables will be found, i.e. the computed ratio will be 1 : 1. Thus, the cut-off range for L1-Mandarin CLI lies between 0.5–1 : 1 for SR_1 and SR_2 values. Mandarin-German hybrid ratios as a result of combined CLI are set at between 1.01–1.05 for SR_1 and between 1.01–1.49 for SR_2. However, if the learner is able to execute TL-German vowel production correctly, TL means lie within syllable ratios of 1.06–1.14 : 1 for SR_1 and 1.5–1.79 : 1 for SR_2. The learner may also display German-English hybrid values, ranging from 1.15–1.17 for SR_1 and from 1.8–2 for SR_2. Finally, if the TL-productions are clearly affected by lateral CLI from the L2 English, an SR_1 of 1.18–1.2 : 1 and SR_2 of 2.01–2.95 : 1 is the result.

Moreover, as said above, the crucial positions at which TL-syllable ratios should be calculated are in srv+sfv and sdv+sfv pairs due to the fact that pre-stress reduction or deletion, and consequently also these syllable pairs, actually only exist in native English, but not in L1 German. Thus, it is possible to extrapolate to potential sources of transfer firstly from the number of such pairs existing in TL-German productions, and secondly from the then calculated SR_3 (srv+sfv) and SR_4 (sdv+sfv): regarding the former, it is hypothesised that if srv+sfv and sdv+sfv pairs can be found in the learner speech, it points to potential L2-English CLI. Concerning the latter, a closer analysis calculating SR_3 and SR_4 will exhibit the extent to which English possibly has influenced vowel reduction or deletion in the TL German: as the durational variation between stressed and unstressed syllables is higher in English compared to German, this also becomes obvious in the SR-calculations; depending on which the respective computed SR resembles most, the more influence will have come from that same language. Due to the fact that there are no reference values for SR_3 and SR_4 available, only a rough categorisation according to estimated cut-off values can be made:

Table 9. Assessment grid for classifying potential influence on the computed SR_3 (srv+sfv) and SR_4 (sdv+sfv) for TL-German productions.

Syllable Ratio	**L1-reference ratios per language**	**Ratio cut-off ranges for CLI**	**Source of CLI**
SR_3 (srv+sfv)	E → 0.1–0.8 : 1 [Man → 1 : 1] [G → 1.12 : 1]	0.1–0.7 : 1 0.71–0.89 : 1 0.9–1.05 : 1 1.06–1.08 : 1 1.09–1.14 : 1	→ L2E CLI → Hybrid E/Man → L1Man CLI → Hybrid Man/G → TL G CLI
SR_4 (sdv+sfv)	E → 0.1–0.5 : 1 [Man → 1 : 1] [G → 1.12 : 1]	0.1–0.5 : 1 0.6–0.8 : 1 0.9–1.05 : 1 1.06–1.08 : 1 1.09–1.14 : 1	→ L2E CLI → Hybrid E/Man → L1Man CLI → Hybrid Man/G → TL G CLI

Consequently, as srv+sfv and sdv+sfv pairs only exist in English, estimated values for TL SR_3 and SR_4 are set at 0.1–0.7 : 1 for SR_3 and at 0–0.5 : 1 for

SR_4. These are oriented towards the reference ratios of 1 : 1 for Mandarin, paying heed to its syllable-timing with all syllables of the same length, and 1.12 : 1 for German, the same value as for sfv+sfv syllable pairs accounted for in the literature, due to the fact that only sfv+sfv and sfv+srv pairs exist in German. English-Mandarin hybrid ratios lie between 0.71–0.89 with regard to SR_3 and between 0.6–0.8 for SR_4. Further SR-reference values are the same because – seeming in both Mandarin and German no srv+sfv and sdv+sfv pairs exist – the ratio for the corresponding sfv+sfv pair with its existing empirical reference values will be used. Thus, if SR_3 and SR_4 are close to 1 : 1, in a range of 0.9–1.05 : 1, meaning that both syllables are approximately of the same length, L1-Mandarin CLI is likely. A hybrid influence from Mandarin and the TL at the same time is stipulated with a calculated ratio of 1.06–1.08 : 1 for both SR_3 and SR_4; and TL-German influence is postulated if the SR_3 (srv+sfv) and SR_4 (sdv+sfv) measurements result in values equivalent to TL-German values for SR_1 (sfv+sfv), i.e. of 1.09–1.14 : 1.

Thus, by attributing the single mean $SR_{1\text{–}4}$ calculations of the participants' TL-German productions to the different reference ranges, potential directions and sources of influence can be elicited looking at the whole participant population as well as at the individual learners. Additionally, the same analysis procedure was applied to the single data sets of the different speaking styles per participant in order to explore whether any covariations with CLI on non-native speech rhythm arise. As was mentioned before (see section 4.2.1.2), Gut (cf. 2009: 174, 180ff) came across different SRs in her non-native German learners in story retellings compared to read-out-loud tasks. The present empirical study will corroborate or refute this finding.

4.2.6.3 Analysis of Coda Consonant Cluster Realisation

For the calculation of the amount of consonant cluster reduction in the L2 and the TL a binary coding of the annotations in Praat was used: i.e. *1* for "Consonant cluster correctly retained" and *0* for "Consonant cluster incorrectly produced or deleted". On the basis of these annotations, the overall percentage of correctly produced consonant clusters (henceforth *CCs*) and incorrectly produced CCs, respectively, for each recorded file was computed. As no CCs exist at all in Mandarin Chinese, the very production, be it correct or incorrect, of CCs in the TL German means either a (partially) correct acquisition, or, to a certain degree, a potentially positive transfer from the L2 English, in which specific CCs also exist. As mentioned in section 4.2.1.3, the phonological process of final -t/-d-deletion in coda clusters is actually quite common in native English (e.g. Labov, 1972, 1989; Neu, 1980; Guy, 1991; Bybee, 2002). For instance, it usually occurs rather frequently in unstressed syllables, in three-consonant clusters, after -s or before a syllable beginning with an obstruent (e.g. Gut, 2007). So, for the L2-English productions, CCs with reduced syllable-final -t/-d are not classified as incorrect. All in all, 2,520 CCs were annotated, 1,126 of which in onset position and 1,394 in coda position.

Besides the quantitative analysis of CC reduction, a more detailed qualitative analysis was also conducted: A list of 13 possible CCs in coda position was compiled first (cf. Appendix C4), which are realised alike in English and German, i.e. potential loci for positive LPT; analogously, another list of 14 possible CCs in coda position was assembled for those CCs realised only similarly in both languages, i.e. further potential loci for LPT – however, for negative CLI. Annotations of the canonical form of all CCs (in SAM-PA transcription) in the single TL files (i.e. L3G_text, L3G_picture story, L3G_sentences1, L3G_sentences2) as well as their actual realisations (in IPA transcription) were manually extracted into an Excel file. From these, all potential loci for LPT were filtered for coda positions. All CCs that are realised very similarly or alike in native German and in native English were also annotated in the L2-English recordings (in SAM-PA), and their actual realisations (in IPA transcription) manually extracted into another Excel file. Afterwards, a comparison of the realisations of these extracted CCs in the TL-German and L2-English recordings was carried out in order to determine any negative LPT.

An overview of the potential constellations of productions of coda CCs produced alike in English and German is given in Table 10.

Table 10. Potential constellations for the L2-English and TL-German CCs produced alike in English and German.

Constellation	**L2E**	**L3G**	**Signifies potentially**
1.	1	1	Positive LPT; correct acquisition in L2E and L3G
2.	1	0	L1Man-CLI; IL
3.	0	1	Correct acquisition in L3G
4.	0	0	Negative LPT; L1Man-CLI; IL

(1 = CC produced correctly, 0 = CC produced incorrectly or deleted)

Potentially more loci for LPT are offered by the production of CCs in coda position that are only similar in English and German, as the following overview in Table 11 indicates.

Table 11. Potential constellations for the L2-English and TL-German productions of CCs existing similarly in English and German.

Constellation	L2E	L3G	Signifies potentially
1.	1	1	Correct acquisition in L2E and L3G
2.	1	0	Negative LPT; L1Man-CLI; IL
3.	0	1	Correct acquisition in L3G
4.	0	0	Negative LPT; L1Man-CLI; IL

(1 = CC produced correctly, 0 = CC produced incorrectly or deleted)

With reference to the complete number of same and similar coda CC-tokens produced in English and German in the respective text, percentages were calculated of correctly produced TL-German CCs, positively transferred from the L2 English or acquired correctly in the TL, as well as of incorrectly produced TL-German CCs. Based on the latter, the percentage of incorrect productions transferred from the L2 English onto the TL German, i.e. negative LPT, was determined as opposed to idiosyncratic interlanguage forms or CC-tokens influenced by the L1 Mandarin[47].

[47] L1-Mandarin CLI onto CCs is recognisable either as CC-reduction to one consonant, as a complete CC-deletion, or as vowel epenthesis between the single consonants of a cluster in order to create a CV-syllable structure conforming to Mandarin Chinese syllables (cf. also Gut, 2009: 123).

5. Results of the Cross-Sectional Study

5.1 Speech Rhythm

For the presentation of the results, the speech rhythm measures %V and nPVI-V are shown for the language learners and compared to native speaker values. Firstly, (1) the mean %V and nPVI-V are presented overall for all participants and attributed to one of the previously established native speaker ranges, followed by (2) %V and nPVI-V values across the two different speaking styles of reading-out-loud and spontaneous retelling. Finally, (3) the single %V and nPVI-V values are given for each participant, and individual cases of potential LPT are examined.

Table 12 shows the mean %V and nPVI-V values for the TL German across the four different tasks:

Table 12. Overall average values for the speech rhythm metrics %V and nPVI-V across the tasks of TL-German elicitation, including German and English native speaker reference ranges established in the literature.

TL task	Non-native %V	Native %V	Non-native nPVI-V	Native nPVI-V
L3G text	44.2	German: 41.7–46.4 English: 38.0–42.0	62.18	German: 52.5–59.7 English: 57.2–73.0
L3G picture story	44.7		59.23	
L3G sentences1	45.89		60.25	
L3G sentences2	45.25		61.16	
Total mean:	**45.01**		**60.71**	

As can be seen from Table 12, %V values across all tasks are situated relatively closely together (range: 44.2–45.89), resulting in a mean 45.01% of vocalic percentage of the L3/Ln learner productions. All mean %V values lie within the range of L1-German native speakers, i.e. the participants seem to have acquired native-like rhythm in their L3/Ln German when measured with %V. However, when it comes to measuring speech rhythm with the nPVI-V metric recommended to triangulate %V calculations (cf. Wiget et al., 2010: 1566), a completely different picture presents itself: with a mean of 60.71, the subjects' TL-productions lie within the English native speaker range, i.e. a clear L2 influence is recognisable. The t-test shows that there is no significant correlation between the speech rhythm measured with %V and that calculated with the nPVI-V metric ($p<0.05$).

The two metrics also give different results depending on speaking style: %V for both the reading (mean %V = 45.11) and retelling tasks (mean %V = 44.7) unambiguously lies within German native speaker range. By contrast, the PVI-V for the read-out-loud tasks is 61.2, i.e. within L1-English native speaker range, whereas the picture-story narration with mean nPVI-V = 59.23 still just lies in between German and English native speaker values, with a tendency towards the L1-English values, suggesting a German-English hybrid.

Figure 5 shows the distribution of the mean %V and nPVI-V values of all participants across the two speaking styles:

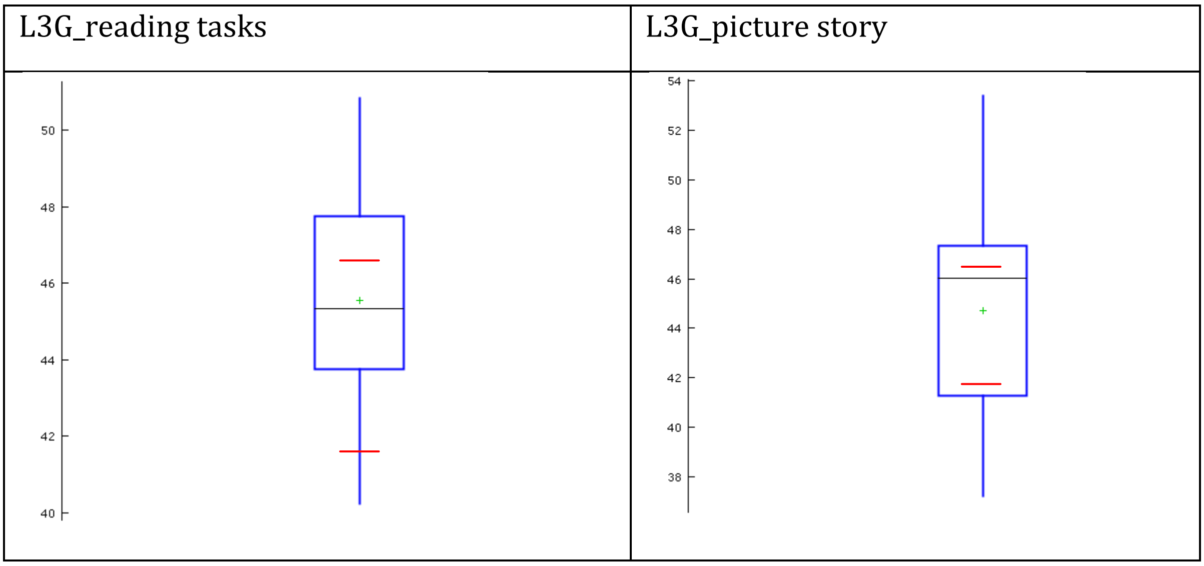

Figure 5. Boxplots of all mean %V values calculated across the three reading tasks (L3G_reading tasks = means of L3G_text, L3G_sentences1, L3G_sentences2) and the picture story retelling (L3G_picture story). Additionally, the German native-speaker range as given in Table 12 is indicated by two red bars.

The central box of the graph comprises 50 per cent of the measured %V; it is bounded by the lower and the upper quartile. The median in the middle divides the box into the upper and lower quartiles, which consequently contain 25 per cent of the measured %V values each; the green cross (+) within the box indicates the mean %V value. Besides, the “whiskers” of the plot extend to the maximum and minimum %V value measured for the participants.

Comparing both boxplots across the two speaking styles, the distribution of the majority of %V values in the reading tasks seems to be rather even, with the mean (mean %V overall = 45.54) almost coinciding with the median (median = 45.34) in the middle of the box. Overall, half of all %V values range between 43.46 to 47.75 per cent. The outliers mark extremes of a minimum of 40.23 (P8_m) and maximum of 50.85 (P4_m) for %V. However, when looking at the boxplot containing the %V values measured for the retelling task, it can be seen that the distribution is less even compared to the reading tasks. The skewedness of the data distribution becomes obvious in the position of the median, which indicates that most values lie in the upper quartile between the median of 46.03 to 47.33 per cent; the mean only comes to 44.7. Further, P8_m marks the minimum %V of 37.2, whereas P1_m pinpoints the maximum of 53.41. As can also be deduced from Figure 5, the distribution of the mean %V values is more or less normal in the TL-reading tasks, but not in the L3/Ln-German picture story retelling.

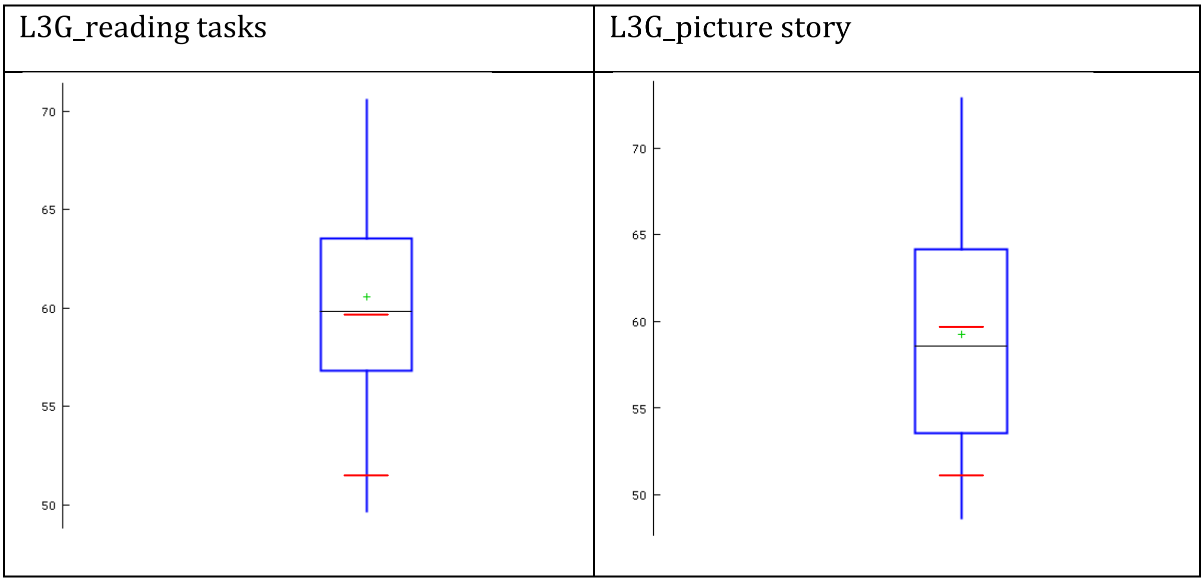

Figure 6. Boxplots of all mean nPVI-V values calculated across the three reading tasks (L3G_reading tasks = means of L3G_text, L3G_sentences1, L3G_sentences2) and the picture story retelling (L3G_picture story). Additionally, the German native-speaker range as given in Table 12 is indicated by two red bars.

As can be seen for the boxplots computed for the nPVI-V measurements, a rather even distribution of the data can be found for the reading tasks as well as for the picture story narration. Both means (nPVI-V L3G_reading tasks = 60.57; nPVI-V L3G_picture story = 59.23) again almost coincide with the median (nPVI-V L3G_ reading tasks = 59.83; nPVI-V L3G_ picture story = 58.59). With regard to the distribution of the majority of measurements, 50 per cent of the nPVI-V values lie between 56.82 and

63.55 in the reading tasks, and between 53.56 and 64.16 in the picture story. The extremes are situated further apart in the readings (minimum: P11_f = 49.68; maximum: P8_m = 70.57) compared to in the retelling (minimum: P14_f = 48.65; maximum: P6_m = 72.87).

The correlation of %V between all read-out-loud tasks and the picture retelling is not significant according to a t-test ($p<0.12$). For nPVI-V ($p<0.46$), also no clear correlation can be assumed. Consequently, the rhythm produced in the read-out-loud tasks is independent of the rhythm measured in the picture retelling according to both rhythm metrics.

When looking at the individual results of both metrics in Table 13, certain subjects stand out:

Table 13. Individual average values for the speech rhythm metrics %V and nPVI-V across the tasks of TL-German elicitation, including attribution to a native speaker reference range established in the literature.

Participant	**%V**	**Potential source of CLI**	**nPVI-V**	**Potential source of CLI**
P1_m	48.11	L1Man	61.10	L2E
P2_f	46.03	Correct L3G acquisition	61.27	L2E
P3_m	44.62	Correct L3G acquisition	59.41	Hybrid G/E
P4_m	49.23	L1Man	57.66	Hybrid G/E
P5_f	46.87	Hybrid G/Man	65.76	L2E
P6_m	43.05	Correct L3G acquisition	67.04	L2E
P7_f	43.85	Correct L3G acquisition	58.58	Hybrid G/E
P8_m	38.72	L2E	69.32	L2E
P9_m	46.92	Hybrid G/Man	57.43	Hybrid G/E
P10_f	43.83	Correct L3G acquisition	60.25	L2E
P11_f	47.60	L1Man	51.92	Hybrid G/Man
P12_f	43.08	Correct L3G acquisition	60.97	L2E
P13_f	47.71	L1Man	59.54	Hybrid G/E
P14_f	42.45	Correct L3G acquisition	54.6	Correct L3G acquisition
P15_m	47.93	L1Man	54.85	Correct L3G acquisition
P16_f	44.34	Correct L3G acquisition	58.47	Hybrid G/E
P17_m	43.38	Correct L3G acquisition	56.69	Correct L3G acquisition
P18_m	43.93	Correct L3G acquisition	68.90	L2E

Overall, the participants exhibit rather heterogeneous mean %V and nPVI-V values: most group together with L1-German-like %V values and nPVI-V values within the L1-English range (P2_f, P6_m, P10_f, P12_f, P18_m). Further, three show %V values within the German native speaker range and nPVI-V values as German-English hybrids (i.e. P3_m, P7_f, P16_f). For those with Mandarin L1 %V, rather disparate corresponding nPVI-V values were measured: for P4_m and P13_f German-English hybrids; for P1_m English-native-like; for P11_f a Mandarin-German intermediate value; and for P15_m German-native-like nPVI-V. Some singular results across both metrics were measured for P5_f, with German-Mandarin %V and nPVI-V English-native-like; P8_m exhibited L2-English-like values for both speech rhythm metrics; P9_m's values were both hybrids, i.e. German-Mandarin %V and German-English nPVI-V; and finally German-like %V and nPVI-V were found for P14_f as well as for P17_m.

5.2 Vowel Reduction

Table 14 presents an overview of the average length of the three syllable types sfv (contains a full vowel), srv (contains a reduced vowel /ə/ or /ɪ/, and for German additionally /ɐ/) and sdv (contains a deleted vowel) in both the participants' L2 English and the TL German:

Table 14. Summary of the mean length of the three examined syllable types sfv, srv and sdv, as well as the calculated correlation coefficient r of between the participants' non-native English and German.

	Mean length **sfv** (in ms)	Mean length **srv** (in ms)	Mean length **sdv** (in ms)	Total n
L2 English	266.16 (SD=26.79) (n=4,595)	189.31 (SD=21.64) (n=1,865)	169.44 (SD=37.34) (n=90)	n=6,550
L3/Ln German	278.41 (SD=57.28) (n=3,780)	183.21 (SD=42.92) (n=868)	195.32 (SD=78.49) (n=53)	n=4,701
Significance	n.s.	n.s.	*	

Syllables containing a full vowel are on average 266.16 milliseconds long in L2 English and 278.41 milliseconds in L3/Ln German. The mean length of syllables with a reduced vowel is 189.31 milliseconds in L2 English and 183.21 milliseconds in L3/Ln German. However, syllables involving a deleted vowel are longer in TL-German than in L2 English. Interestingly, both sfv and sdv absolute means are longer for German productions compared to non-native English, whereas the absolute mean of srv is higher for English. In order to investigate any potential CLI between the learners' German and English, t-tests were applied to compare mean syllable length of the three single types in the L2 and L3/Ln. The mean syllable lengths are significantly different solely for sdv. However, sfv and srv mean syllable lengths are not significantly different, that means there is a relationship between L2-English and L3/Ln-German sfv and srv syllable lengths.

Table 15. Syllables that contain a reduced (srv) or deleted (sdv) vowel across the L3/Ln-German tasks as well as in the L2-English task (in per cent), including native speaker reference values.

Srv & sdv syllables Participants	**L3G tasks overall (in %)**	**L3G reading tasks (in %)**	**L3G picture story (in %)**	**German native value**	**L2E task (in %)**	**English native value**
P1_m	21.67	15.84	33.33	29.2% (cf. Gut, 2009: 178)	22.71	30.65% (cf. Gut, 2009: 179)
P2_f	18.26	17.10	21.74		30.17	
P3_m	22.15	22.15	---		28.73	
P4_m	21.81	24.55	16.33		29.87	
P5_f	23.03	24.03	22.02		21.90	
P6_m	13.10	14.29	11.9		28.21	
P7_f	16.44	19.55	13.33		30.16	
P8_m	15.91	16.19	15.63		33.51	
P9_m	16.99	21.48	12.5		30.92	
P10_f	12.92	16.52	5.71		31.25	
P11_f	10.48	8.96	12		33.00	
P12_f	20.22	20.53	19.59		35.52	
P13_f	20.93	20.65	21.21		34.78	
P14_f	10.12	15.97	4.26		26.74	
P15_m	18.41	16.19	20.63		31.46	
P16_f	15.99	12.28	19.7		29.91	
P17_m	23.51	19.64	31.25		32.04	
P18_m	19.19	19.19	---		28.01	
Average:	**17.84**	**18.06**	**17.57**		**29.94**	

As Table 15 shows, on average 29.94% (ranging from 21.9% to 35.52%) of all syllables in the participants' L2 English productions contain either a reduced or deleted vowel. This in fact lies only just below the native speaker reference value of 30.65% from Gut's (2009: 179) study. In the L3/Ln German, only 17.84% (ranging from 10.12% to 23.51%) of all syllables contain reduced or deleted vowels – half of the amount found in the TL English. In contrast to English, the German learner productions deviate significantly from the German native speaker reference value of 29.2% (cf. Gut, 2009: 178), but also from the computed non-native percentage of 28.66% (cf. Gut, 2009: 178).

Looking at the single participants (cf. Table 15), with regard to English, all produce around the average percentage of srv or sfv, except for P5_f with the lowest percentage of 21.9%, similarly to P1_m (22.71%) and P14_f (26.74%). On the other hand, P12_f exhibits the highest amount of not fully articulated syllables (35.52%), followed closely by P13_f with 34.78%. Concerning the German productions overall, with 10.12%, P14_f deviates most from the measured mean, the same as P11_f (10.48%), P10_f (12.92%) and P6_m (13.1%). Equally, P17_m (23.51%), P5_f (23.03%) and P3_m (22.15%) also differ considerably from the mean percentage of produced srv/sdv syllables. None achieves an amount of not fully articulated syllables comparable to the 29.2% measured by Gut (cf. 2009: 178) in German native speakers. In English, some even supersede the L1-reduction rate. There is no significant relationship between the amount of reduced/deleted syllables in English and German ($p<0.53$).

As regards potential differences across the two speaking styles, read-out-loud task and picture story retelling, the former exhibits an only somewhat higher percentage of not fully articulated syllables overall in the TL, i.e. 18.06% as opposed to 17.57% in the retelling. However, individual participants do exhibit higher rates, too – though mostly in the reading tasks: P3_m (22.15%), P4_m (24.55%), P5_f (24.03%), P7_f (19.55%), P9_m (21.48%), P12_f (20.53%), P13_f (20.65%), P17_m (19.64%) and P18_m (19.19%) all show higher values than the average. But none comes close to the German native speaker reference value, not to speak of the even higher L1-English value. P11_f (8.96%) produces the lowest percentage of reduced/deleted vowels by far, closely followed by P6_m (14.29%). Both also produce rather few not fully articulated syllables in the retelling task (P6_m: 11.9%; P11_f: 12%). Even lower, however, are P10_f's and P14_f's percentages: with 5.71% and 4.26%, respectively, they produce almost exclusively full-vowelled syllables. At the other end of the extreme are P1_m (33.33%) and P17_m (31.25%), whose amount of syllable reduction and deletion surpasses the L1-German and even the L1-English reference value. The remaining participants all produce between 15.63% (P8_m) and 22.02% (P5_f) of srv and sdv syllables. Computing any potential correlation between the single tasks, only the retelling and reading speaking styles in the L3/Ln German are correlated ($p=0.0007$). There is neither a correlation between the read-out-loud style in the TL German and that in the L2 English ($p<0.53$) nor between the retelling style and the L2–English reading style ($p<0.6$).

Table 16 now shows the computed syllable-ratio values for L2 English and L3 German:

Table 16. Summary of mean syllable ratio measurements SR_1 sfv+sfv, SR_2 sfv+srv, SR_3 srv+sfv and SR_4 sdv+sfv across all L2-English and TL-German tasks, and absolute numbers of the measured syllable pairs, respectively.

Task	SR_1 sfv+sfv		SR_2 sfv+srv		SR_3 srv+sfv		SR_4 sdv+sfv	
	Ratio	n	Ratio	n	Ratio	n	Ratio	n
L2E_text	**1.2 : 1**	**2,168**	**1.76 : 1**	**1,335**	**0.78 : 1**	**1,157**	**0.69 : 1**	**53**
L3G_text	1.13 : 1	129	2.24 : 1	59	0.61 : 1	44	0.51 : 1	3
L3G_picture story	1.19 : 1	359	1.81 : 1	145	0.73 : 1	124	0.93 : 1	5
L3G_sentences1	1.15 : 1	744	1.87 : 1	260	0.78 : 1	206	0.76 : 1	1
L3G_sentences2	1.19 : 1	531	1.78 : 1	288	0.72 : 1	221	0.98 : 1	33
L3G_overall	**1.17 : 1**	**1,763**	**1.88 : 1**	**752**	**0.74 : 1**	**595**	**0.83 : 1**	**42**

Regarding SR_1, all mean values computed for German are lower, ranging from a ratio of 1.13 : 1 to 1.19 : 1. With a ratio of 1.2 : 1, L2-English full-vowelled syllables preceding another full-vowelled syllable are slightly longer compared to L3/Ln German. Nevertheless, overall, adjacent full-vowelled syllables are roughly of the same length across both NNL productions. For SR_2 measurements, a different picture presents itself: all L3/Ln mean ratios are higher (1.78–2.24 : 1) than in L2 English (1.76 : 1). This signifies that in the syllable pair sfv+srv, the learners produce comparatively longer sfv in German than in English, and thus an even higher durational variation within the German sfv+srv pair. Compared to the ratios for adjacent full-vowelled syllables, mean SR_2 shows that there are much larger durational differences between a full-vowelled syllable followed by a reduced-vowelled syllable both in the participants' English and in the German productions. Looking at the mean SR_3 values, similar to SR_1, reduced-vowelled syllables preceding a full-vowelled syllable in both L2 English and L3/Ln German are almost of the same length, with a ratio of 0.78 : 1 for English and 0.74 : 1 (range: 0.61–0.78 : 1) for German. For SR_4, on the other hand, syllables containing a deleted vowel followed by a full-vowelled syllable are considerably shorter in the learners' L2 English (0.69 : 1) compared to in their L3/Ln German with 0.83 : 1 (range: 0.51–0.98 : 1), according to the present measurements. Further, the mean SR_4 for non-native German is higher than the SR_3. This means in the two syllable pairs the average length of the reduced syllable in the SR_3 is shorter than that of the syllable containing a deleted vowel in the SR_4. As regards a potential relationship between English and German learner syllable ratios calculated with a t-test, solely for SR_3 a certain correlation may be assumed ($p=0.04$). None of the remaining SRs are significant across the L2 and L3/Ln (SR_1: $p<0.37$; SR_2: $p<0.15$; SR_4: $p<0.82$).

In Table 17, the SRs are placed within value ranges for native speakers to indicate the potential occurrence of CLI.

Table 17. Assessment of potential influence on SR-measurements based on Tables 8 and 9.

Task	**SR_1 sfv+sfv**		**SR_2 sfv+srv**		**SR_3 srv+sfv**		**SR_4 sdv+sfv**	
	Ratio	Source	Ratio	Source	Ratio	Source	Ratio	Source
L2E_text	**1.2 : 1**	**L2E**	**1.76 : 1**	**L3G**	**0.78 : 1**	**Hybrid E/Man**	**0.69 : 1**	**Hybrid E/Man**
L3G_ text	1.13 : 1	L3G	2.24 : 1	L2E	0.61 : 1	L2E	0.51 : 1	L2E
L3G_ picture story	1.19 : 1	L2E	1.81 : 1	Hybrid G/E	0.73 : 1	Hybrid E/Man	0.93 : 1	L1Man
L3G_ sentences1	1.15 : 1	Hybrid G/E	1.87 : 1	Hybrid G/E	0.78 : 1	Hybrid E/Man	0.76 : 1	Hybrid E/Man
L3G_ sentences2	1.19 : 1	L2E	1.78 : 1	L3G	0.72 : 1	Hybrid E/Man	0.98 : 1	L1Man
L3G_ overall	**1.17 : 1**	**Hybrid G/E**	**1.88 : 1**	**Hybrid G/E**	**0.74 : 1**	**Hybrid E/Man**	**0.83 : 1**	**Hybrid E/Man**

It was mentioned before that reference values from previous studies only exist for SR_1 and SR_2 (Gut, 2009); results of SR_3 and SR_4 measurements are assigned to hypothesised reference ranges (see section 4.2.6.2). Thus, with regard to SR_1 measurements, the learners produce SRs within the native speaker range in the L2 English (mean SR_1 = 1.2 : 1). The German ratios also lie within the English native speaker range for the L3/Ln picture story (mean SR_1 = 1.19 : 1) as well as for one of the read-out-loud tasks, L3G_sentences2 (mean SR_1 = 1.19:1). The learners correctly render the syllable pairs in the German reading text (mean SR_1 = 1.13 : 1), but produce only German-English hybrid ratios in the German L3G_sentences1 task (mean SR_1 = 1.15 : 1) – the same as overall in the German tasks (mean SR_1 = 1.17 : 1). Concerning SR_2, the L2-English text task with a ratio of 1.76 : 1 lies within German native speaker range. This is the case also for the L3G_sentences2 reading task (mean SR_2 = 1.78:1). Whereas the mean ratio of the German text task can be placed within the English native speaker range (mean SR_2 = 2.24 : 1), the sentence and picture story task exhibit hybrid syllable ratios in between German and English values. This also applies to the overall mean SR_2 for the participants' German productions (mean SR_2 = 1.88 : 1). For the srv+sfv and sdv+sfv syllable pairs, which only exist in English, predominantly hybrid English-Mandarin values can be found – for the English text task as well as for the German tasks. Solely for the German read-out-loud text the mean SR_3 and SR_4 lie within the L1-English range (mean SR_3 = 0.61 : 1; mean SR_4 = 0.51 : 1). The TL-picture story narration (mean SR_4 = 0.93 : 1) and L3G_sentences2 reading task (mean SR_4 = 0.98 : 1), however, show SR_4 measurements within the Mandarin native speaker range.

Further, the mean ratios were compared across two different speaking styles, i.e. reading-out-loud and retelling, in order to elicit whether there are any covariances with vowel reduction. As was just described, mean ratios for the story retelling task cover every possible constellation of interlingual influence, except that of TL-native-like values: SR_1 lies within English native speaker range, SR_2 displays a hybrid German-English ratio, SR_3 an intermediate English-Mandarin value, and SR_4 is produced within L1-Mandarin range. With respect to the mean ratios of the reading tasks, a similarly heterogeneous picture emerges: With 1.16:1, SR_1 reflects a hybrid in between German and English values, the same as SR_2 with 1.96:1. Regarding SR_3 across all reading tasks, a ratio within English native speaker range can be calculated (mean SR_3 = 0.7). Finally, SR_4 displays an intermediate ratio of 0.75 : 1 in between English and Mandarin native values.

Figure 7 summarises and juxtaposes the four mean ratios across the two speaking styles investigated in the present study.

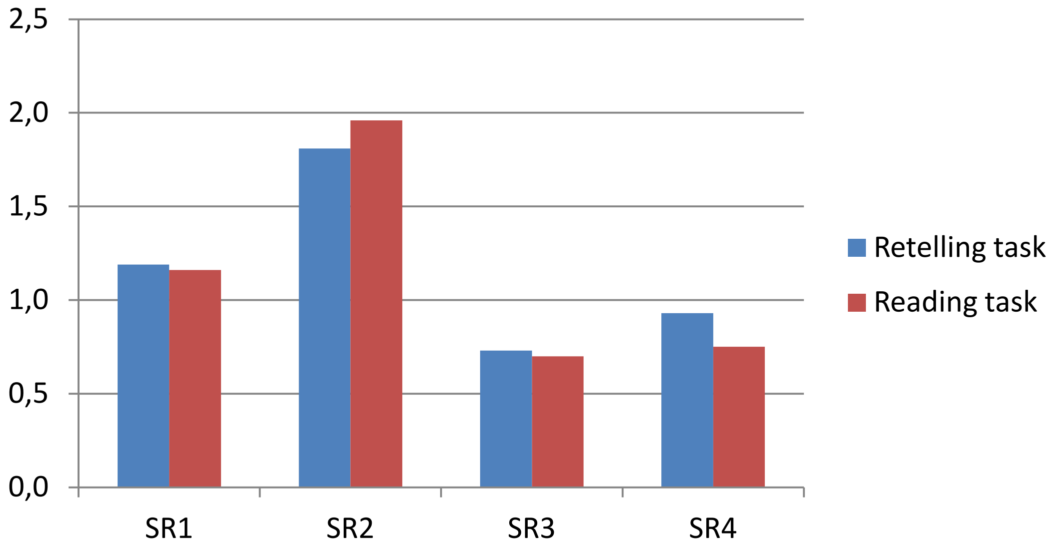

Figure 7. Juxtaposition of the mean SRs 1 to 4 in the reading tasks as opposed to in the story retelling.

As can be seen, particularly SR_1 and SR_3 are very close together for both the retelling and reading tasks, with slightly higher ratios in the story retelling. Testing them for any potential correlation across the two speaking styles, SR_1 is uncorrelated. For SR_3, a certain correlation may be assumed ($p=0.0965$). Though still also rather similar overall, SR_2 and SR_4 show a more pronounced difference in ratios. What has to be noticed is that for SR_2, it is the reading tasks which exhibit higher mean ratios, whereas for SR_4, the calculated average is higher in the retelling. SR_2 is also uncorrelated. Since there are too few tokens of the single SR_4 values across the two speaking styles to arrive at meaningful results, no correlation coefficients were computed.

Table 18. Average individual SR_{1-4} values across all TL-German tasks with previously defined L1-German reference ratios.

L3/Ln-German syllable ratios Participants	**SR_1 sfv+sfv**	**SR_2 sfv+srv**	**SR_3 srv+sfv**	**SR_4 sdv+sfv**
P1_m	1.34	1.78	0.84	---
P2_f	1.22	1.39	0.71	0.95
P3_m	1.21	2.36	0.64	0.77
P4_m	1.06	1.44	0.84	---
P5_f	1.16	1.71	0.82	---
P6_m	1.06	1.49	0.60	---
P7_f	1.37	1.60	1.11	0.76
P8_m	1.18	3.48	0.35	0.61
P9_m	1.14	1.74	0.70	---
P10_f	1.19	3.12	0.52	---
P11_f	1.25	1.92	0.91	---
P12_f	1.25	1.89	0.71	1.00
P13_f	1.07	1.44	0.95	---
P14_f	1.32	1.75	0.81	---
P15_m	1.20	1.69	0.77	0.98
P16_f	1.07	1.75	0.76	0.77
P17_m	0.98	1.68	0.58	---
P18_m	1.07	1.60	0.77	---
Average:	**1.17**	**1.88**	**0.74**	**0.83**
Native-speaker ratio range:	1.06–1.14 : 1	1.5–1.79 : 1	1.09–1.14 : 1	1.09–1.14 : 1

Table 19. Average individual SR_{1-4} values in the L2-English task with previously defined L1-English reference ratios.

L2-English syllable ratios **Participants**	**SR_1 sfv+sfv**	**SR_2 sfv+srv**	**SR_3 srv+sfv**	**SR_4 sdv+sfv**
P1_m	1.25	1.99	0.83	0.83
P2_f	1.17	1.68	0.70	0.74
P3_m	1.24	1.54	0.74	0.79
P4_m	1.15	1.69	0.78	0.58
P5_f	1.19	1.8	0.71	0.40
P6_m	1.16	1.78	0.75	0.69
P7_f	1.24	1.89	0.75	0.00
P8_m	1.31	1.62	0.90	0.62
P9_m	1.11	1.96	0.77	0.83
P10_f	1.19	1.62	0.85	0.64
P11_f	1.20	1.57	0.78	0.93
P12_f	1.23	2.00	0.83	0.95
P13_f	1.35	1.85	0.79	0.55
P14_f	1.21	1.96	0.70	0.77
P15_m	1.15	1.78	0.79	0.49
P16_f	1.13	1.58	0.82	---
P17_m	1.21	1.6	0.86	0.71
P18_m	1.17	1.69	0.74	1.22
Average:	**1.20**	**1.76**	**0.78**	**0.69**
Native-speaker ratio range:	1.18–1.2 : 1	2.01–2.95 : 1	0.1–0.7 : 1	0.1–0.5 : 1

Variation across participants is high: Firstly, concerning SR_1 calculations, numerous learners (i.e. P5_f, P7_f, P8_m, P9_m and P11_f) exhibit a mix of ratios within German and English native-speaker range; some go even beyond L1-English reference ratios from the literature (see also Tables 8 and 9 in section 4.2.6.2). Several, though, also show SR_1 values across all tasks higher than L1-English values (i.e. P1_m, P3_m, P12_f and P14_f). Similarly, P10_f displays English ratios in the L2E_text task, but also in the TL-German tasks, apart from in the picture retelling. There, she shows a mean ratio within the L1-Mandarin range. P16_f's productions also only differ in the picture story narration, where a Mandarin-German hybrid ratio was computed, whereas the other tasks are performed with German-native-like ratios. A mix of ratios is presented by P2_f and P15_m: while they exhibit English ratios in the TL tasks – except for P15_m in one task (L3G_picture story), who shows a German-English intermediate ratio – interestingly both produce also a German-English hybrid ratio in the English reading task. Some Mandarin-German intermediate ratios can be found in P4_m, P6_m and P13_f besides target-like German values (P4_m in L3G_sentences2, P6_m in L3G_sentences1, P13_f in L3G_text). Their English read-out-loud text is situated in between German and English for P4_m and P6_m, and even beyond English native ratios in P13_f. A similar mix of SR results can be seen in P17_m: he shows predominantly L1-Mandarin ratios in the L3/Ln German retelling and the L3G_sentences1 reading tasks, a German-English hybrid ratio for L3G_sentences2, and a hypercorrect English-native-like L2-English read-out-loud text task beyond native speaker values. Finally, P18_m exhibits a mixture of an L1-Mandarin ratio for the L3G_sentences1 reading task, an L1-German SR_1 for L3G_sentences2, and a German-English intermediate value for the L2-English text task.

An even more heterogeneous picture presents itself for the SR_2 measurements across the individual participants: whereas the read-out-loud tasks show mainly a mixture of German, English and German-English intermediate values, there are several Mandarin-German hybrid ratios for the TL-picture story retelling (i.e. P4_m, P6_m, P7_f, P9_m, P13_f and P14_f), and only one in P2_f for the L3G_sentences1 reading task. Both the latter P2_f and P17_m further show L1-Mandarin ratios in the picture retelling, German-English intermediate values in the L3G_sentences2 reading task and German values for the L2-English text. Additionally, P17_m also exhibits an English-native-like SR_2 in the L3G_sentences1 task. English ratios can also be found in the German text reading task in P3_m and P8_m, who additionally displays an English ratio in the picture story that is much higher than that of a native speaker. Both produce German ratios in the English reading task, though. A few further learners show Mandarin-German hybrids in the retelling (i.e. P4_m, P6_m and P13_f), as well as target-like ratios in L3G_sentences1 (i.e. P4_m and P6_m), L3G_sentences2 (i.e. P4_m) and in the text task (i.e. P13_f). Moreover, P4_m and P6_m also produce German ratios in the English task, whereas P13_f arrives at a German-English intermediate value. Such German-English hybrids for the English read-out-loud task appear in several learners (i.e. P1_m, P12_f, P5_f, P7_f, P9_m and P14_f). However, some combine this with target-like ratios (P1_m: retelling, L3G_sentences2; P12_f: retelling; P5_f: retelling, L3G_sentences1), others with further hybrids (i.e. P7_f:

Mandarin-German in retelling, German-English in L3G_sentences1) or a mixture of intermediate ratios (P9_m and P14_f: Mandarin-German in the retelling, English in L3G_sentences1). Such hybrid German-English SR_2 values also appear in some TL-tasks, namely in the L3G_sentences1 (i.e. P12_f, P15_m and P16_f) or L3G_sentences2 reading (i.e. P10_m). Further ratios seem to lie mainly within TL-range (i.e. P5_f: retelling, L3G_sentences1; P18_m: L3G_sentences1, L3G_sentences2; P10_m: L3G_sentences1; P11_f: retelling; P15_m: retelling; P16_f: retelling). Also within L1-German range, but not target-like, are some ratios produced in the L2-English reading task (i.e. P10_m, P11_f, P15_m, P16_f and P18_m). Apart from that, some English-native-like SR_2 measurements are also displayed by P1_m (L3G_sentences1), P11_f (L3G_sentences1), P12_f (L3G_sentences2) and by P10_m (retelling) even beyond the English native-speaker reference range adapted from the literature.

The results of the SR_3 calculations in the single learners are a little less diversified: Conspicuously, many L1-English ratios are recognisable in the various TL-German tasks, and equally numerous English-Mandarin hybrids. The latter intermediate ratios constitute the majority (i.e. in 15 participants) of the calculated SR_3 for the English reading task. A combination of both is displayed by P6_m (English ratio in retelling, English-Mandarin in L3G_sentences1 and L2E_text), P12_f (English ratio in retelling, English-Mandarin in L3G_sentences1, L3G_sentences2 and L2E_text) and P18_m (English ratio in L3G_sentences1, English-Mandarin in L3G_sentences2 and L2E_text). Also both English and English-Mandarin values were measured; however, the former only in the TL-tasks and the latter only in the L2 reading task for P3_m, P10_f and P17_m. Solely English-Mandarin hybrids can be seen in P5_f's productions of the picture-story retelling, L3G_sentences1 and the L2-English text. Besides the same English-Mandarin intermediate ratios for the TL-tasks and the English reading, P1_m and P11_f also exhibit another hybrid, i.e. Mandarin-German ratios, for the TL retelling task. Similarly, P7_f and P13_f also show English-Mandarin values across the German and English reading tasks. In the picture-story retelling they display target-like ratios, though – P7_f even beyond how a native German speaker would produce SR_3. Some L1-Mandarin ratios in combination with English-native-like values also become apparent in P2_f (Mandarin ratio in L3G_sentences1, English in retelling, L3G_sentences2 and L2E_text), P14_f (Mandarin ratio in retelling, English in L3G_sentences1 and L2E_text) and P15_m (Mandarin ratio in L3G_sentences1, English in retelling). The latter participant additionally exhibits an English-Mandarin mean value in the English reading task. Such hybrid English-Mandarin ratios are also measured for P9_m (retelling and

L2E_text) plus an L1-English SR_3 in the L3G_sentences1 task, and in P16_f (L3G_sentences1 and L2E_text), who shows an English ratio in the TL picture story retelling. In P4_m, the English-Mandarin intermediate SR_3 (in L3G_sentences1, L3G_sentences2 and L2E_text) combines with a Mandarin-native-like ratio for the L3G_sentences1 read-out-loud task. Mandarin values are also exhibited by P14_f in the picture story narration, combined with English ratios in the L3G_sentences1 task as well as a native-like value in the English text, and by P8_m in the L2-English reading plus L1-English ratios in the German text and the story retelling.

Finally, the assignment of the computed SR_4 values of the single participants is much clearer. This is due to the fact that the majority did not even produce any SR_4 (sdv+sfv) syllable pairs in the TL tasks, but only in the English reading task. Of those, six display English-Mandarin hybrid values (i.e. P4_m, P6_m, P10_f, P13_f, P14_f and P17_m), three show L1-Mandarin-like ratios (i.e. P1_m, P9_m and P11_f) and one each exhibits a German mean value even beyond the native ratio (i.e. P18_m) and a target-like English value (i.e. P5_f). Another correct L1-English target value is produced by P15_m, combined with a Mandarin-like ratio in the TL-picture story retelling. Further L1-Mandarin SR_4 values can be seen in P12_f (retelling, L3G_sentences2 and L2E_text) and in P2_f (L3G_sentences2). The latter learner additionally shows an English-Mandarin intermediate ratio in the English read-out-loud task. The same hybrid values also appear in P3_m (L3G_text and L2E_text), P7_f (L3G_sentences1) and P16_f (retelling). Both P7_f and P16_f are the only ones to not produce any SR_4 (sdv+sfv) syllable pairs at all in the L2 English. The most heterogeneous combination is visible in P8_m. He shows a mean L1-English ratio in the L3G_text task, a Mandarin value in the picture story narration and an English-Mandarin hybrid in the L2 reading task. Overall, much fewer SR_4 (sdv+sfv) syllable pairs were produced compared to the other three kinds.

5.3 Coda Consonant Cluster Realisation

Thanks to the distinctive differences in syllable structures across the participants' investigated three languages, Mandarin, English and German, CC realisation, in particular in coda position, was used to elicit potential LPT in the learner productions. Thereby, the binary distinction is made of *correctly produced*, i.e. the complete cluster is retained correctly, and *incorrectly produced*, i.e. the cluster is either indeed rendered incorrectly or modified by the aforementioned phonological processes of partial or total deletion, epenthesis, paragoge, cluster-final obstruent devoicing or metathesis (see section 4.2.1.3).

Firstly, as mentioned in section 4.2.6.3, the overall percentage of correctly retained CCs or incorrectly rendered clusters in onset and coda position, respectively, was calculated for each recorded TL file as well as for the L2-English task. The subsequent Table 20 gives an overview of the absolute numbers plus the corresponding percentages:

Table 20. Tokens of CCs (absolute numbers) produced correctly and incorrectly in onset and coda position in non-native English and German.

Consonant cluster:	**Onset**		**Coda**	
	Correct	Incorrect	Correct	Incorrect
L3G_text	36	12	33	32
L3G_picture story	82	14	107	96
L3G_sentences1	191	24	104	85
L3G_sentences2	103	37	94	67
Total:	**412**	**87**	**338**	**280**
L2E_text	448	179	315	461

All in all, 499 onset clusters were produced in the TL German and 618 CCCs. In the L2 English, 627 clusters in onset position and 776 in coda position were annotated in the learner data. Of the TL data, 82.57% (n=412) were rendered correctly in the onset and solely 17.43% (n=87) incorrectly. In coda position, 54.69% (n=338) were produced correctly and 45.31% (n=280) incorrectly. With regard to onset CCs, the descending order of correct onset clusters was L3G_sentences1 (n=191) > L3G_sentences2 (n=103) > L3G_picture story (n=82) > L3G_text (n=36). For the incorrect renderings of onset CCs, the similar order of L3G_sentences2 (n=37) > L3G_sentences1 (n=24) > L3G_picture story (n=14) > L3G_text (n=12) was exhibited. In coda position, a slightly different order was visible for correct clusters, namely L3G_picture story (n=107) > L3G_sentences1 (n=104) > L3G_sentences2 (n=94) > L3G_text (n=33). The same order can be seen for the incorrectly produced coda clusters, only distributed with slightly different percentages: L3G_picture story (n=96) > L3G_sentences1 (n=85) > L3G_sentences2 (n=67) >

L3G_text (n=32). As regards the L2-English data, learners produced 71.45% (n=448) of onset clusters correctly, and solely 28.55% (n=179) incorrectly. In coda position, it is more evenly distributed, namely 40.59% (n=315) correct CCCs are produced, and 59.41% (n=461) incorrect ones. Contrasting percentages of correct and incorrect CC realisation in the L2 English and the TL German, onset retention of clusters in the learners' non-native German is slightly higher than in their non-native English. For coda clusters, the retention rate in L3/Ln German is nearly the inverse L2-English constellation, i.e. the slightly lower amount of correct coda productions in English is almost equal the amount of incorrectly produced coda clusters in German.

The more qualitative analysis of lateral transfer of CC realisation in the present learners particularly focuses on those clusters produced in coda position. These also happened to provide more numerous tokens to base the empirical investigation on. For that, firstly a distinction was made between CCs that exist in the L2 English and the TL German in the same form and are produced alike, and those CCs that are pronounced similarly in the L2 and the TL (see section 4.2.6.3). The clusters canonically realised alike across both languages are in fact potential loci for positive and negative LPT. Those produced only similarly represent loci for potential negative LPT.

Regarding the same CCs, of the total of 618 tokens of TL-coda clusters, 572 are produced the same across English and German (e.g. /st/ as in English *just* /dʒʌst/ and German *fest* /fest/, /nt/ as in English *countless* /ˈkaʊn̩tləs/ and German *blind* /blɪnt/, or /kt/ as in English *exactly* /ɪgˈzæktli/ and German *saugt* /zaʊkt/). Of these, 316 (i.e. 55.24%) were produced correctly and 256 (i.e. 44.76%) incorrectly. As regards the latter incorrect coda cluster realisations, especially with regard to the occurrence of negative LPT, the fewest appear in the L3G_text reading (10.16%). This is followed by 20.31% in the L3G_sentences2 task and 32.81% in L3G_sentences1, but the highest rate of incorrect CCC tokens is found in the L3G_picture story (36.72%).

Looking at the individual results for those CCCs existent alike in both English and German, in the L3G_text task P13_f only produced 22.22% incorrect clusters as opposed to 77.78% correct ones. Thus she displays half of the overall average of 44.76% of incorrect CCC, whereas all others exhibited more incorrectly than correctly produced coda clusters in the read-out-loud text task. As mentioned before, the highest percentages of incorrect CCCs can be found in the L3G_picture story task, particularly in P12_f (71.43%), P13_f (75%), P16_f (75%) and P1_m (81.82%). P18_m does not even exhibit one correct coda cluster. A further six participants, moreover, display percentages of incorrect clusters above the measured average in the story retelling, ranging from 44.44% to 69.23%. The remaining learners are below the mean of 36.72%, with P11_f (14.29%) and P14_f (16.67%) displaying the fewest incorrect tokens. In the L3G_sentences1 task with a mean of 32.81% of wrong CCCs, P15_m displays an extremely low value of incorrect clusters (8.33%). Together with P7_f, with the second lowest rate of 30.77% of incorrect coda clusters, they are the only participants to stay beneath the average computed for the task. The remaining learners produce more incorrect tokens, reflected in percentages ranging between 33.33% and 92.86%. The latter value by P9_m, though, is exceptionally high. The most extreme percentages after P9_m's are by P4_m with 66.67% and P10_f with 61.54%. Regarding the L3G_sentences2 task, none of the participants renders a lower amount of incorrect coda clusters than the overall mean of 20.31%. P2_f with 21.74% and consequently the fewest incorrect tokens is the learner closest to said average. The rest of the learners' percentages range between 33.33% and 66.67% for P18_m.

Now, referring to the matrix of potential constellations of CCCs produced alike in English and German in section 4.2.6.3, it becomes apparent that for the present study's overall research goal, i.e. the investigation of LPT, particularly two constellations are relevant: the first one, with the coda clusters produced correctly both in the L2 English as well as in the TL German; and the fourth constellation of incorrect clusters also across both the L2 and L3/Ln. Now, integrating the individual participants' results of both English and German clusters with this matrix, we arrive at the following overview.

Table 21. Individual correct (1) and incorrect (0) TL and L2 tokens (absolute number of tokens and percentage) of the CCCs existing in the same form across both English and German.

Same coda consonant clusters	**L2 English**			**TL German**		
	Correct (1)		Incorrect (0)	Correct (1)		Incorrect (0)
	Number	In %	Number	Number	In %	Number
P1_m	20	80	5	16	48.48	17
P2_f	21	80.77	5	31	73.81	11
P3_m	10	52.63	9	4	33.33	8
P4_m	8	32	17	24	50	24
P5_f	11	44	14	13	46.43	15
P6_m	14	50	14	28	57.14	21
P7_f	15	57.69	11	19	70.37	8
P8_m	23	82.14	5	19	45.24	23
P9_m	17	62.96	10	21	50	21
P10_f	20	74.07	7	18	52.94	16
P11_f	22	81.48	5	18	69.23	8
P12_f	16	57.14	12	25	58.14	18
P13_f	5	41.67	7	10	58.82	7
P14_f	16	59.26	11	18	75	6
P15_m	18	66.67	9	17	56.67	13
P16_f	17	60.71	11	11	45.83	13
P17_m	17	62.96	10	15	55.56	12
P18_m	13	46.43	15	9	37.50	15

Juxtaposing the single participants' same CCC productions, they are assessed as correct if more than 70% of all clusters are produced correctly, and as incorrect if more than 70% are rendered incorrectly. Some results arise where positive or negative CLI could have occurred, namely where the first or fourth constellation applies: With regard to the former, i.e. correct coda clusters in both the L2 and the L3/Ln, in fact only one learner, P2_f, manages to produce correct clusters in both English and German. Lateral transfer is particularly impeded by four participants (i.e. P1_m, P8_m, P10_f and P11_f), who are classified as rendering L2 CCCs correctly, and utterly inhibited by their overall incorrect clusters in the corresponding L3/Ln tasks. These four learners correspond to the second matrix constellation. P7_f and P14_f conform to the third constellation of the set-up matrix, i.e. overall incorrect coda clusters in the L2 English and correct ones in the TL German. The remaining 11 learners (P3_m, P4_m, P5_f, P6_m, P9_m, P12_f, P13_f, P15_m, P16_f, P17_m and P18_m) correspond to the fourth constellation relevant for examining LPT, i.e. incorrect coda clusters across both the L2 and the TL. They offer loci either for negative LPT, L1-Mandarin CLI or simply idiosyncratic forms.

For the exploration particularly of negative LPT, those clusters that are only similar in the L2 and L3/Ln are also specifically relevant (e.g. English *tree* [**tɹ**iː] versus German *Australien* [aʊsˈ**tr**aːliən] or English *included* [ɪnˈ**kɫ**uːdəd] versus German *klettert* [ˈ**kl**ɛtɐt]). Regarding these similar CCCs, there are only 46 of the total of 618 tokens. Of these, 22 (i.e. 47.83%) were produced correctly and 24 (i.e. 52.17%) incorrectly. The incorrect cluster realisations, which offer loci for negative LPT, are rarest in the L3G_sentences1 task with solely 4.17%, followed by the L3G_picture story with 8.33% of all incorrect tokens, L3G_text with 25% and the majority of incorrect coda cluster realisations in L3G_sentences2 with 62.5%.

As concerns the single participants' rates of correctly and incorrectly produced CCCs existent in a similar form in their L2 English and their L3/Ln German, the following can be seen: The lowest percentage of correct realisations in the L3G_text read-out-loud task can be found in P3_m, with 100% incorrect coda clusters. The other participants' number of incorrect tokens is also situated above the measured mean of 25%, but the majority of their coda cluster realisations are still correct. In the L3G_picture story task, only very few tokens of CCCs are produced at all. Of those, five learners (i.e. P1_m, P7_f, P11_f, P12_f and P16_f) produce solely correct clusters, whereas P5_f renders only incorrect tokens. The remaining participants fail to produce any tokens at all. The lowest mean rate of incorrect coda clusters can be found in L3G_sentences1, as mentioned. However, there are only two participants producing coda clusters therein at all. Finally, regarding the L3G_sentences2 task, three learners, namely P1_m, P6_m and P17_m, render all of their coda clusters incorrectly. Moreover, P4_m and P10_f also stay above the measured mean of 62.5% of incorrect tokens. Solely P2_f and P12_f manage to produce a considerably higher amount of correct coda cluster realisations (75% and 66.67%, respectively) than the others. The remaining participants fail to produce any coda clusters at all.

Analogously to the same CCCs, a different matrix of potential constellations for similar CCC productions in the L2 and L3/Ln was set up (see section

4.2.6.3). According to this matrix, specifically constellation two (i.e. correct L2 CCC and incorrect L3/Ln CCC) and four (i.e. incorrect CCCs in both L2 and L3/Ln) are of interest to the exploration of LPT. In the case of similar CCCs, strictly speaking no positive transfer can occur from the L2 into the L3/Ln because the clusters are only similar and not alike. Thus, only negative LPT is conceivable. The subsequent Table 22 integrates the single learners' results of their L2-English and TL-German coda clusters with this matrix.

Table 22. Individual correct (1) and incorrect (0) TL and L2 tokens (absolute number of tokens and percentage) of the CCCs existing in a similar form across both English and German.

Similar coda consonant clusters	**L2 English**			**TL German**		
	Correct (1)		Incorrect (0)	Correct (1)		Incorrect (0)
	Number	In %	Number	Number	In %	Number
P1_m	1	5.88	16	1	25	3
P2_f	5	26.32	14	3	75	1
P3_m	1	6.25	15	0	0	1
P4_m	0	0	18	1	25	3
P5_f	0	0	19	1	33.33	2
P6_m	4	21.05	15	0	0	4
P7_f	4	22.22	14	1	100	0
P8_m	2	11.11	16	6	66.67	3
P9_m	0	0	18	0	0	0
P10_f	0	0	19	1	33.33	2
P11_f	0	0	19	1	100	0
P12_f	2	11.11	16	3	75	1
P13_f	0	0	7	3	60	2
P14_f	2	10.53	17	0	0	0
P15_m	6	33.33	12	0	0	0
P16_f	0	0	18	1	100	0
P17_m	4	22.22	14	0	0	2
P18_m	1	5.56	17	0	0	0

Like for the already discussed same CCCs, the individual percentages of coda cluster realisation are also assessed as correct when more than 70% of all clusters are produced correctly, and analogously for the incorrect clusters. Overall, with reference to the calculated mean percentages of correct and incorrect TL coda cluster realisation, 11 participants produce less than the average of 47.83% of correct clusters. Further, another 11 learners show lower percentages of incorrectly rendered coda clusters than the mean of 52.17%.

Now, regarding the exploration of negative LPT in the realisation of similar coda clusters, the relevant constellation two with correct L2-English clusters and incorrect TL-German ones in fact does not even appear once in the present learners' data: as all of their L2 coda cluster productions are unambiguously incorrect, it is impossible for this constellation to occur. Seven participants (i.e. P4_m, P5_f, P9_m, P10_f, P11_f, P13_f and P16_f) produce even solely incorrect L2 clusters. The lowest percentage of incorrect coda clusters in P15_m (66.67%) still considerably supersedes the computed overall TL-mean of all incorrect coda clusters (52.17%). The second relevant constellation four, with incorrect realisations in both the L2 and L3/Ln, however, yields numerous tokens: P1_m, P3_m, P4_m, P5_f, P6_m, P8_m, P10_f, P13_f and P17_m all render incorrect coda clusters in English as well as in German. Like constellation two, the first set-up with correct L2 and L3/Ln clusters is also impossible due to the solely incorrectly produced English coda clusters. Only constellation three can be found in the incorrect L2-English/correct TL-German pairings of P2_f, P7_f, P11_f, P12_f and P16_f.

Some of the participants also stand out: P9_m, P14_f, P15_m and P18_m all produce incorrect L2 clusters, but no corresponding similar TL-German clusters at all. Further, like the above-mentioned seven learners that exhibit only incorrect L2 clusters, several also produce 100% incorrect tokens in the TL, namely P3_m, P6_m and P17_m. At the same time, there are three learners, P7_f, P11_f and P16_f, who show solely correct German coda cluster realisations. Particularly noticeable are the latter two, P11_f and P16_f: besides their 100% of correct TL clusters they additionally produce 100% of incorrect L2-English clusters.

Overall, however, it is valid for similar as well as alike CCCs that a purely quantitative exploration of potential LPT does not suffice. Consequently, a more qualitative analysis is necessary. Further, an assessment is required of whether, for instance, attributing the label *incorrect* to all CCC tokens of a learner who produces more than 70% incorrectly makes sense; after all, almost every participant (except those with 0% or 100%) still also produces some correct or incorrect clusters, respectively, although only a minor percentage. This fact must not be neglected.

Particularly suitable for a more detailed examination of LPT are those TL CCCs that are produced incorrectly, regardless of whether it concerns similar or alike clusters. For an unambiguous determination of the occurrence of LPT particularly negative LPT lends itself rather well. As was seen in the posited matrices (see section 4.2.6.3) and discussed above, specific constellations are especially relevant for investigating negative LPT. However, in order not to neglect any potential loci for LPT, constellation one of clusters existing in the same form in both English and German will also be taken into consideration. It offers the possibility of positive transfer from the L2 onto the L3/Ln. Thus, realisations of the coda clusters in the TL German were compared to productions in the L2 English for these constellations.

Restrictions on the analysis are imposed by the elicitation material, particularly by the single English text recorded for each participant to serve as a data sample for potential LPT from the L2. It only contains a limited number of CCCs that exist in the same or similar form also in the TL German. In fact, solely seven different coda clusters in the same form and eleven with a similar form can be found in the L2E_text. Consequently, only few tokens can be analysed to which all prerequisites (i.e. incorrectly, or correctly respectively, produced in the TL; existent similarly or alike in both English and German; produced in the recorded L2 sample text) apply.

Table 23. Individual productions of CCCs existent in the same form across the L2 English and the L3/Ln German with a focus on correct TL-German productions.

Same coda consonant clusters **Participants**	**Canonical form**	**Correct and incorrect L2-English tokens**		**Correct TL-German tokens**	
P1_m	/nts/	*[ns]	(n=1)	[nts]	(n=1)
	/kt/	[kt]	(n=2)	[kt]	(n=3)
	/st/	[st]	(n=3)	[st]	(n=3)
		[s]	(n=2)		
P2_f	/st/	*[sts]	(n=1)	[st]	(n=6)
		[s]	(n=3)		
		*[sd]	(n=1)		
	/kt/	[kt]	(n=2)	[kt]	(n=2)
	/nt/	[n]	(n=5)	[nt]	(n=9)
	/nts/	[nts]	(n=1)	[nts]	(n=1)
		*[ns]	(n=1)		
P3_m	/nt/	[nt]	(n=1)	[nt]	(n=2)
		[n]	(n=2)		
P4_m	/st/	[st]	(n=1	[st]	(n=1)
		*[stə]	(n=4)		
	/nt/	[nt]	(n=2)	[nt]	(n=14)
		*[ntə]	(n=2)		
	/kt/	[kt]	(n=2)	[kt]	(n=2)
	/nts/	*[ntsə]	(n=1)	[nts]	(n=1)
		*[ns]	(n=1)		
P5_f	/st/	[st]	(n=2)	[st]	(n=2)
		*[stə]	(n=2)		
		[s]	(n=2)		
	/nt/	[nt]	(n=2)	[nt]	(n=5)
		[n]	(n=1)		
		*[ntlə]	(n=1)		
	/kt/	[kt]	(n=1)	[kt]	(n=3)
		[---]	(n=1)		
P6_m	/st/	[st]	(n=2)	[st]	(n=5)
		*[stə]	(n=3)		
	/kt/	[kt]	(n=1)	[kt]	(n=3)
		*[ktə]	(n=1)		

	/nt/	[nt]	(n=4)	[nt]	(n=4)
	/nd/	*[ndə]	(n=2)	[nd]	(n=2)
		*[nə]	(n=2)		
		*[nt]	(n=2)		
		[n]	(n=2)		
		*[ndə]	(n=1)		
	/nts/	*[s]	(n=1)	[nts]	(n=1)
		*[ns]	(n=1)		
P7_f	/nt/	[nt]	(n=3)	[nt]	(n=7)
		[n]	(n=1)		
	/st/	[st]	(n=2)	[st]	(n=1)
		*[sə]	(n=1)		
		*[stə]	(n=2)		
	/kt/	[kt]	(n=2)	[kt]	(n=4)
P8_m	/nt/	[nt]	(n=1)	[nt]	(n=7)
		*[ntə]	(n=1)		
		*[nd]	(n=1)		
		[n]	(n=1)		
	/st/	[st]	(n=5)	[st]	(n=5)
	/nts/	[nts]	(n=1)	[nts]	(n=1)
		*[ns]	(n=1)		
P9_m	/nt/	*[n]	(n=3)	[nt]	(n=13)
		*[ŋk]	(n=1)		
	/st/	[st]	(n=2)	[st]	(n=4)
		*[stə]	(n=3)		
	/ks/	[ks]	(n=2)	[ks]	(n=1)
	/kt/	[kt]	(n=2)	[kt]	(n=2)
P10_f	/nd/	[nd]	(n=2)	[nd]	(n=1)
		[n]	(n=5)		
		*[---]	(n=1)		
		*[nə]	(n=1)		
	/nt/	[nt]	(n=2)	[nt]	(n=7)
		[n]	(n=2)		
	/kt/	[kt]	(n=2)	[kt]	(n=2)
	/st/	[st]	(n=2)	[st]	(n=1)
		*[stə]	(n=2)		
		[s]	(n=1)		
	/nts/	*[ns]	(n=2)	[nts]	(n=1)

P11_f	/st/	[st]	(n=3)	[st]	(n=2)
		[s]	(n=2)		
	/nt/	[nt]	(n=1)	[nt]	(n=9)
		[n]	(n=3)		
	/kt/	[kt]	(n=2)	[kt]	(n=3)
P12_f	/st/	[st]	(n=1)	[st]	(n=3)
		*[stə]	(n=3)		
		[s]	(n=1)		
	/nt/	[nt]	(n=3)	[nt]	(n=9)
		[n]	(n=1)		
		*[---]	(n=1)		
	/kt/	[kt]	(n=1)	[kt]	(n=3)
		*[ktə]	(n=1)		
P13_f	/nt/	*[ntə]	(n=1)	[nt]	(n=3)
	/st/	[st]	(n=1)	[st]	(n=3)
		*[stə]	(n=1)		
	/nts/	[nts]	(n=1)	[nts]	(n=1)
	/kt/	---	---	[kt]	(n=1)
P14_f	/st/	[st]	(n=3)	[st]	(n=2)
		*[stə]	(n=2)		
	/nt/	[nt]	(n=3)	[nt]	(n=6)
		*[t]	(n=1)		
	/kt/	*[ktə]	(n=2)	[kt]	(n=3)
P15_m	/st/	[st]	(n=2)	[st]	(n=2)
		[s]	(n=2)		
		*[sd]	(n=1)		
	/nt/	[nt]	(n=3)	[nt]	(n=5)
		[n]	(n=1)		
	/kt/	*[gtə]	(n=1)	[kt]	(n=3)
		*[g]	(n=1)		
P16_f	/st/	[st]	(n=1)	[st]	(n=2)
		[s]	(n=2)		
		*[sə]	(n=1)		
	/nt/	[nt]	(n=2)	[nt]	(n=3)
		[n]	(n=2)		
		*[ənə]	(n=1)		
	/kt/	*[dəd]	(n=1)	[kt]	(n=2)
		*[t]	(n=1)		

P17_m	/kt/	[kt]	(n=2)	[kt]	(n=2)
	/nt/	[nt]	(n=3)	[nt]	(n=3)
		[n]	(n=1)		
	/st/	[st]	(n=2)	[st]	(n=3)
		*[stə]	(n=2)		
		[s]	(n=1)		
P18_m	/kt/	*[k]	(n=1)	[kt]	(n=2)
		*[gə]	(n=1)		
	/nt/	[nt]	(n=1)	[nt]	(n=1)
		[n]	(n=2)		
		*[---]	(n=1)		
		*[ndə]	(n=1)		
	/st/	[st]	(n=1)	[st]	(n=1)
		*[stə]	(n=3)		
		[s]	(n=1)		

First, all correct TL coda cluster productions overlapping with those in the L2E_text were considered in detail and juxtaposed with the corresponding L2-English tokens (see Table 23 above). Afterwards, the cluster pairs were assigned to one of two possible constellations: correct TL realisations according to the set-up matrix (see section 4.2.6.3) for CCCs existent alike in both English and German, namely constellations one and three. Overall, 58.2% of all correctly produced TL CCCs that exist in both English and German correspond to constellation one, with correct realisations across both the L2 and L3/Ln; 40.98% can be assigned to constellation three, i.e. correct coda clusters in the TL but not in the L2; 0.82% correspond to neither because no tokens of the correctly produced TL cluster can be found in the L2 productions. A summary of the results can be seen in the subsequent Table 24.

Table 24. Constellations (absolute number of occurrence and in per cent) of correct TL-German CCC realisations and corresponding alike L2-English clusters.

L2 – L3/Ln CCC constellation	Absolute number of occurrence	In %
Constellation 1:		
→ 1 correct L2 CCC, 1 correct L3/Ln CCC	21	35.0
Constellation 3:		
→ 1 incorrect L2 CCC, 1 correct L3/Ln CCC	4	6.67
→>1 incorrect L2 CCC, 1 correct L3/Ln CCC	5	8.33
Constellations 1 and 3 combined:	**29**	**48.33**
→ 1 correct and 1 incorrect L2 CCC, 1 correct L3/Ln CCC	23	79.31
→ 1 correct and 2 incorrect L2 CCC, 1 correct L3/Ln CCC	5	17.24
→ 1 correct and 3 or more incorrect L2 CCC, 1 correct L3/Ln CCC	1	3.45
No corresponding L2 CCC tokens:	1	1.67

As can be gathered from the data, a more detailed differentiation should be made as regards the assignment to a specific constellation: The single participants do not only produce solely one correct or incorrect corresponding token in the L2; they also exhibit several different incorrect L2 clusters that all pertain to constellation three, or a combination of both constellations, with one to three different incorrect L2 tokens besides correct clusters in both languages. Thus, 35% of these clusters reflect the former constellation one (i.e. with one correct cluster each in the L2 and L3/Ln). Only 6.67% unambiguously belong to constellation three (i.e. with a correct TL cluster and one incorrect L2 cluster). 8.33% also pertain to the third constellation; however, for these, several different incorrect L2 tokens are found in a single learner. No corresponding L2 cluster can be found at all in 1.67% of all cases. The majority, i.e. 48.33%, is in fact a combination of correct and incorrect corresponding L2 realisations. Of these, most show a combination of a correct and one type of incorrect token each in the respective learners' English productions; and 17.24% produce a correct and two different kinds of incorrect coda clusters in the L2. Finally, 3.45% even show three or more different types of incorrect coda clusters in their English data besides the correct rendering.

Table 25. Individual productions of CCCs existent in the same form across the L2 English and the L3/Ln German with a focus on incorrect TL-German productions. Further, each incorrect TL-token is assigned to one of three classes: (1) the CCC is produced in the same form in the L3/Ln and the L2; (2) the incorrect TL-cluster is the result of cluster reduction to one consonant, complete deletion, epenthesis, paragoge or of cluster-final obstruent devoicing; or (3) neither of these two categories.

Same coda consonant clusters **Participants**	**Canonical form**	**Correct and incorrect L2-English tokens**		**Incorrect TL-German tokens**		**TL category**
P1_m	/nt/	[nt]	(n=4)	*[ndə]	(n=5)	3
				*[ndæ]	(n=1)	3
				*[n]	(n=1)	2
	/ts/	[ts]	(n=3)	*[s]	(n=1)	2
	/kt/	[kt]	(n=3)	*[gt]	(n=2)	3
	/st/	[st]	(n=4)	*[ʃs]	(n=1)	3
		[s]	(n=2)	*[χʃt]	(n=1)	3
P2_f	/st/	*[sts]	(n=1)	*[χs]	(n=1)	3
		[s]	(n=3)			
		*[sd]	(n=1)			
	/kt/	[kt]	(n=2)	*[gt]	(n=1)	3
				*[ŋkt]	(n=1)	3
	/nt/	[n]	(n=5)	*[n]	(n=2)	1
				*[ntʃ]	(n=1)	3
				*[nd]	(n=1)	3
	/nd/	[nd]	(n=3)	*[nd]	(n=1)	1
		[n]	(n=3)			
		*[nt]	(n=2)			
P3_m	/nt/	[nt]	(n=1)	*[dnə]	(n=1)	3
		[n]	(n=2)	*[nd]	(n=2)	3
				*[nə]	(n=1)	3
				*[ndʒ]	(n=1)	3
				*[ndə]	(n=1)	3

P4_m	/nt/	[nt]	(n=2)	*[n]	(n=2)	2
		*[ntə]	(n=2)	*[ntə]	(n=2)	1
	/st/	[st]	(n=1)	*[stə]	(n=4)	1
		*[stə]	(n=4)	*[χst]	(n=1)	3
	/kt/	[kt]	(n=2)	*[χtə]	(n=1)	3
				*[ktə]	(n=1)	2
	/nd/	*[ntə]	(n=2)	*[ntə]	(n=1)	1
		[n]	(n=1)			
		*[ndə]	(n=3)			
		*[nt]	(n=1)			
P5_f	/st/	[st]	(n=2)	*[stə]	(n=2)	1
		*[stə]	(n=2)			
		[s]	(n=2)			
	/nt/	[nt]	(n=2)	*[n]	(n=3)	1
		[n]	(n=1)	*[ntə]	(n=1)	2
		*[ntlə]	(n=1)			
	/kt/	[kt]	(n=1)	*[ktə]	(n=1)	2
		[---]	(n=1)			
P6_m	/nt/	[nt]	(n=4)	*[ndɜ:]	(n=6)	3
				*[ndX:]	(n=1)	3
				*[ndə]	(n=4)	3
	/st/	[st]	(n=2)	*[s]	(n=1)	2
		*[stə]	(n=3)	*[stə]	(n=3)	1
				*[χstə]	(n=1)	3
	/kt/	[kt]	(n=1)	*[gt]	(n=1)	3
		*[ktə]	(n=1)			
	/nd/	*[ndə]	(n=2)	*[ndə]	(n=2)	1
		*[nə]	(n=2)			
		*[nt]	(n=2)			
		[n]	(n=2)			
		*[ndɔ]	(n=1)			
P7_f	/st/	[st]	(n=2)	*[stə]	(n=3)	1
		*[sə]	(n=1)			
		*[stə]	(n=2)			
	/nt/	[nt]	(n=3)	*[n]	(n=1)	1
		[n]	(n=1)	*[ntə]	(n=1)	2

P8_m	/nt/	[nt]	(n=1)	*[n]	(n=3)	1
		*[ntə]	(n=1)	*[ntə]	(n=2)	1
		*[nd]	(n=1)	*[nd]	(n=4)	1
		[n]	(n=1)			
	/kt/	[kt]	(n=2)	*[gt]	(n=1)	3
	/st/	[st]	(n=5)	*[s]	(n=2)	2
	/ks/	[ks]	(n=2)	*[ʃ]	(n=1)	3
				*[gs]	(n=1)	3
	/nd/	[nd]	(n=1)	*[nt]	(n=1)	2
		[n]	(n=7)			
		*[---]	(n=1)			
		*[nə]	(n=1)			
P9_m	/st/	[st]	(n=2)	*[stə]	(n=6)	1
		*[stə]	(n=3)			
	/nt/	[n]	(n=3)	*[n]	(n=3)	1
		*[ŋk]	(n=1)			
	/nts/	*[ns]	(n=2)	*[nz]	(n=1)	3
	/kt/	[kt]	(n=2)	*[gt]	(n=2)	3
				*[ŋkt]	(n=2)	3
P10_f	/st/	[st]	(n=2)	*[stə]	(n=5)	1
		*[stə]	(n=2)			
		[s]	(n=1)			
	/nt/	[nt]	(n=2)	*[n]	(n=2)	1
		[n]	(n=2)	*[ŋk]	(n=1)	3
				*[nd]	(n=1)	3
	/kt/	[kt]	(n=2)	*[gt]	(n=2)	3
P11_f	/nt/	[nt]	(n=1)	*[n]	(n=1)	1
		[n]	(n=3)	*[ntə]	(n=1)	2
	/kt/	[kt]	(n=2)	*[gt]	(n=1)	3
P12_f	/st/	[st]	(n=1)	*[stə]	(n=5)	1
		*[stə]	(n=3)			
		[s]	(n=1)			
	/nt/	[nt]	(n=3)	*[n]	(n=2)	1
		[n]	(n=1)			
		*[---]	(n=1)	*[nd]	(n=5)	3
	/kt/	[kt]	(n=1)	*[gt]	(n=1)	3
		*[ktə]	(n=1)			
	/nd/	[nd]	(n=2)	*[nt]	(n=1)	1
		[n]	(n=3)			
		*[nt]	(n=2)			

		*[ndə]	(n=1)			
		*[---]	(n=1)			
	/nts/	*[ns]	(n=2)	*[nds]	(n=1)	3
P13_f	/nt/	*[ntə]	(n=1)	*[nə]	(n=1)	2
				*[ndə]	(n=2)	3
				*[n]	(n=1)	2
	/st/	[st]	(n=1)	*[stə]	(n=1)	1
		*[stə]	(n=1)	*[s]	(n=1)	2
P14_f	/nt/	[nt]	(n=3)	*[n]	(n=2)	2
		*[t]	(n=1)			
	/kt/	*[ktə]	(n=2)	*[gt]	(n=1)	3
				*[ktə]	(n=1)	1
	/st/	[st]	(n=3)	*[s]	(n=1)	2
		*[stə]	(n=2)			
P15_m	/st/	[st]	(n=2)	*[s]	(n=3)	1
		[s]	(n=2)	*[z]	(n=1)	3
		*[sd]	(n=1)	*[zt]	(n=1)	3
	/nt/	[nt]	(n=3)	*[nd]	(n=2)	3
		[n]	(n=1)	*[n]	(n=4)	1
	/kt/	*[gtə]	(n=1)	*[gl]	(n=1)	3
		*[g]	(n=1)			
P16_f	/st/	[st]	(n=1)	*[s]	(n=4)	1
		[s]	(n=2)			
		*[sə]	(n=1)			
	/nt/	[nt]	(n=2)	*[n]	(n=4)	1
		[n]	(n=2)	*[nd]	(n=1)	3
		*[ənə]	(n=1)			
	/kt/	*[dəd]	(n=1)	*[χt]	(n=1)	3
		*[t]	(n=1)	*[ŋkt]	(n=1)	3
P17_m	/st/	[st]	(n=2)	*[stə]	(n=2)	1
		*[stə]	(n=2)	*[χstə]	(n=1)	3
		[s]	(n=1)			
	/nt/	[nt]	(n=3)	*[n]	(n=1)	1
		[n]	(n=1)	*[ndə]	(n=1)	3
	/kt/	[kt]	(n=2)	*[gt]	(n=1)	3
				*[ŋkt]	(n=1)	3
	/nts/	*[ns]	(n=2)	*[nd]	(n=1)	3

P18_m	/kt/	*[k]	(n=1)	*[ktə]	(n=1)	2
		*[gə]	(n=1)	*[kən]	(n=1)	3
	/nt/	[nt]	(n=1)	*[n]	(n=1)	1
		[n]	(n=2)	*[nd]	(n=1)	3
		*[---]	(n=1)	*[ndə]	(n=1)	1
		*[ndə]	(n=1)			
	/st/	[st]	(n=1)	*[stə]	(n=3)	1
		*[stə]	(n=3)			
		[s]	(n=1)			
	/nts/	*[ns]	(n=2)	*[nds]	(n=1)	3

With regard to the second locus for LPT to be explored further, Table 25 gives an overview of the produced incorrect TL-clusters and the corresponding L2 tokens. These TL-coda cluster realisations can further be assigned to one of three different categories: (1) produced in exactly the same form in the L2 and the L3/Ln; (2) different from the L2 reduced to one consonant, deleted completely or simplified by means of vowel epenthesis or paragoge; or (3) neither of these two possibilities. Following this classification, the CCC productions were analysed.

All in all, 102 different incorrect TL-coda cluster realisations were found that exist alike in both English and German. The corresponding L2 clusters alternate between correct and incorrect productions. Of these 102 clusters, 32.35% (n=33) belong into the first category, i.e. the same realisation in the L2 and the L3/Ln. A further 16.67% (n=17) reflect a simplification process, either by the reduction of the TL cluster to one consonant (n=9),[48] paragoge (n=6), devoicing of the cluster-final obstruent (n=1) or even a combination of simplification strategies, i.e. in the present case reduction plus paragoge (n=1). Finally, the majority of 50.98% (n=52) pertain to neither of these two categories, i.e. the productions cannot be structured and categorised according to specific classes of cluster realisations.

Like for the first locus for LPT, it is possibly revealing to have a closer look at the combinations of coda cluster pairs that exist in the same form across both the L2 and L3/Ln. As the second locus for LPT solely concerns incorrect TL clusters, Table 26 focuses on summarising the corresponding coda cluster production types in the L2 English.

[48] The overwhelming majority of the analysed clusters consists of two consonants. An exception is the three-consonant cluster /nts/, which, however, was never reduced by one or two consonants in the present TL-data.

Table 26. Number (absolute and in per cent) and kinds of combinations of different types of CCC productions in the participants' L2 English corresponding to the incorrect L3/Ln German realisations.

L2 – L3/Ln CCC combination	Absolute number of occurrence	In %
Combination 1:		
→ 1 L2 CCC type, 1 L3/Ln CCC type:	**10**	**16.67**
L2 CCC type correct	6	60
L2 CCC type incorrect	4	40
Combination 2:		
→ 1 L2 CCC type, >1 L3/Ln CCC type:	**18**	**30**
L2 CCC type correct	14	77.78
L2 CCC type incorrect	4	22.22
Combination 3:		
→>1 L2 CCC type, 1 L3/Ln CCC type:	**20**	**33.33**
L2 CCC types all incorrect	1	5.
1 correct and 1 incorrect L2 CCC type	13	65
1 correct and 2 incorrect L2 CCC types	3	15
1 correct and 3 incorrect L2 CCC types	2	10
1 correct and 4 incorrect L2 CCC types	1	5
Combination 4:		
→>1 L2 CCC type, >1 L3/Ln CCC type:	**12**	**20**
L2 CCC types all incorrect	2	16.67
1 correct and 1 incorrect L2 CCC type	8	66.67
1 correct and 2 incorrect L2 CCC types	2	16.67

Of the 60 different kinds of combinations of types of coda cluster realisations, 16.67% (n=10) comprise a one-to-one combination of an L2 and L3/Ln cluster; of the L2 types, 60% (n=6) are produced correctly and 40% (n=4) incorrectly together with the incorrect TL cluster. A further 30% (n=18) reflect the second combination, namely again one L2 CCC type (77.78%/n=14 correct; 22.22%/n=4 incorrect) and two or three different kinds of incorrect TL clusters. With 33.33% (n=20) the majority of produced combinations, the third constellation (i.e. two or more different L2-English CCC types combined with one incorrect L3/Ln type of CCC) is also differentiated further with regard to the L2 realisations: 5% (n=1) are rendered incorrectly; for 65% (n=13) of all clusters produced according to combination three, one correct plus one incorrect L2 CCC type was produced; for 15% (n=3), the incorrect TL cluster is paired with one correct and two incorrect types of L2 realisations. In 10% (n=2) of all cases, the one correct L2 CCC type is complemented by three incorrect ones. In a further 5% (n=1), it combines even with four incorrect types of L2 clusters. Finally, combination four, i.e. with two or more types of clusters across both learner English and German, is produced in 20% (n=12) of all cases. Once again, of these, 16.67% (n=2) reflect exclusively incorrect L2 realisations besides the incorrect TL types; most, though, i.e. 66.67% (n=8), produce one correct and one incorrect L2 type each. Finally, 16.67% (n=2) of the clusters comprise one correct plus two incorrect L2 clusters besides the several incorrect L3/Ln cluster types.

Table 27. Individual productions of CCCs existent in a similar form across the L2 English and the L3/Ln German. Further, each TL-token is assigned to one of four classes: (1) the CCC is produced in the same form in the L3/Ln and the L2; (2) the incorrect TL-cluster is the result of a simplification process; (3) neither of these two categories applies; or (4) no similar clusters were produced at all in the L2 and L3/Ln.

Similar coda consonant clusters	**Canonical forms**		**Correct and incorrect L2-English tokens**		**Correct and incorrect TL-German tokens**		**TL category**
Participants	L1E	L1G					
P1_m	/lt/	/lt /	*[t]	(n=1)	[lt]	(n=1)	3
P2_f	/lt/	/lt/	*[ɔt]	(n=1)	[lt]	(n=1)	3
	/ls/	/ls/	*[ɔs]	(n=1)	[ls]	(n=1)	3
					*[s]	(n=1)	2
P3_m	/lt/	/lt/	*[t]	(n=1)	*[---]	(n=1)	2
	/ls/	/ls/	*[ɔs]	(n=1)	[ls]	(n=1)	3
					*[---]	(n=1)	2
P4_m	/lt/	/lt/	*[tə]	(n=1)	*[ət]	(n=1)	3
	/ls/	/ls/	*[ɔs]	(n=1)	*[ʊs]	(n=2)	3
P5_f	/lt/	/lt/	*[t]	(n=1)	*[tə]	(n=1)	2
			*[aʊt]	(n=1)			
P6_m	/lt/	/lt/	*[aʊt]	(n=1)	*[t]	(n=1)	2
	/ls/	/ls/	*[ɔs]	(n=1)	[ls]	(n=1)	3
					*[st]	(n=1)	3
P7_f	/lt/	/lt/	[lt]	(n=1)	[lt]	(n=1)	1
	/ls/	/ls/	[ls]	(n=1)	[ls]	(n=2)	1

P8_m	/lt/	/lt/	*[t]	(n=1)	[lt]	(n=6)	3
					*[nt]	(n=1)	3
					*[t]	(n=1)	1
	/ls/	/ls/	*[ɹs]	(n=1)	[ls]	(n=1)	3
	/lp/	/lp/	*[b]	(n=1)	*[lb]	(n=1)	2
P9_m	---	---	---	---	---	---	4
P10_f	---	---	---	---	---	---	4
P11_f	/lt/	/lt/	*[t]	(n=1)	[lt]	(n=1)	3
P12_f	/lt/	/lt/	*[t]	(n=1)	[lt]	(n=1)	3
	/ls/	/ls/	*[s]	(n=1)	[ls]	(n=2)	3
P13_f	/lt/	/lt/	---	---	[lt]	(n=1)	3
					*[t]	(n=1)	2
P14_f	---	---	---	---	---	---	4
P15_m	---	---	---	---	---	---	4
P16_f	/lt/	/lt/	*[t]	(n=1)	[lt]	(n=1)	3
P17_m	---	---	---	---	---	---	4
P18_m	---	---	---	---	---	---	4

Thirdly, the final loci for negative LPT are described in the above Table 27, focusing on incorrect TL-German cluster productions existent only in a similar form in both English and German. Just like the preceding second negative LPT locus, the TL-coda cluster realisations can also be attributed to one of the above-mentioned categories: (1) produced in the same form in both the L2 and the L3/Ln; (2) different from the L2 with a simplified form by means of reduction to one consonant, complete deletion, vowel epenthesis, paragoge, devoicing of cluster-final obstruents or metathesis or a combination of simplification processes; or (3) neither of these two aforementioned categories. Additionally, (4) a fourth category is introduced for those cases where single participants failed to produce any similar clusters in both the L2 and the L3/Ln at all.

In sum, 26 different pairs of similar learner English and German coda clusters were produced. Of these, solely 11.54% (n=3) are rendered in the same form across both the L2 and L3/Ln; in 26.92% (n=7) of all cases, the TL clusters are subjected to simplification; and the majority of 61.54% (n=16) cannot be assigned to either of these two categories. Besides, a further six participants do not realise any similar clusters at all in either language.

Again, a slightly different view as well as a more detailed differentiation of the L2-English/TL-German pairings of similar coda cluster realisations makes sense in order to explore potential LPT, or more specifically negative LPT due to the nature of the only similarly existing clusters. According to the previously established matrix of constellations concerning similar CCCs in the L2 and L3/Ln (see section 4.2.6.3), solely incorrect TL clusters are considered for examining negative LPT. Owing to the relatively low total number of tokens (n=26) of realised similar coda cluster pairs, it is more sensible look at the single productions (cf. Table 27) instead of trying to establish classes of cluster pairings (e.g. Bayley, 1996; Major, 1996; Gut, 2009).

Table 28. Overview of all realised similar CCCs in L2 English and their incorrect L3/Ln German counterparts resulting from simplification processes.

Participant	**Canonical form of similar CCCs**	**L2-English tokens**		**L3/Ln-German tokens**	
		IPA	n	IPA	n
P3_m	/lt/	*[t]	1	*[---]	1
P4_m	/lt/	*[tə]	1	*[ət]	1
	/ls/	*[ɔs]	1	*[ʊs]	2
P5_f	/lt/	*[t]	1	*[tə]	1
		*[aʊt]	1		
P6_m	/lt/	*[aʊt]	1	*[t]	1
P8_m	/lp/	*[b]	1	*[lb]	1

Firstly, regarding the LPT-relevant TL clusters, solely five kinds of cluster combinations with one incorrect L2 and L3/Ln-type are produced. One token of /lt/ in each language by P3_m (/lt/: reduction to *[t] in L2; complete deletion to *[---] in L3/Ln) and P4_m (/lt/: reduction plus paragoge to *[tə] in L2; idiosyncratic production *[ət] in L3/Ln) is elicited. P4_m further produces one token of /ls/ in English and two in German (/ls/: idiosyncratic production *[ɔs] in L2; idiosyncratic production *[ʊs] in L3/Ln). Further, P6_m also produces one instance each of /lt/ in the L2 and the TL (/lt/: idiosyncratic production *[aʊt] in L2; reduction to *[t] in L3/Ln), and P8_m shows one token of /lp/ in his English and German (/lp/: idiosyncratic production *[b] in L2; idiosyncratic production *[lb] in L3/Ln). One more relevant cluster pairing comes from P5_f, who combines two incorrect L2 cluster realisations of /lt/ with one incorrect TL cluster (/lt/: reduction to *[t] and idiosyncratic production *[aʊt] in L2; reduction and paragoge to *[tə] in L3/Ln). A further six learners do not produce any similar coda clusters at all, as mentioned. The rest of the L2 – L3/Ln-cluster combinations can be disregarded for the present LPT examinations because they consist of at least one correctly produced TL-cluster type.

Due to the limited number of tokens per participant statistical analyses do not make sense as the results would not be significant.

6. Discussion

The overall objective of the present empirical, cross-sectional study was to answer the question of whether LPT exists at all or not. With the help of three segmental and suprasegmental features, namely speech rhythm (see section 6.1), vowel reduction (see section 6.2) and CCC realisation (see section 6.3), it was attempted to give an answer to this question. The individual results, as just presented, will be discussed subsequently with regard to their potential to provide evidence for the existence of LPT. A final condensed summary of the conclusions that can be drawn from the results will be given, and the research questions put forward in section 4.1 will be answered (see section 6.4).

6.1 Speech Rhythm

The aim of the previous sections on speech rhythm measurements was to investigate the potential occurrence of lateral phonological influence from the L2 English of the L1-Mandarin native speakers onto their TL-German productions. The quantitative-qualitative empirical analyses of the participants' German productions, measuring speech rhythm with the two metrics of %V and nPVI-V, exhibited heterogeneous results.

The first objective was to elicit potential sources of influence overall on the mean %V and nPVI-V values computed for all participants and across all TL-German tasks (see section 5.1). From the summary of the mean %V values (cf. Table 12), which all lay within L1-German range, it can basically be deduced: the learners must have acquired correctly the proportion of vocalic and consonantal intervals in order to produce native-like speech rhythm in the TL. Interestingly, when measured with the nPVI-V rhythm metric triangulating %V measurements as suggested by Wiget et al. (cf. 2010: 1566), all mean values – except for the German-English hybrid of the picture story narration – lie within English native-speaker range. This points to LPT onto the TL-German speech rhythm from the L2 English. These contradictory results, i.e. according to %V measurements the participants have acquired native-like German speech rhythm, whereas measured with nPVI-V the non-native-like TL-speech rhythm was influenced by the learners' L2 English, could be explained as follows:

Gut (cf. 2012: 85), who compared the reliability of measuring rhythm in learner speech of, among others, the %V and nPVI-V metrics across different studies (e.g. Arvaniti, 2012; Grabe & Low, 2002; Ramus et al., 1999; Dellwo & Wagner, 2003), posited three potential reasons for any observed unreliability of the metrics: firstly, the differences of how researchers segment the speech signal into vocalic and consonantal intervals, which is also the basis for the computation of %V and nPVI-V; secondly, the influence of speaking style; and thirdly – what Gut (2012) hypothesises has the most crucial effect on rhythm metrics –, the influence of speech rate. Seeming the same vocalic and consonantal intervals as annotated manually in the present data by the same researcher were used as the basis for both rhythm metrics, Gut's first assumption does not explain the different results. The second one, i.e. the impact of speaking style, does not hold either because %V and nPVI-V were calculated on the basis of the same types of tasks, namely read-on-your-own text tasks and story retelling. The latter speech rate, however, could possibly be an explanation for the present divergences.

As two different rhythm metrics were used to triangulate the results, which obviously did not work out, there must be some flaw in either of the metrics to consequently arrive at biased results. As was discussed previously (see section 4.2.1.1), there is one crucial difference between nPVI-V and %V: %V measures durational differences globally, i.e. the proportion of vocalic parts of the total utterance duration on a segmental basis is calculated; whereas nPVI-V computes such durational differences locally, i.e. only for specific adjacent interval pairs. Yet, according to previous studies (e.g. Li, 2014), that does not make a difference: both metrics allegedly still arrive at the same results.

However, looking at the differences in results for the present data, this does not appear to be the case. A further difference between the two metrics is that nPVI-V is normalised to control for speech rate (cf. Low et al., 2000); V% is not, although it seems to be quite robust regarding variation in the speech rate (cf. Dellwo & Wagner, 2003; Knight, 2011: 279; Wiget et al., 2010: 1566; White & Mattys, 2007: 509). If speech rate did not have any influence on the calculation of speech rhythm with these two metrics, though, the results should have been the same. Yet, according to nPVI-V values, the results indicate LPT in the learners' TL productions, whereas according to %V values, native-like acquisition of speech rhythm is suggested. The lack of a statistically significant correlation between speech rhythm measured with %V and that calculated with the nPVI-V metric further proposes a bias that prohibits the triangulation of the results with two metrics allegedly measuring the same. The biasing factor could well be speech rate for %V measurements, contradicting prior studies that claim its independence of it. Secondly, this suggests that the results of the nPVI-V calculations, which are designed to be controlled for speech rate, are the correct ones. Subsequently, apparent influence from the L2 English onto the L3-German speech rhythm could be posited.

The overall mean %V of 45.01 within L1-German range, on the other hand, could be explained by a slower articulation rate and thus by a more precise articulation of vowels compared to in the participants' L2 English. The resulting higher percentage of vocalic intervals could thus account for the seemingly correct acquisition of TL-German rhythm. Such overarticulation of vowels is in fact rather common for L1-Mandarin learners for example of English or German: Due to the Mandarin syllable-timing, all syllables are pronounced equally long without the reduction of vowels. This often gets transferred into NNLs Mandarin speakers acquire. There, it frequently leads to this overarticulation of each syllable, particularly in stress-timed languages, even if a certain amount of vowel reduction is required to guarantee isochronous feet, not syllables. Consequently, the %V values within L1 German range of the present participants' data could also point to a certain degree of combined CLI from the learners' L1 Mandarin as well as the learners' L2 English: For English, relatively low %V values (38.0–41.0, see section 4.2.6.1) are common due to the high amount of reduced vowels (e.g. Gut 2009; Grabe & Low, 2002; Ramus et al., 1999). In Mandarin, however, rather high %V values (47.6–55.8, see section 4.2.6.1) are the norm because no vowel reduction exists; and further, according to the most common Mandarin CV-syllable structure, the distribution of vocalic and consonantal intervals is thus almost equal. If influence from both the learners' L1 Mandarin and their L2 English comes together, a hybrid concoction in between could be the result: an intermediate %V value within German native speaker range (42.0–46.4, see section 4.2.6.1) – such as measured in the present study's participants. Consequently, the learners overall exhibit a native-like TL-speech rhythm situated towards the stress-timed end of the rhythm continuum. This, though, might in fact be the result not of correct acquisition but of combined L1/L2 influence.

A similarly multifaceted finding is exhibited examining the measured mean nPVI-V value of TL productions within the L1-English range. Actually, this clearly suggests LPT from the learners' L2. Once again, the syllable-timing and thus little durational variation in vowels of the L1 Mandarin is reflected in low nPVI-V values (27.0–37.0, see section 4.2.6.1). English-native-like nPVI-V due to its durational variability is rather high (59.7–73.0, see section 4.2.6.1) – including the measured mean value of 60.71 for the present TL data. The L1-German nPVI-V range, on the other hand, lies in between (52.5–57.2, see section 4.2.6.1). The high mean nPVI-V value, however, measured for the present study's TL productions unambiguously shows much vocalic durational variation in the TL German similar to that found in English native speakers. Consequently, the learners must have transferred the speech rhythm from their L2 English onto their L3/Ln German, according to the nPVI-V calculations.

What is also conceivable is that these rhythm metrics are perhaps unsuitable to assess speech rhythm in learner language due to its heterogeneous nature. It could be that the idiosyncratic differences between the learners regarding their TL productions effect the different mean %V and nPVI-V values. Contrary to the global measurement %V, which integrates all vocalic intervals in order to calculate speech rhythm, the calculation of the local metric nPVI-V could have been distorted by the productions of specific adjacent pairs by individual learners. This hypothesis will be looked at in detail further down.

To sum up, regarding the target-like %V values, firstly, correct TL-speech rhythm acquisition could account for them. Overarticulation and a concomitant slower articulation rate could also be the reason for the %V values found. Thirdly, potential combined CLI could have led to the German-native-like mean %V value. This would then signify CLI not only from the L2 English, but also from the L1 Mandarin. According to nPVI-V measurements, though, solely L2-English influence is the reason for the calculated TL rhythm within English-native-like range. However, the observed differences in results depending on which metric was applied may also be inherent to the metrics themselves: particularly speech rate could have influenced the %V metric and led to the native-like values calculated. This would suggest that nPVI-V calculations are more likely correct. Individual differences, though, could also be the reason for the diverging results.

Having looked at the respective mean %V and nPVI-V values for the overall TL-German productions, the second aim was to examine in more detail potential variations in speech rhythm across two speaking styles. Again, differences become obvious depending on the rhythm metric applied: In all three German read-out-loud tasks, the mean %V value lies within German native-speaker range with an overall mean of 45.11 across all three texts. For the picture-story retelling, also a German-native-like mean %V of 44.7 is computed for all participants. Like with regard to the overall mean %V, either correct TL acquisition, overarticulation or combined L1-Mandarin/L2-English CLI could be the reason for the native-like results. Further, judging from the similar %V calculations across both task types, speech rhythm then seems to be independent of speaking style, which is also supported by statistical tests. This contradicts, for instance, previous findings by Gut (cf. 2009: 163).

Regarding nPVI-V means for the single speaking styles, a slight covariation with speech rhythm is recognisable: mean nPVI-V values for all three read-out-loud tasks are situated within English native-speaker range, i.e. exhibiting LPT from the L2; mean nPVI-V calculated for the picture-story narration, on the other hand, reflects a German-English intermediate value. Though closer to the L1-English range than to German, the latter combination of L2 and L3/Ln values appears to result from LPT onto the TL-German productions of the story retelling; however, only up to a certain degree, which is mirrored by the statistical calculations. It must have led to an increase of the durational variability of vocalic intervals, and consequently to an increase of the German nPVI-V value computed on this basis, beyond the TL-native-like range up to a German-English hybrid.

These results in fact corroborate as well as to a certain extent refute Williams and Hammarberg's (1993) claim of task relatedness conditioning the occurrence of LPT: According to them, the amount of phonological CLI from a NNL increases the freer and thus more complex the task is, particularly at the early stage of TL acquisition. Williams and Hammarberg found LPT from the L2 German in their L1-English beginner of Swedish particularly in the read-on-your-own tasks, like those of the present empirical study. The measured nPVI-V values corroborate Williams and Hammarberg's finding in the read-out-loud tasks in the non-native TL: due to the participants' relatively low proficiency therein, they tended to draw on their advanced knowledge of the L2 to compensate for gaps with regard to how to produce a target-like speech rhythm in the L3/Ln German. However, the second type of task, i.e. the picture retelling, is even more complex than the reading out loud of a text: The only input were six coherent pictures (cf. Appendix A2) for which they were supposed to make up a story in the TL German. Consequently, according to Williams and Hammarberg's (1993) claim, one could expect even more LPT from the L2 English. Yet this is not the case: instead of an increased amount of LPT, the participants only exhibit a mean nPVI-V for the picture story narration in between German and English native values, i.e. lower than for the reading tasks. So, the learners managed to produce German speech rhythm in the free story retelling to a certain extent, though influenced by the L2 English. For the reading tasks they only drew on the L2 rhythm and transferred it into the TL.

These slightly contradictory findings are also reflected in the correlations computed for each rhythm metric across both speaking styles: For %V, no statistically significant relationship is found between the rhythm of the reading tasks and the rhythm of the picture story narration. This means, how the TL speech rhythm, measured in %V, is produced in the read-out-loud tasks is independent of how it is produced in the picture retelling. With regard to nPVI-V, also no clear correlation can be measured across both speaking styles; so, no relationship exists between the learners' TL speech rhythm in the reading and retelling tasks.

What is interesting is that the rhythm metrics do not correlate, despite the fact that the database for all calculations of both %V and nPVI-V values is the same: the vocalic intervals were segmented and annotated by the same person according to the same principles using the same kind of elicitation material. When computing the correlation coefficient overall for %V and nPVI-V to see whether the results of both metrics based on the same data are correlated, which could be expected, surprisingly none can be found, either. Thus, as in fact they should be correlated, this aspect is possibly inherent to the rhythm metrics. They are probably not suitable to assess learner speech rhythm, contrary to previous findings (e.g. Arvaniti, 2012; Grabe & Low, 2002; Ramus et al., 1999; Dellwo & Wagner, 2003). On the other hand, it could also be due to outliers produced by single participants, which consequently prevent any correlation due to too strong divergences.

This was looked at more closely with regard to the third objective of the study: the single %V and nPVI-V values were examined for each participant in order to elicit individual cases of potential LPT. As already touched upon above as explanation for the differing results overall and in the different speaking styles, idiosyncractic productions could also reflect LPT. But this does not become obvious in the overall means.

As was said, actually the %V and nPVI-V results should be correlated due to the fact that they are based on the same data. So, either the flaw lies with the rhythm metrics themselves, or single participants produce a TL rhythm so far off from the average that it destroys any potential correlation(s). Visualising all %V and nPVI-means of every single participant in a diagram drawing a regression line through the field of measured data points, it becomes obvious which participants diverge most conspicuously.

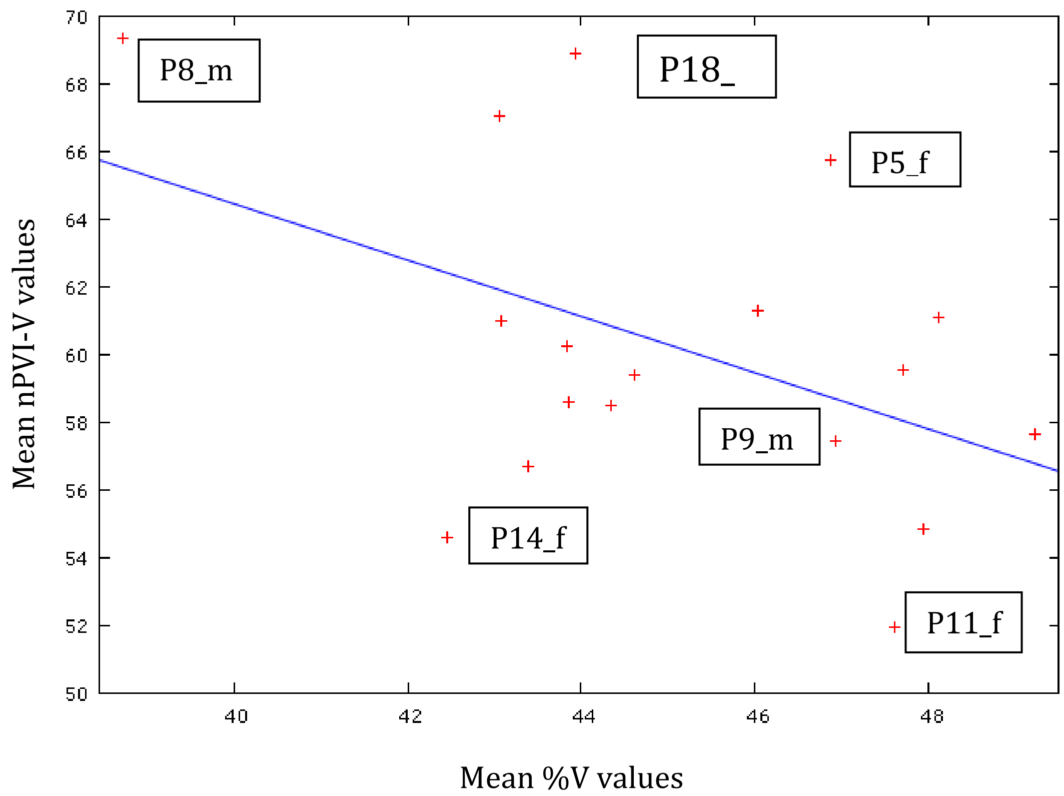

Figure 8. Visualisation of overall %V and nPVI-V means across every single participant, plotted in a linear regression line.

As can be seen from the regression line, the individual mean %V and nPVI-V values plotted against each other are rather heterogeneous across all participants. The following tries to explain the single mean results of %V and nPVI-V calculations looking at the individual linguistic background of the participants. Thereby, it is left aside that this heterogeneity is probably inherent to the rhythm metrics, which are possibly unable to capture learner rhythm.

In line with the participants' linguistic profile, it was expected for them to exhibit LPT from the L2 English. This was to become evident in speech rhythm measurements both using %V as well as nPVI-V. However, solely the values of one of 18 subjects were in accordance with this hypothesis, namely those of P8_m (mean %V = 38.72; mean nPVI-V = 69.32). This LPT onto the TL rhythm goes conform with the allegedly promoting factors when looking at P8_m's linguistic background: With 12 years of formal instruction in his L2 English, he postulates an advanced speaking proficiency level in English. Simultaneously, he claims an advanced beginner's level in the L3/Ln German, the main language of the environment he has been residing in for only one year. Besides, when trying to elicit his psychotypology, he clearly rejects similarities between Mandarin and English. Instead, he stresses the similarities of his L2 English and German, and how these help him acquire his L3/Ln. P8_m moreover clearly exhibits a lot of lexical CLI from his L2, particularly during the interview. He further indicates that he thinks in English when trying to talk in German. All of these factors together, which also favour the occurrence of phonological transfer (see section 3.3) from a NNL according to previous studies, could have triggered this LPT in P8_m's case with regard to his TL speech rhythm.

The rest of the participants, however, show varying speech rhythm results, as visible from Figure 8. The majority with L1-German-like %V (P2_f, P6_m, P10_f, P12_f and P18_m) probably already had a too high TL proficiency. Consequently, this would neither allow for the L1 Mandarin nor for the L2 English to interfere with the correct acquisition of TL speech rhythm. Looking at their individual proficiency self-assessment, this could be true for P2_f and P12_f, who claim an advanced TL-speaking proficiency; P6_m, P10_f and P18_m, though, indicate only a beginner's level. This contradicts advanced proficiency as a reason for native-like %V values. Thus, the latter's subjective self-assessment might diverge from their actual competence in German: it possibly also rather lies in the advanced range, leading to native-like %V production. However, P18_m presents a particularly interesting picture: Objectively, he has one of the lowest TL proficiency levels; he even broke off the picture story narration task and conducted the interview in English due to his self-professed lack of TL-German knowledge. Nevertheless, P18_m also exhibits a mean %V within German native-speaker level. This again suggests that %V is probably not particularly suitable to capture learner speech rhythm correctly. Another potential explanation for P18_m's L1-German-like %V, considering his linguistic profile, is combined influence: CLI from the high L1-Mandarin values together with the low L1-English %V might have resulted in an intermediate L1-German-like %V value (%V = 43.93), as shown by P18_m.

On the other hand, all five participants with German-native-like %V at the same time exhibit L1-English-like speech rhythm when measured with nPVI-V. This could be clear evidence for LPT onto German speech rhythm: English-influenced nPVI-V values within native speaker range are higher than German-native-like nPVI-Vs (i.e. reflecting the differences in vocalic interval production) and much higher than Mandarin L1 values. If it were not LPT, this too would hint at nPVI-V's unsuitability to assess learner rhythm.

A further three participants, P3_m, P7_f and P16_f, also exhibit German-native-like %V. This could also be explained as a Mandarin-English concoction as a result of their combined CLI. It seems logical to follow the explanation that the learners' L1 has at least a certain amount of influence on the TL-German rhythm production and the L2 English an even stronger impact, when looking at P3_m's, P7_f's and P16_f's German-English hybrid nPVI-V values. These could be again explained by combined CLI from the low L1-Mandarin nPVI-V and the high English values: The stronger L2-English influence, resulting in English-native-like TL rhythm, is mitigated by the L1 Mandarin. That results in slightly lower values than English-native-like nPVI-V, i.e. an intermediate between English and German. The learners' linguistic background confirms this hypothesis to a certain extent: All three have received 10 years of formal instruction in English, which should have led to an advanced competence able to influence their L3/Ln German. Nevertheless, P7_f and P16_f conservatively assess their speaking proficiency in English as that of advanced beginners and beginners respectively, and as advanced beginners and advanced learners in their TL German. This then rejects any L2 influence on the basis of a higher proficiency therein, if the proficiency hypothesis is correct. P3_m corroborates the hypothesis: he shows one of the highest proficiency levels in the L2 English, especially due to the fact that he is exposed to it on a daily basis in a native speaker environment. His German, on the other hand, is only rudimentarily left from instruction years ago in school. It thus could have been influenced more easily by his L2 English, according to Williams and Hammarberg's (1993) claim.

Besides those who produce %V like German native speakers, there are a few with TL-%V within Mandarin native speaker range, i.e. P4_m, P13_f, P1_m, P11_f and P15_m. These high %V values signify that the learners relied on their L1 with regard to the amount of vocalic intervals produced; presumably, they transferred the syllable-timing with primarily equally long CV-syllables onto their non-native TL German. When looking at the nPVI-V results, though, rather heterogeneous combinations arise: P4_m and P13_f display German-English hybrids besides their Mandarin %V. This crass divergence of %V and nPVI-V results might be due to problems in assessing learner speech rhythm with these metrics. The German-English intermediate nPVI-V values, however, could also be explained as follows: The learners' TL productions would have been within English native speaker range if they had not been influenced either by their L1 Mandarin, downtoning the high English nPVI-V to German-English hybrid level, or to a certain extent by TL values themselves; thus, by mixing German and English nPVI-V, we arrive at an intermediate hybrid in between. It is interesting that particularly P4_m and P13_f exhibit these values. P4_m confidently indicates a near-native speaking proficiency in English, thanks to his 16 years of active and passive use of and formal education in his L2; his German abilities he judges as those of an advanced beginner, as he learnt it via a brief self-learning course and via immersion by staying in the TL environment during the time of recording. P13_f claims an advanced proficiency in both English and German, due to her 17 years of formal education in English as well as due to her 9-year-long stay in Germany over the course of her English studies. The high English proficiency of both learners could serve as an explanation: their TL nPVI-V values would have lain within English native speaker range, if it had not been for their advanced beginner and advanced competence, respectively, in German. This probably mitigated the high nPVI-V and decreased it down to a German-English intermediate value.

In the case of P1_m, with Mandarin %V and English-native-like nPVI-V, his German proficiency (indicated as advanced, just like his English competence) could have not sufficed to mitigate said L2-English-influenced nPVI-V values in the TL productions. This is surprising seeming that in fact P1_m is one of the participants with an objectively high German proficiency. Despite a lack of formal education, he even exhibits dialectal influence in German, mainly due to his intensive immersion year at a German *Gymnasium*. If nPVI-V correctly captures learner rhythm, P1_m must have transferred the stress-timing known from his L2 English onto the L3/Ln TL German; however, not to the extent so that L1-German values would have been reached.

This is achieved by P15_m, though: Besides L1-Mandarin %V, a mean nPVI-V within German native speaker range is measured. He in fact assesses his German competence as higher than his L2-English proficiency, namely as that of an advanced learner as opposed to only an advanced beginner. This is justified particularly when considering that P15_m has been residing in Germany for 10 years already, but has not received much formal education. Thus, correct German nPVI-V is not surprising along the lines of the proficiency hypothesis, but Mandarin influence when measured with %V is.

The last participant with Mandarin-influenced %V, i.e. P11_f, displays a Mandarin-German hybrid nPVI-V. As a self-professed advanced learner of English it is surprising that apparently no LPT onto her advanced beginner's level L3/Ln German can be measured. This is particularly interesting as she has had eight years of formal education in English as opposed to only two in German. It seems that her TL rhythm measured with nPVI-V is the result of a combination of her L1 Mandarin and rudimentary German speech rhythm. On the other hand, the Mandarin-German hybrid could also be explained drawing on P11_f's English knowledge: her L2 could have had only a slight influence on her TL productions, which otherwise would have been completely influenced by the L1 Mandarin. Thus, it could have increased the mean nPVI-V value slightly up to a Mandarin-German intermediate level.

Furthermore, there are a few participants who show rather heterogeneous patterns of %V and nPVI-V results. Coming back to Figure 8, one of the farthest removed from the regression line is P5_f (mean %V = 46.87; mean nPVI-V = 65.76). Her German-Mandarin hybrid mean %V points to a fossilised TL form influenced by the subject's L1 Mandarin when looking at her background: With 11 years of residence in Germany, P5_f is the participant with the longest exposure to the TL in the native environment. She consequently assesses her TL oral proficiency as that of an advanced learner. This counteracts Williams and Hammarberg's (1993) claim that LPT preferably occurs at the early stages of TL acquisition. P5_f must have passed beyond that stage, and the previous L1 influence suppressed at first (cf. Williams & Hammarberg, 1993) has influenced her TL-speech rhythm productions. In that, L1 and TL features converged so that she ended up producing a hybrid German-Mandarin concoction when measuring the amount of vocalic intervals in %V.

However, though she solely uses it in class and now only applies it passively, P5_f also received seven years of formal instruction in her L2 English. This could account for the LPT on her TL speech rhythm measured with the nPVI-V metric, resulting in an English-native-like mean value. Contradictory to the above postulated factors promoting LPT, however, is the fact that P5_f actually assesses her L2-source language speaking proficiency lower (beginner) than that in her L3/Ln TL German itself. The utterly diverging results of the two speech rhythm metrics, although based on the same data, once again possibly point to a weakness inherent to one or both metrics themselves: both are unable to correctly capture learner speech rhythm.

Looking at P9_m (mean %V = 46.92; mean nPVI-V = 57.43), two opposing hybrid values, i.e. German-Mandarin %V and German-English nPVI-V, require an explanation. The former German-Mandarin intermediate %V could reflect an ongoing L1-Mandarin influence on TL production. However, if Hammarberg and Williams' (1998) claim is correct, it is surprising then that no L2-English influence is recognisable, considering P9_m's linguistic background and proficiency self-assessment: P9_m has only been residing in Germany for a month at the time of recording, and so far has received two years of his still ongoing formal education. He assesses himself as advanced beginner of German, who reports on actively and passively using the TL, and as an advanced learner of English, with nine years of experience in formal education. This relatively low TL proficiency and rather high potential SL level suggests a favoured L2 influence over L1 transfer on TL speech rhythm, according to previous studies (e.g. Hammarberg, 2001; Hammarberg & Williams, 1993, 1998; Murphy, 2003). As a consequence, longer vocalic intervals than usual for a German native speaker, but not as long as for a Mandarin native, could be measured. Nevertheless, P9_m's TL proficiency apparently must have sufficed for the suppression of L1 influence to be lifted. This is corroborated by the fact that an intermediate German-Mandarin vocalic percentage is measured, and no English influence.

With regard to P9_m's second hybrid speech rhythm value, i.e. German-English nPVI-V, this again goes against L1 influence, as argued for %V computations. Assuming nPVI-V is a valid metric, this could point to LPT, corroborated by his sufficiently high L2-English proficiency level: P9_m's nPVI-V German productions could have been influenced by his L2 to a certain extent and thus been raised up to German-English intermediate level. On the other hand, combined influence on TL productions is also conceivable: The L2-influenced TL-German rhythm could have additionally been affected by L1-Mandarin influence. This would have led to slightly downtoned German-English intermediates instead of values within English native speaker range. With the present methods available it cannot be decided which scenario is more likely, unfortunately.

The last curious results concern participants P14_f (mean %V = 42.45; mean nPVI-V = 54.6) and P17_m (mean %V = 43.38; mean nPVI-V = 56.69): Both rhythm measurements exhibit values within German native speaker range. At first glance, these results appear to reflect correct TL rhythm acquisition. However, their proficiency level self-assessments in German as beginners would rather suggest LPT from their advanced beginner and advanced competence, respectively, in English. With seven years of residence in Germany, P14_f could also err in her conservative self-assessment. She could in fact have acquired German rhythm correctly, as reflected by her %V and nPVI-V values. P17_m, on the other hand, has been in a German-speaking environment for one and a half years, with only one year of formal education in the TL. Thus, perhaps transfer from his other languages could be a more likely explanation for the TL-native-like rhythm: for both %V and nPVI-V values, a concoction of simultaneous Mandarin and English influence could have created an intermediate %V and nPVI-V, respectively, within German native speaker range, and thus give the illusion of correct acquisition.

Overall, it could be seen that speech rhythm measurements arrived at rather heterogeneous results: overall for %V and nPVI-V, across the two speaking styles of reading-out-loud and picture story retelling, as well as within the single participants' mean %V and nPVI-V productions. Some LPT is conceivable, but also forward transfer from the L1, as well as combined influence from both the L1 and the L2. What also becomes evident is the fact that the two rhythm metrics, as suggested and used in previous studies, probably are unsuitable to measure learner rhythm correctly. Further, the single factors that allegedly promote LPT, primarily a low TL proficiency and a high SL proficiency, seem to be so multifarious and idiosyncratic that it is difficult to cover all for each participant. This, of course, could also have had an effect on the calculated results.

6.2 Vowel Reduction

The aim of measuring vowel reduction with the four SR metrics was to examine speech rhythm in the L1-Mandarin learners' TL-German productions from a different angle in order to investigate the potential occurrence of LPT from the L2 English.[49] Rejecting the idea of the possibility of transfer, according to Kaltenbacher (cf. 1998: 24), the degree of vowel reduction must be language-specific. This consequently would lead to acquisitional problems for any learner – regardless of his syllable-, stress- or mora-timed L1. Although heterogeneous to a certain extent, the results of the present empirical study examining vowel quantity in terms of syllable length rather refute Kaltenbacher's claim: it is not unavoidably difficult to produce correct vowel reduction in languages other than the L1.

[49] Where possible, participants' productions were included in the analysis only if a sufficiently high number of tokens was produced, i.e. less than 30 tokens were excluded from the discussion of the results.

Firstly, concerning the mean length of the three different syllable types – sfv, srv and sdv – produced in the learners' TL German and L2 English, interesting results appear: Analogously to values as those measured by Gut (cf. 2009: 178f), it was expected that their mean length first of all would be longer in the non-native productions compared to native speaker reference values from the literature; and secondly, that all three types of non-native German syllables would be longer than the non-native English equivalent. Indeed, for both L2 English and L3/Ln German productions, the learner syllable types were longer than the native values as measured by Gut (2009). This points to an overall slower non-native speech. As regards the comparison of English and German learner syllables (see also section 5.2), in fact only sfv and sdv were longer in the L3/Ln, but not srv.

The relatively small difference of 12.25 milliseconds for the sfv values, though, hints at a potential transfer of syllable length from the L2 onto the L3/Ln. Support for this assumption can be found when computing whether both values are significantly different or not. As no such statistically significant difference between the sfv values in the L2 and those in the L3/Ln can be found, it suggests that there is a relationship between them. Put in other words, it appears that some kind of interlingual influence must have occurred between the English and German mean syllable lengths. Of course there is a much higher variation in the L3/Ln-German productions, as shown by the rather high standard deviation. This actually translates to rather heterogeneous productions of the participants. Nevertheless, overall, the similar mean sfv syllable lengths could be the result of LPT from the L2 – or of LPT in the other direction from German onto English. As the L3/Ln-German average value is nowhere near the native speaker reference range (cf. Gut, 2009: 178f), transfer from the L2 is more likely, though. In order to make an unambiguous statement about the occurrence of LPT in the sfv syllables, it would be convenient to also have access to mean L1-Mandarin syllable length values for comparison. Thus could be seen whether they are sufficiently different to the L2 and TL sfv measured, or whether perhaps the L1 could have already exerted an influence.

Like for the full-vowelled syllables, also no significant difference can be found in mean srv syllable values across English and German. This too means that a relationship exists between them – which is not surprising, considering the difference between the mean values, with 6.1 milliseconds, is even much smaller than that for the sfv syllables. Thus, this similarity of syllable length again suggests that possibly CLI from the previously acquired L2 English onto the TL German has occurred. It is corroborated by the L3/Ln values that do not lie within native speaker range and consequently do not signify correct TL acquisition. Again, variation is much more pronounced in German learner productions than in English reduced-vowelled syllables, suggesting heterogeneous mean values across the single participants.

For the syllables containing a deleted vowel, though, which were also shorter in the L2 English compared to the TL German, there is a considerable difference of 25.88 milliseconds between the English and German average sdv. This apparent independence of the L2 and TL values is substantiated by the statistically significant difference computed across the two languages, which signifies that there is no relationship between English and German mean sdv. The extremely high standard deviation in German may be explained by a couple of outliers – first and foremost by P17_m's mean sdv value across the German tasks (431.5 ms). A possible explanation for the divergence of both languages could be the comparatively low number of tokens for each learner compared to sfv and srv. Looking at the single mean TL sdv lengths of each participant, firstly, they only produce one to three tokens of sdv, except for P12_f (sdv n=34); and secondly, there are a few who exhibit very long average TL values, like the above-mentioned P17_m. If only P17_m is excluded from the calculations of the average sdv, the mean result decreases considerably, arriving at an average length of 175.64 milliseconds. When then comparing the mean L2-English sdv with the mean L3/Ln German syllable length, the following becomes apparent: the negligible difference of 6.2 milliseconds between the consequently very similar sdv durations across both the L2 and the TL then also points to transfer of said syllable length, though not native-like, from English onto German. Due to too few tokens, only a single participant (i.e. P17_m) can lead to biased results, such as an extremely long non-native mean sdv in German.

These findings only partly corroborate what Gut (cf. 2009: 192) found in her corpus analyses. There, she showed that rhythmic properties of non-native English as well as of non-native German diverged considerably: syllables involving a reduced or deleted vowel in learner English were not only shorter than those in learner German; durational differences between full-vowelled and reduced-vowelled syllables were also more pronounced (cf. Gut, 2009: 192), as will be discussed further on.

In Gut's (cf. 2009: 192) data, the amount of reduction in non-native German (28.66%) turned out to be greater than in learner English (24.01%), which she attributed to potential non-native language influence (e.g. also Major, 2001). A few of her learners of both English and German substantiated this explanation: they exhibited dissimilar rhythms in their non-native English compared to their non-native German, regardless of their differing proficiency levels across English and German (cf. Gut, 2009: 192). All her participants showed fewer not fully articulated syllables in English than in German. These findings are not corroborated by the present data, as seen in section 5.2: the participants actually produce almost double the percentage of syllables containing a reduced or deleted vowel in the L2 English (29.94%) compared to in the L3/Ln German (17.84%). In the L2, the present learners show a native-like amount of vowel reduction or deletion, as can be deduced from the very similar values to those of Gut's native speakers (cf. 2009: 178f). This reflects their required high proficiency in the potential non-native SL for LPT, with shorter and more syllables containing a reduced or deleted vowel.

However, when looking at the produced TL percentage of almost only half of the L2-English vowel reduction or deletion, another considerable difference compared to Gut's results appears: In her L1-German measurements, the percentages of srv and sdv were very similar to her L1-English values. Further, her learners also produced pretty much the same amount of srv and sdv in native and non-native German and English (cf. Gut, 2009: 178f). The L3/Ln German data by the present participants, though, diverge considerably in this regard: Besides the almost native-like L2-English srv/sdv percentage, the measured TL-German value of only 17.84% reflects a low degree of vowel reduction and deletion – much lower than in Gut's participants. This low value then points in fact rather to L1-Mandarin influence than to LPT, as in Mandarin no vowel reduction or deletion should be found due to its syllable-timing. Consequently, the present learners must have been already beyond a certain TL-proficiency threshold level: According to Hammarberg and Williams' (1993) hypothesis LPT should occur only at the early stages of TL acquisition and is replaced by L1 influence with increasing TL proficiency. Following then their explanation for the apparent L1-Mandarin influence (cf. 1993: 68), the participants must have rejected drawing on the L2 English as a coping strategy with the new non-native TL. Instead, they must have focused directly on the German productions and thereby unconsciously increased phonological CLI from the L1. As the learners still produce at least some vowel reduction and deletion, it is conceivable that the participants previously rendered higher srv and sdv percentages, but have indeed reached already a too high proficiency level for LPT to occur unhindered. The computed t-test result attests to a non-existent relationship between not fully articulated syllables in the L2 and the TL.

With regard to the mean durational ratio calculation using the four different SR metrics to assess the learners' speech rhythm, the results were attributed to the established native speaker reference ranges (see section 5.2). It was expected that the learners show similar rhythm in their L2 and L3/Ln due to phonological CLI from English in their TL-German productions. This took into account their linguistic background as advanced L2-English learners with a low TL-German proficiency as well as the previously discussed factors promoting LPT (see section 3.3). However, looking at the data, predominantly rhythmic differences become recognisable.

The overall mean SR_3 values possibly corroborate the hypothesis with their similarity across the English and German learner productions. When comparing the ratios based on the present data, i.e. 0.78 : 1 for L2 English and 0.74 : 1 for L3/Ln German, with the L1-SR_3 values established in section 4.2.6.2, i.e. 0.1–0.7 : 1 for L1 English and 1.09–1.14 : 1 for L1 German, it can be seen that, firstly, overall the learner syllables in English are slightly longer in learner speech as opposed to in native speakers. Consequently, English learner speech is slower. The contrary is in fact true when comparing TL German and L1-German reference values: the non-native productions appear to be much faster. Or put in other words: the rather similar average SR_3 value of German to that of English native speakers and very dissimilar to German native values suggests LPT. This is also corroborated to some degree by a certain correlation found for SR_3 in English and German learner syllables.

Further, the overall mean SR_1 values also possibly attest to LPT with their relative similarity across the English and German learner productions (i.e. 1.2 : 1 for L2 English and 1.17 : 1 for L3/Ln German). Contrasted with the L1-SR_1 values from Gut's (cf. 2009: 178f) study, i.e. 1.18 : 1 for L1 English and 1.12 : 1 for L1 German, it can again be seen that overall learner syllables are longer in learner speech, which is consequently slower. Moreover, the learner ratios as measured in the present study are closer together than Gut's native speaker ratios (0.03 in learners vs. 0.06 in native speakers), reflecting less durational differences (cf. also Gut, 2009: 176). This divergence of the English and German ratios is not that substantial. But the similarity of the learner values could actually point to a transfer of full-vowelled syllable length from the L2 into the L3/Ln, as was already mentioned in the above discussion of the mean syllable type lengths. Considering the established reference values, indeed the TL-German value reflects a German-English hybrid ratio; this probably results from LPT of the native-like English ratio on L3/Ln productions, which increases the TL SR_1, but only up to an intermediate level. However, this cannot be supported by statistics – the correlation of syllable ratios for two subsequent full-vowelled syllables is not significant across the L2 and the TL.

Looking at the other two mean SR results, though, mentioned rhythmic differences become obvious. With regard to SR_2, for which also L1-reference values from Gut's (cf. 2009: 178f) study exist (i.e. 2.45 : 1 for English and 1.76 : 1 for German), interestingly the English learner ratio (i.e. 1.76 : 1) is much lower than the L1 value; in fact, it lies within German native-speaker range. This shows that the participants do not even approximate native rhythm in the L2 English, as expected from advanced learners. It is either due to lateral transfer from the L3/Ln onto the L2, which according to factors like SL proficiency, though, should be unlikely; or it is due to L1-Mandarin influence, decreasing the SR_2 to a certain extent, but only down to an L1-German level and not to a Mandarin-native-like ratio of 1 : 1. The overall mean SR_2 computed for the German learner speech (i.e. 1.92 : 1), however, is higher than the native value as indicated by Gut (2009): they are situated in between German and English. Like for SR_1, this appears to be the result of L2 influence on the learners' German speech rhythm, raising the ratio up to hybrid level in between German and English.

Moreover, the sheer fact that syllable pairs of the kind srv+sfv and sdv+sfv exist in the TL productions of some participants points to L2 influence: As was said before (see section 4.2.1.2), vowel reduction or deletion in native German in fact occurs only in post-stress syllables (cf. Gut 2009: 169; e.g. Helgason & Kohler, 1996; Kohler, 2001); consequently, no correct TL acquisition holds for the results at hand. L1 influence does also not serve as an explanation, seeming there is no vowel reduction or deletion in Mandarin Chinese and thus also no srv+sfv or sdv+sfv syllable pairs, respectively. Yet, 595 srv+sfv combinations and 42 sdv+sfv pairs were annotated in the present data. With 1,157 srv+sfv and 53 sdv+sfv pairs produced in their L2 English, it appears that the learners' German syllable pair productions were affected by LPT. So, also pre-stress vowel reduction and deletion was produced in their TL. Particularly the relative similarity of mean SR_3 values across English and German supports this hypothesis. The slightly diverging absolute SR_4 values (i.e. 0.69 : 1 for L2 English vs. 0.83 : 1 for L3/Ln German), however, have to be considered with caution because of the low number of occurrence. They do not serve as corroborating evidence for LPT, but rather seem to be either an L1-influenced TL ratio or an idiosyncratic value. Eleven participants did not produce any sdv+sfv pairs in their German data; two additionally did not even display any for the L2 English. For the latter two, the claim of LPT is not valid because no produced pre-stress vowel reduction or deletion exists to transfer. Consequently, particularly relevant with regard to being affected by LPT are solely those learners who produce both srv+sfv as well as sdv+sfv pairs in their L2 English and L3/Ln German, as will be looked at further on. However, these do not exist in the present study population.

Regarding the durational variation across the four ratios, the most crucial differences are visible in the TL-German SR_2 results: the full-vowelled syllable followed by a reduced-vowelled syllable is almost twice as long as said srv. It is particularly interesting that the full-vowelled syllable at the initial position of the syllable pairs on which the SR_1 and SR_2 measurements are based varies in length depending on its position: it is considerably longer when followed by a reduced-vowelled syllable as in SR_2 (**sfv**+srv) compared to in SR_1 (**sfv**+sfv), both in the L2-English and L3/Ln-German productions. This could be due to the extreme prominence put on the single full-vowelled syllable in an sfv+srv pair, once again as a result of overarticulation.

What is also striking regarding durational variation is the fact that in the TL-German SR_3 and SR_4, the syllable containing a deleted vowel (SR_4: **sdv**+sfv) is longer than the syllable with only a reduced vowel (SR_3: **srv**+sfv). The reason for this could actually be the relatively restricted number of tokens of the syllable pair sdv+sfv (n=42) as opposed to the pair srv+sfv (n=595). Already a few diverging participants could have an impact on the average length of the first syllable, resulting in a longer sdv than srv. Indeed, looking at the individual means across the 42 produced TL pairs, the three participants P2_f, P12_f and P15_m stand out with their high mean SR_4 values (i.e. 0.95–1.00 : 1), i.e. almost equally long syllables, like those of L1-Mandarin speakers. With such few tokens, this has of course the potential to bias the overall mean SR_4. On the other hand, from the 595 tokens of srv+sfv as the basis for TL-SR_3 measurements, the mean ratios of the two learners P11_f (i.e. 0.91 : 1) and P13_f (i.e. 0.95 : 1) further are conspicuous with Mandarin-native-like ratios. It seems as if they had possibly transferred their English-Mandarin hybrid L2 SR_3. Simultaneous L1-Mandarin influence on the TL production then led to the TL-SR_3 values they exhibit. Looking at the absolute L2 ratios of 0.78 : 1 and 0.79 : 1, respectively, it is conceivable that the increase of the ratio could be due to combined L1 and L2 CLI.

The second main aim of examining speech rhythm in terms of vowel quantity with the syllable ratio metrics was to explore whether these ratios reflect any covariation with speaking style. For that, the single four ratios were looked at more closely in the reading tasks as opposed to the picture retelling. As could be seen in Figure 7, there is hardly a difference in the SR_1 as well as the SR_3 values across the two speaking styles (i.e. 0.03 for both): values for the picture story narration are only slightly higher. This similarity of ratios across both types of tasks in fact suggests no covariation with vowel reduction, and consequently no differences of speech rhythm interacting with speaking style. Surprisingly, though, computing the correlation coefficient, SR_3 is the only ratio to show a certain significant relationship across the two speaking styles.

With regard to SR_2, the TL-German learners still exhibit no significant durational difference (i.e. 0.15) between the reading and retelling tasks. This is also reflected by the lack of a statistically significant correlation. So, also no real interaction of vowel reduction and speaking style becomes apparent. However, it is interesting that the participants exhibit greater durational differences in the reading task than in the story retelling, which is the other way round for SR_1, SR_3 and SR_4. Looking at the absolute ratios, SR_2 lies in between German and English values both in the reading condition as well as in the retelling task. Both ratios thus point to influence from the L2 English onto the TL SR_2, which increases the latter up to an intermediate value in between German and English. Consequently, SR_2 calculations cannot confirm that there is more LPT in the speech rhythm of the picture story narration compared to in the reading tasks.

Compared to Gut's (cf. 2009: 181) findings, who computed among others mean SR_2 values in TL-German learners across the three speaking styles of free speech (1.44 : 1), retelling (1.48 : 1) and reading (1.53 : 1), the present participants overall displayed greater durational differences in the reading condition (1.96 : 1) as well as in the picture story narration (1.81 : 1). This is in line with what Engstrand and Krull (2003) concluded from looking at syllable duration in Swedish across reading tasks and spontaneous speech: syllable durations vary more in read-out-loud tasks than in spontaneous language, where durational variability seems to level out and approaches syllable-timing. Nevertheless, Gut did not find any statistically significant differences in the SR_2 values across the mentioned three speaking styles in her German learners, which is corroborated by the present SR_2 data.

Looking at the SR_4 measurements, which cannot be calculated for German native speech because no syllable pair sdv+sfv exists, also yields interesting insights: With a difference of 0.18, the German learners exhibit the comparably greatest durational difference between the two speaking styles, with a higher ratio in the picture story narration. Yet, no potentially significant correlation across the two types of task can be computed due to the few tokens available of sdv+sfv syllable pairs. This, of course, can also bias results and has to be considered when drawing conclusions on SR_4 production.

When juxtaposing the ratios computed across the two types of task in order to elicit potential sources of transfer, we arrive at heterogeneous combinations (cf. Table 29; see also section 5.2).

Table 29. Summary of mean syllable ratios SR_{1-4} across the two speaking styles reading out loud and story retelling including an indication of the statistical significance computed for the ratios of both styles.

TL task	**SR_1**	**SR_2**	**SR_3**	**SR_4**
L3G_text	1.13	2.24	0.61	0.51
L3G_sentences1	1.15	1.87	0.78	0.76
L3G_sentences2	1.19	1.78	0.72	0.98
Mean L3G_reading tasks	**1.16**	**1.96**	**0.70**	**0.75**
Mean L3G_picture story	**1.19**	**1.81**	**0.73**	**0.93**
Significance	n.s.	n.s.	*	---

As regards SR_1, which is attributed to the L1-English range for the picture story retelling and to an intermediate German-English value for the readings, Williams and Hammarberg's (1993) hypothesis appears to be confirmed to some extent: According to them, phonological CLI between NNLs is more likely and more frequent the more the learner has to focus directly on producing the TL forms. This is the case to a higher degree in free speech and relatively free retellings as in the present study, less so for reading-out-loud tasks, and the least for speaking or reading after a native speaker model (cf. Williams & Hammarberg, 1993). Both SR_1 values seem to have been affected by L2 CLI, which can be deduced from the similarly increased durational differences they display. The retelling tasks, though, show even more pronounced LPT: a ratio within English native-speaker range is computed as opposed to the slightly lower German-English hybrid in the reading condition. Although also influenced by the L2 up to German-English intermediate level, SR_2, on the other hand, refutes Williams and Hammarberg's (1993) claim; both ratios in the two kinds of task lie within the same reference range. The sheer fact that SR_3, together with SR_4, can be calculated for the present data again already signifies LPT by virtue of being produced at all. But despite that the mean SR_3 for the read-out-loud task reflects an English-native-like ratio influenced by the L2, and the story retelling an English-Mandarin hybrid as a result of combined CLI from the L1 and the L2, no significant difference exists between both types of task when looking at the absolute ratios. So, it does not justify claiming a difference in the amount of LPT exerted in the two different speaking styles. Further, the SR_4 of the reading condition is located in between English and Mandarin L1 values, reflecting a concoction of the learners' L1 and L2 as a result of combined influence. Together with the L1-Mandarin-influenced ratio of the picture story retelling, this actually completely goes against Williams and Hammarberg's (1993) hypothesis: only the former reading task seems to have been affected slightly by LPT; the story narration not at all, though it should have been subjected to L2 influence according to Williams and Hammarberg. These findings are also corroborated by calculations of any potential correlation across the two types of task for each syllable ratio. It solely turned out to be slightly statistically significant for SR_3, but neither so for SR_1 nor for SR_2; there were too few tokens to be able to calculate a meaningful correlation for SR_4.

To sum up, with regard to the covariation of speech rhythm in terms of vowel reduction and speaking style, the present results cannot clearly confirm Williams and Hammarberg's (1993) hypothesis of a task-related occurrence of LPT. Whereas they found significantly more LPT in their subject's free speech, the results based on the present data are not so unambiguous: Rather heterogeneous ratios across the two speaking styles examined with various sources of influence cannot unreservedly support their claim. No clear difference can be seen between an increased amount of LPT on the relatively free picture retelling task as opposed to in the reading condition. This suggests the possibility that Williams and Hammarberg's finding is only an artefact of their methodology or of the productions of their single subject. It thus requires further systematic empirical investigations, preferably corpus-based on a large empirical basis, with even more participants and further speaking styles, in order to arrive at clear results.

Besides the above-mentioned conspicuous SR values in certain learners, there are also a few more interesting ratios in some participants which hint at idiosyncratic patterns of interlingual transfer. As visualised in the subsequent Figures 9 to 12, TL productions of SR calculations are overall rather heterogeneous; various potential SLs for CLI on the TL phonological system can be seen: some participants apparently exhibit the sought-after L2 CLI, with L3/Ln-German syllable ratios within English native-speaker range or in between German and English values; others show L1-influenced ratios within Mandarin native speaker range or hybrid values in between the L1 Mandarin and German; some exhibit combined CLI from the L1 and L2 in between English and Mandarin; and some display native-like TL productions.

Starting with SR_1 measurements, Figure 9 depicts again the realised values across all participants (see also section 5.2).

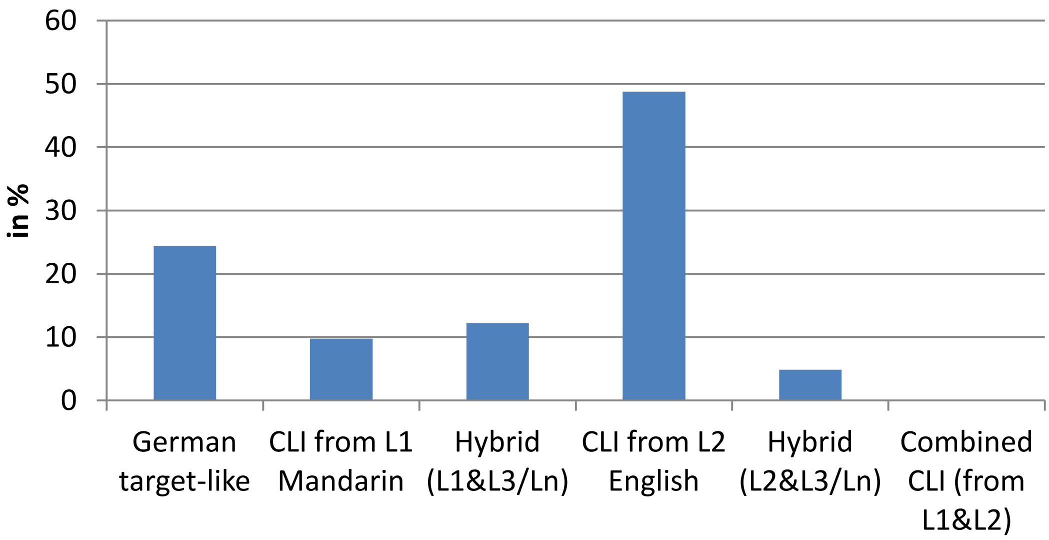

Figure 9. Assignment of ratios to reference ranges and percentages of CLI from the source languages onto all participants' non-native-like L3/Ln German productions of SR_1, juxtaposed to target-like ratios.

For the sfv+sfv syllable pairs, a clear L2-English influence is recognisable. Particularly the SR_1 values of P1_m, P3_m, P12_f and P14_f are all subject to intense LPT. Their ratios are even situated beyond the postulated L1-English reference values, resulting in increased durational differences within the sfv+sfv pair and consequently in the TL speech rhythm.

Apparently, all four learners must represent an ideal combination of factors promoting LPT: the L2-English ratio, which is also already higher than when produced by English native speakers, is transferred from their L2 onto their L3/Ln German across all tasks. All four comply with the required high SL proficiency in English; their length of formal instruction shows that, although P14_f conservatively assesses herself only as advanced beginner in speaking English, in contrast to the advanced proficiency the others ascribe to themselves. Particularly P3_m complies with Hammarberg and Williams' (cf. 1993: 67f) hypothesis of a favourable condition for LPT when the SL proficiency is advanced and the TL proficiency at beginner's level: he is the only participant exposed to the L2 English in a native speaker environment, and indicates a very low non-native German competence. P1_m and P12_f indicate an already advanced speaking proficiency in the L3/Ln after four years of residence in Germany. However, they still also exhibit LPT like the beginners P3_m and P14_f, which either points to an incorrect self-perception of their TL competence or to other factors than a low TL proficiency promoting CLI.

Besides these four thoroughly LPT-influenced learners, though, most (i.e. P5_f, P7_f, P8_m, P9_m and P11_f) exhibit a mixture of L2 influence and target-like productions of SR_1 across the different tasks. Compliant with Hammarberg and Williams (cf. 1993: 67f), with between 7 to 12 years of formal instruction in English and only up to 2 years in German, they indicate an advanced level of English (apart from P5_f and P7_f with beginner's and advanced beginner's self-assessed proficiency, respectively) and an advanced beginner's competence in the TL (again apart from P5_f indicating advanced knowledge). P7_f, P9_m and P11_f additionally have been residing in Germany solely for a month at the time of recording. It appears that although their L2-English proficiency is high enough to influence their TL-German productions, they are already a bit more advanced in the L3/Ln so that they alternate between SLs: they are able to reproduce target-like SR_1 in some tasks, but in others still rely on their L2 English. They transfer it onto TL productions, which results in German ratios within English native speaker range. P9_m, however, unlike the other four learners, does not even produce a single target-like mean ratio in the L2 English read-out-loud task to be transferred. Instead, he shows a German value. Seeming he also displays a very similar SR_1 to his L2-English ratio in one of his German tasks, though, still hints at LPT. However, this results in a target-like German production due to its transfer already from the L2. The German and English L1 ratios of P5_f also have to be considered with great care: In the speech rhythm measurements in terms of %V and nPVI-V, P5_f has exhibited conspicuous values (see section 6.1). These possibly distorted the results, as shown in the statistical analyses. Now, for the vowel reduction analysis, it is also rather surprising that after 11 years of residence in Germany, P5_f's TL-German proficiency seems to be low enough for it to be affected by LPT; she still attributes only a beginner's speaking proficiency in the L2 English to herself, with seven years of formal education.

One of the learners that contributes to the percentage of L1-Mandarin-like ratios is P10_f, who rather curiously produces such a ratio in her picture story retelling, although her other TL-values lie beyond English native speaker ratios. These are possibly transferred and intensified from her L2-target-like SR_1. The Mandarin ratio could actually be an artefact, resulting from a rather low number of tokens in the retelling (n=10). If this can be disregarded, then the leftover L1-English values make sense considering P10_f's linguistic background: with 10 years of formal instruction in her L2 English (although she still assigns herself an advanced beginner's speaking proficiency in her L2), she likely possesses the required level of competence for LPT to occur. At the same time, P10_f has been residing in Germany for about a year, with only just eight months of formal instruction, also reflected in her self-assessment as that of a beginner. This again suggests a rather low TL proficiency, which is apparently conducive to being influenced by a non-native language like the L2.

The L1-CLI percentage consists further of TL-German productions within Mandarin native-speaker range by P17_m and P18_m. Particularly P17_m's L3G_picture story and L3G_sentences1 show L1 influence, although the former with only three produced tokens has to be considered with caution. What is curious, though, is the fact that P17_m additionally also exhibits a German-English hybrid SR_1 for L3G_sentences2. This could result from a concoction of L3/Ln features and his hypercorrect L2-English ratio even beyond native speaker range. The partial L2 influence can be explained considering P17_m's proficiency levels: a self-assessed advanced learner of English, in line with his 11 years of formal instruction in the L2, and his beginner level of German, corroborated by his 1.5 years of residence in Germany and only about a year of formal instruction in the L3/Ln, suggest the occurrence of LPT. However, that does not account for the L1 influence on TL productions. According to Hammarberg (2001: 34) and Hammarberg and Hammarberg (1993: 61), this does not really go together with LPT: concomitant with an articulatory resetting of the neuro-motor routines with a more advanced TL proficiency level is often a simultaneous increase of L1 influence that replaces L2 CLI as a result of persistent L1 settings.

A further heterogeneous profile ratio is exhibited by P18_m, who shows a 1 : 1 ratio for the L3G_sentences1 task, i.e. perfectly Mandarin-native-like and thus seemingly influenced by the L1. On the other hand, he also produces a target-like mean SR_1 for L3G_sentences2, which seems to reflect correct acquisition. Looking at P18_m's L2-English ratio, though, it appears as if there is a consistent underlying L1 influence in all of his productions: the German-English hybrid L2 SR_1 could already be the result of an L1-influenced English ratio, decreased down to the intermediate level in between German and English. This hybrid SR_1 in turn could have been further transferred into the L3/Ln when acquiring German. The latter is suggested by the similar ratios, but simultaneously with influence from the L1 Mandarin, which must have decreased the transferred ratio even further down to the seemingly target-like German value. The linguistic background of P18_m supports this argumentation: in Germany for only seven months without any formal instruction in the TL as opposed to six years of instruction in English, P18_m is trying to acquire German by immersion at the time of recording. He considers himself an absolute beginner of the L3/Ln. This, in fact, is the ideal set-up for LPT to occur, if Hammarberg and Williams (1993) are correct; it is even surprising that not more unambiguous L2 CLI can be found in P18_m. A possible explanation for that, as well as a drawback for the study, is that for P18_m's analysed TL tasks only 17 to 19 tokens were produced by him. It suggests to only draw conclusions from these results carefully.

Rather interesting is also P16_f's combination of ratios across the different tasks. She displays a German-native-like L2-English value, which appears to have also been transferred onto the L3/Ln due to its similarity with the L3/Ln ratio. For this value, two explanations seem possible: Firstly, there could be an underlying L1-effect on the L2-English ratio within German native-speaker range. That means Mandarin has had an influence on the acquisition of vowel reduction in the L2, but only to the extent that the L2 ratio was elevated up to L1-German level. This L2 value again was then possibly transferred into the L3/Ln, which the similarity of ratios in L2English_text and L3German_sentences1 suggests. Further, potential LPT could have also occurred in the form of combined CLI from the L1 and the L2: said L2-English value already affected by the L1 could have amalgamated with further Mandarin influence and consequently combined to a Mandarin-German hybrid concoction, as found in P16_f's L3German_picture story.

The second possible explanation for P16_f's ratios also suggests lateral transfer, but not from the L2 onto the L3/Ln, but the other way around: Indeed, looking at P16_f's metadata, it can be seen that she has been residing in Germany for 6 years already; she further has received formal education in the TL for around 5 years as opposed to 10 years in English. However, it appears as if P16_f's dominant non-native language has shifted from English to German. This is also reflected in her self-assessment as beginning speaker of English, but as advanced speaker of German. Consequently, it is conceivable that P16_f's German proficiency level is indeed beyond that of a beginner, as can be seen in the target-like L3/Ln-German ratio. By now, it is able to exert influence on her L2 English, whose proficiency level in turn must have declined particularly with the lack of its use P16_f reports on.

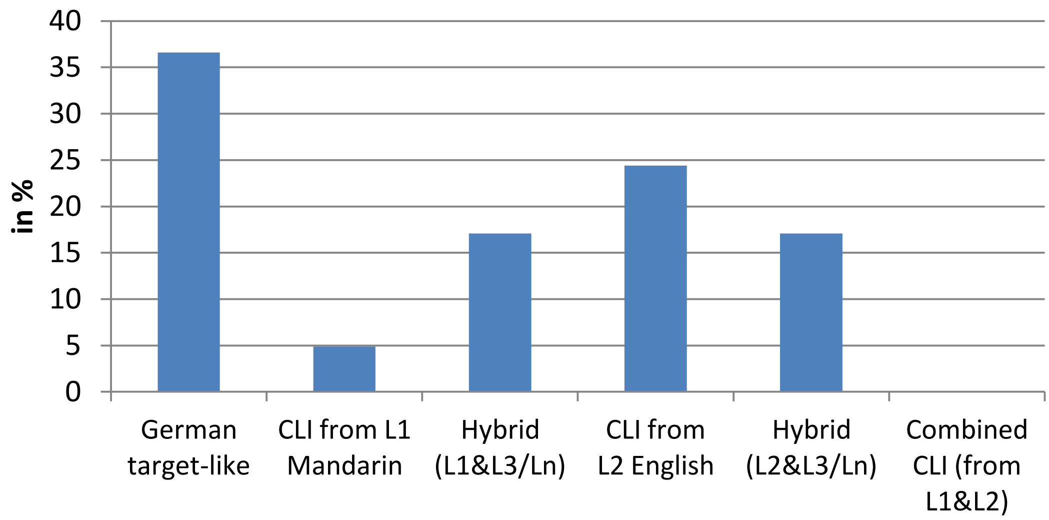

Figure 10. Assignment of ratios to reference ranges and percentages of CLI from the source languages onto all participants' non-native-like L3/Ln German productions of SR_2, juxtaposed to target-like ratios.

The assignment of the mean SR_2 calculations to the respective reference ranges (see also section 5.2) as depicted in Figure 10 presents a different picture than for SR_1. Vowel reduction in the TL sfv+srv syllable pairs appears to have been acquired predominantly target-like, judging from the above bar chart. It indicates a majority of produced ratios within L1-German range.

Although it looks like correct TL acquisition, it is in fact likely that it is the result of underlying L2-English influence, as will be argued: In fact, all computed L2-English SR_2 either lie in between German and English or within the L1-German reference range. Now, taking into account the chronology of acquisition, i.e. English before German, this could either be due to lateral transfer in the direction of from the L3/Ln onto the L2; or it could be due to a consistent L1-Mandarin influence that competes with English features and subsequently decreases the L2 ratio to a German-English hybrid, or even further to an L1-German level. The former, however, according to Hammarberg and Williams (1993) or Hammarberg and Hammarberg (2005), would have to concur, for instance, with a higher proficiency in the L3/Ln.

When considering the linguistic background of all learners in view of this latter hypothesis, four participants stand out: P5_f with 11 years of residence in Germany and P13_f with 9 years plus 2 years of formal German instruction; further, P15_m, who has been residing in Germany for 10 years, but has only been receiving formal instruction in his L3/Ln for 9 months; and finally P16_f, with 6 years of residence in the German native-speaker environment and around 5 years of formal instruction. Moreover, all learners indicate a higher self-assessed speaking proficiency in the L3/Ln German (i.e. advanced) than in the L2 English (i.e. beginner to advanced beginner), apart from P13_f (i.e. advanced in both L2 and L3/Ln). These are already beneficial prerequisites for the L3/Ln German to become the non-native SL. Now, additionally looking at the ratios and their actual number of tokens as produced by the present four learners, no clear lateral transfer from the L3/Ln German can be determined: Firstly, a reasonable number of tokens of sfv+srv syllable pairs in order to draw meaningful conclusions from the calculations is only provided by P5_f (n=47) and P15_m (n=33), but not by P13_f (n=24) nor P16_f (n=23). Secondly, examining P5_f's and P15_m's ratio across their NNLs, both do not unambiguously show sufficiently similar L3/Ln and L2 values, which would point to LPT; in P5_f's case additional L1 influence could have concurred with the L3/Ln features and thus resulted in the relatively similar German-English hybrid L2 ratio. For P15_m, however, the average L3/Ln SR_2 seem more disparate. So, although their linguistic background is suitable for lateral transfer to occur from the L3/Ln onto the L2, no clear evidence can be gained from P5_f and P15_m. Consequently, it has to be dug deeper into the second potential explanation for the numerous seemingly target-like German SR_2 values.

In fact, the linguistic profile of the other 14 participants rather suggests an underlying L2 influence than the discussed lateral transfer from the L3/Ln onto English. With between 6 to 12 years of formal instruction in English,[50] but only up to 2 years in German, as well as chiefly advanced English knowledge and beginner's to advanced beginner's in German as corresponding self-assessed proficiency level, these learners are conducive to showing LPT from their L2 (cf. also Williams & Hammarberg, 1993). Taking the absolute numbers of produced sfv+srv syllable pairs into consideration, P6_m (n=16), P8_m (n=18), P11_f (n=17) and P14_f (n=19) are excluded from the analysis. From the leftover participants, the degree of similarity of the L2- and L3/Ln-SR_2 values and thus the possibility of their transfer can be considered in more detail: P1_m, like P12_f, shows German-English hybrid SR_2 in English. Both, though, are just on the border of the reference ranges to English native-like values. With regard to the similarity of ratios, for P1_m, results from the L3G_sentences1 task are very close, hinting at LPT; the other two mean ratios within L1-German native speaker range of the picture story retelling and L3G_sentences2 are a bit more removed from the L2 value. However, they are still conceivable to be the result of an amalgamation of the German-English L2 hybrid with possibly some L1 features, resulting in a target-like amount of vowel reduction. The same goes for P12_f: her German-English intermediate SR_2 seems to have been transferred directly from the L2 into the L3/Ln. This concerns both L3G_sentences tasks, judging from their similarity of English and German values. Mean SR_2 for the picture story diverges a bit from the German-English L2 SR_2, reaching only L1-German level. This too could be considered the result of combined L1 and L2 influence, arriving at a value in between; it still should also be taken up carefully due to a relatively low number of tokens (n=15).

An unambiguous case of underlying L2 influence is visible in P18_m. He exhibits SR_2 values within the L1-German range not only in the TL tasks, but also in the L2-English one. Besides, the ratios are all rather similar across the tasks and languages, which strongly suggests a transfer of the German-native-like L2 SR_2. This is likely the result of a mixture of L1-Mandarin and English influence during the acquisition of the L2. The LPT is unreservedly supported by P18_m's background: With no formal instruction in German whatsoever and his seven-month long stay in Germany at the time of recording, he assesses his L3/Ln speaking

[50] Apart from P3_m with three years of formal instruction in English; however, he is the only participant to have been residing in an English native-speaker environment at the time of recording.

proficiency level acquired by immersion so far as that of an absolute beginner. Consequently, according to the factor of TL proficiency (see section 3.3.1), his German knowledge is weak enough: he is still conducive to drawing on his L2, although he only considers himself an advanced beginner of English, in order to cope with the very new non-native TL system.

Taking into account that all L2-English SR_2 reflect either German-English hybrids or L1-German native speaker values, as discussed above, suggests the following: unambiguous LPT from the L2 onto the L3/Ln must only be visible in further German-English intermediate values or L1-German SR_2, respectively, in the L3/Ln German. As said, these L2 ratios probably stem from L1-CLI on the L2 during the acquisition of English vowel reduction. Now, looking at the single remaining participants with a reasonably high number of tokens to draw meaningful results from, i.e. P2_f, P3_m, P4_m and P17_m with L1-German L2-SR_2, mixed results appear: Particularly P2_f exhibits a heterogeneous combination of ratios. However, two of those, namely the L1-Mandarin-like L3G_picture story retelling as well as the L3G_sentences1, which reflects a Mandarin-German hybrid, have to be excluded from the analysis due to their few tokens (7 and 14, respectively). Only her SR_2 of the L3G_sentences2 task is based on a sufficient number of tokens. Although just situated in between German and English native speaker values, it is rather similar to the consequently potentially transferred L2 value. P2_f also seems to fulfil a likely very important prerequisite for LPT, namely a rather low TL proficiency compared to the L2 competence level. With her four years of instruction in German as opposed to 12 years in English and a stay in the German-speaking environment for 12 months at the time of recording, she appears more prone to being affected by LPT.

A TL-SR_2 value directly attributed to the L1-English range can be found in P3_m's L3G_text read-out-loud task. Interestingly, his dissimilar L2-English ratio lies within L1-German native speaker range. How can this be explained? P3_m is the only participant in an L1-English environment at the time of recording; additionally, his TL-German proficiency is rather low, with only six months of formal instruction and him hardly using it anymore. This makes him an ideal candidate to be transferring from a NNL into his non-native TL German, according to the proficiency hypothesis. As he displays a German L2 SR_2, which probably results from mentioned L1 influence during L2 acquisition, however, another German, target-like ratio in the L3/Ln would have to be the consequence. Yet, P3_m produces

English SR_2. If this is not a singular idiosyncratic realisation of L3/Ln German vowel reduction, it could also reflect a hypercorrect TL production: due to the lack of a correct mental representation of German SR_2, P3_m deliberately draws on the language of his surrounding, i.e. English. He thus intensifies the degree of vowel reduction, which he probably perceives to be a crucial feature of adequate TL production. Consequently, P3_m arrives at a more pronounced durational difference within the sfv+srv syllable pair in his L3/Ln compared to that in his L2.

Similarly, a further L3/Ln ratio within English native-speaker range is exhibited by P17_m in the L3G_sentences1 task. Again, P17_m in fact shows a German L2 SR_2. It does not seem to have been transferred directly into the TL, though, judging from its dissimilarity. Considering his language learning history, P17_m actually displays an ideal set-up for LPT to occur, according to the proficiency factor (see section 3.3.1): 11 years of formal education in English and only 1 in German, plus a 1.5-year stay in Germany at the time of recording; this is reflected in his self-assessment as advanced L2 learner, but beginner of L3/Ln German. Yet, no direct transfer of his L1-German native-like L2 value can be recognised in the TL. Only a mixture of a German-English mean intermediate value in the L3G_sentences2 task is measured, and a similar ratio – though already within L1-English range – in said L3G_sentences1 reading condition; the result of the story retelling has to be left aside because P17_m only produced two tokens of the sfv+srv syllable pair. These two remaining TL means can be explained either as idiosyncratic interlanguage productions, or as a potentially hypercorrect, intensified rendering of the German SR_2, like in P3_m. Contrary to the latter, though, P17_m is surrounded by TL native speakers, not by those of his L2 English. This makes idiosyncracy as an explanation sound more reasonable.

Finally, P4_m only exhibits L1-German ratios in his L2 as well as in the L3/Ln, apart from one. In the picture-story retelling, he shows a Mandarin-German hybrid, which, however, is disregarded due to the low number of five tokens of sfv+srv pairs. Nevertheless, he in fact appears to show clear LPT from English: With no proper formal instruction in the TL so far, P4_m attributes an advanced beginner's speaking proficiency to himself in German. For English, after 16 years of formal instruction and constant active and passive use, he optimistically indicates a near-native competence level; this is not confirmed objectively by his English productions during the recording session, though. Thus, P4_m is another participant with ideal prerequisites for LPT to occur. Looking at the absolute mean ratios across his L2 and L3/Ln, they are rather similar. This suggests indeed a direct transfer of the already L1-influenced L2-English SR_2 within German native-speaker range into the TL. By chance, the transferred L2 ratio is target-like in the L3/Ln.

According to the above bar chart, Mandarin-German hybrid SR_2 also occur, which were not mentioned so far. However, all but one of these intermediate ratios occur in the picture story retelling. They are in fact all based on under 10 tokens of sfv+srv syllable pairs – too few to draw meaningful conclusions from; consequently, they are neglected.

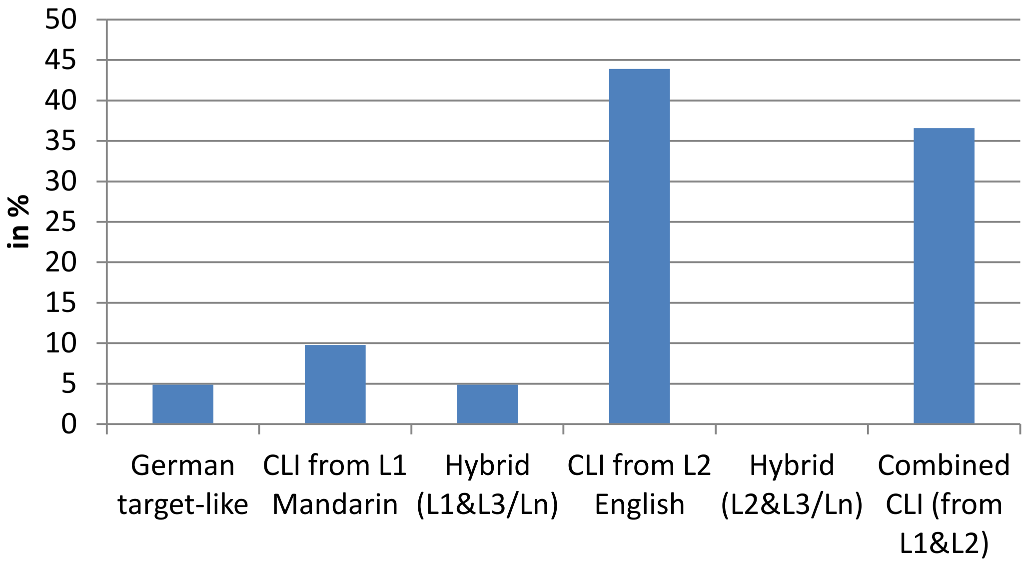

Figure 11. Assignment of ratios to reference ranges and percentages of CLI from the source languages onto all participants' non-native-like L3/Ln German productions of SR_3, juxtaposed to target-like ratios.

The mean SR_3 ranges as produced by the present participants in the TL-German tasks are again different compared to SR_1 and SR_2: At first, it appears as if predominantly LPT, in the form of direct L2 transfer and as part of combined CLI, has occurred. This has to be verified looking at the actual single ratios compiled on the basis of the srv+sfv syllable pairs.

First of all, all 18 participants show pre-stress vowel reduction in German. Such reduction is actually non-existent in native speaker speech. So, the occurrence of srv+sfv pairs is enabled on which SR_3 calculations are based. All subsequently computed German SR_3 are then potentially results of LPT from the learners' L2 English, in which pre-stress vowel reduction and deletion do exist. Several learners, i.e. P6_m, P7_f, P8_m, P11_f, P14_f and

P16_f, indeed produce some such srv+sfv pairs and consequently possibly show a certain influence from their L2. However, due to too few TL tokens they are excluded from the discussion. Looking closely at the remaining single values, a few rather similar L2 and L3/Ln ratios can be seen. These appear to corroborate the hypothesis, namely in P1_m, P2_f, P4_m, P9_m, P15_m and P18_m. Of these, however, only the English SR_3 of P2_f are produced native-like and very similarly, suggesting LPT. This is in accord with her linguistic background: considering that although P2_f attributes an advanced speaking proficiency to herself in both her L2 and L3/Ln, she has only spent 1 year in Germany at the time of recording; further, she has received solely 4 years of formal instruction in the TL as opposed to 10 years in English. So, her non-native source-language English proficiency should supersede her likely beginner's level in the TL German, which apparently promotes LPT.

With regard to those learners who also exhibit similar SR_3 values across both English and German – but both non-native-like – all produce English-Mandarin hybrids (i.e. P1_m, P4_m, P9_m, P15_m and P18_m). It appears that the English SR_3 is the result of an underlying L1-Mandarin influence during L2 acquisition. The intermediate value itself was probably transferred then from the L2 into the L3/Ln TL German, as can be deduced from the interlingual similarity of ratios. This is confirmed considering the likely impact of the factor proficiency (see section 3.3.1), which is reflected in most of the participants' proficiency profiles: With regard to the formal instruction in the TL, they all range between none to two years maximum. Similarly, their length of residence in the German-native speaker surrounding ranges from one month to four years (apart from P15_m with 10 years of residence). Their L2-English instruction, however, comprises 6 to 16 years. This also mostly coincides with the learners' subjective self-assessment of their competence levels: all indicate an advanced beginner's to advanced and even near-native (P4_m) proficiency in the L2; at the same time, they attest absolute beginner's to advanced beginner level in the L3/Ln, apart from P1_m and P15_m with allegedly advanced proficiency.

With differences of 0.1 or more in between the English and German ratios, the other six participants seem to have enhanced further the SR_3 concoction transferred from their L2: Some of the English-Mandarin intermediate L2 ratios (i.e. P3_m, P10_f, P12_f and P17_m) reach English native-like values in the TL productions. This either hints at some idiosyncratic curiosity: the degree of vowel reduction is intensified, arriving thus at an SR_3 within the L1-English range. Or this intensification stems from a sort of hypercorrect rendering of this reduction, which induces influence from the English features of the hybrid SR_3 value of their much stronger L2. Looking at the linguistic background, the latter hypothesis could be corroborated: with between 8 to 11 years of formal instruction in the L2 English (except for P3_m, who has only received 3 years, but is residing in Australia at the time of recording and thus is exposed to English native speakers on a daily basis) and at the same time only very little in the L3/Ln German, namely between none to one year, this slightly different kind of LPT is also conceivable.

The remaining two participants, P5_f and P13_f, also exhibit English-Mandarin hybrid SR_3 in the L2 as well as in the L3/Ln. These intermediate L2 values probably result from combined influence of the L1 Mandarin and English during L2 acquisition. What is interesting and points to LPT then, though, is that the English-Mandarin intermediate SR_3 in the L3/Ln are very similar in terms of the absolute ratios. Thus, the already L1-influenced L2 ratio seems to have been transferred further into the L3/Ln TL: LPT has occurred, although the SR_3 value lies in between the L1 and L2 and thus appears to reflect combined L1/L2 CLI, as also shown in the above bar chart. P13_f additionally produces a mean target-like SR_3 for the German picture-story narration. However, with only 6 tokens for the retelling and all in all 20 tokens for all TL tasks, P13_f's productions should be considered with care.

Interestingly, this proneness to LPT is not unreservedly supported by P5_f's and P13_f's linguistic background: Both have been residing in Germany for 11 and 9 years, respectively. But at the same time, they have received only very little formal instruction in the TL. Their L2 English, though, they have been taught for 7 and 17 years, respectively. Moreover, both consider themselves already advanced speakers of their L3/Ln, which would reject Williams and Hammarberg's (1993) hypothesis of more LPT at the early stages of TL acquisition. Regarding the L2, P13_f also indicates an advanced competence level in line with the proficiency factor hypothesis. Yet P5_f states a beginner's proficiency in English, which would rather suggest lateral transfer from the L3/Ln into the weaker L2 than the other way around. Apparently, either their subjective self-assessment does not reflect their real proficiency levels, the ratios are singular idiosyncracies, or P5_f and P13_f are counterevidence for the proficiency factor hypothesis.

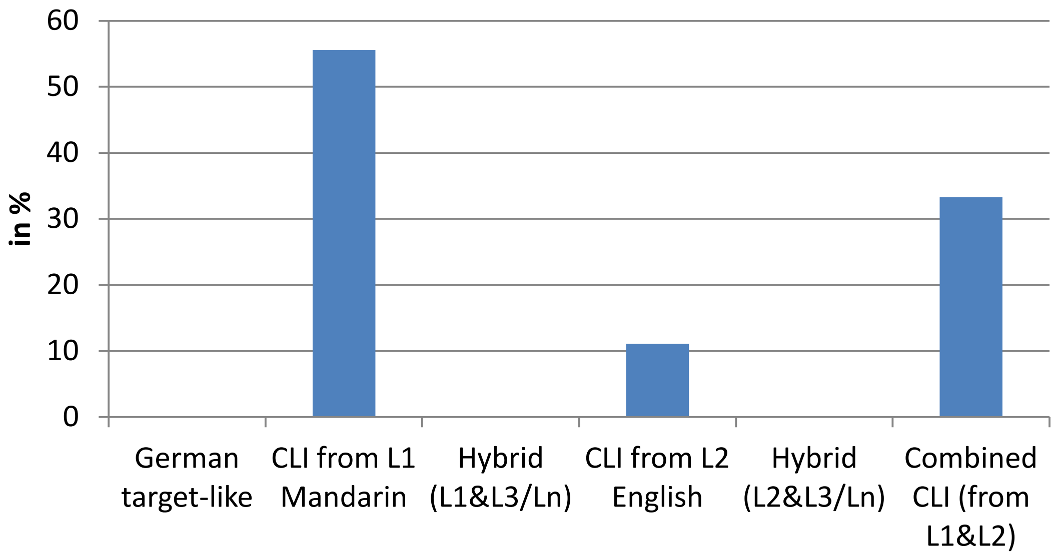

Figure 12. Assignment of ratios to reference ranges and percentages of CLI from the source languages onto all participants' non-native-like L3/Ln German productions of SR_4, juxtaposed to target-like ratios.

First of all, only seven learners produce pre-stress vowel deletion, resulting in sdv+sfv syllable pairs and consequently computed SR_4 values. As a comparison, all 18 learners showed pre-stress vowel reduction as the basis for SR_3 calculations – although it is not even part of the German native-speaker phonological system. As can be seen in Figure 12, another different set-up of attributed reference values becomes apparent for these mean SR_4: primarily L1-influenced values plus Mandarin-English hybrids as well as apparently some LPT.

Overall, the results of the SR_4 calculations must be considered rather carefully, seeming there are only few tokens overall: apart from P12_f, who produces 31 of 42 tokens, only the occasional one to three sdv+sfv pairs can be found in the remaining learners. Like for the SR_3 calculations based on the srv+sfv syllable pairs, the sheer existence of such combinations points to LPT from the participants' L2 English. There, pre-stress vowel deletion exists and is also produced, though not numerously, in all but two learners.

Now, regarding the interesting case of P12_f, both her mean SR_4 in English and the mean ratio in her TL German lie within the L1-Mandarin reference range. However, it could be that this reflects an underlying L1-effect: the already influenced L2-English value is transferred into the L3/Ln. This again would signify LPT. Comparing the absolute English and German ratios of P12_f, their striking similarity indeed suggests such CLI from the non-native English. On the other hand, considering that she produces 31 sdv+sfv pairs in the L3/Ln, but only 3 in the L2, it could also be that the Mandarin influence comes directly from the L1. This is supported by the ratio of 1 : 1, although also no pre-stress vowel deletion exists in Mandarin. In order to find corroborating evidence in her metadata, P12_f's language learning background is examined, too: Interestingly, she indicates an advanced speaking proficiency both in the L2 English as well as in the L3/Ln TL German. With eight years of formal instruction in English and a four-year stay in Germany, her self-assessment could be correct. For the advanced German learner P12_f rather the latter scenario, i.e. direct L1-Mandarin CLI onto TL productions, appears more likely. Then, the hypothesis of the occurrence of LPT primarily at a low TL-proficiency level would hold once again (e.g. Dewaele, 2001; Fuller, 1999; Hammarberg, 2001; Williams & Hammarberg, 1998).

All in all, it can be seen that a considerable amount of LPT from the L2 English occurs – even if it is not directly recognisable as L1-English-like productions; but also influence from the L1 on the TL-German vowel reduction productions are observed. Overall, Kaltenbacher's (1998) claim of rejecting the possibility to also transfer a feature like vowel reduction from one language onto another and thus avoid acquisitional problems, must be negated. The present participants clearly transferred vowel reduction and deletion from their L2 English onto their L3/Ln German, though both do not exist in their L1 Mandarin. It is not always clearly discernible as LPT in the syllable ratios as such, i.e. within the previously established English native-speaker reference values taken from the literature. But CLI from the L2 occurs rather frequently: besides clear LPT solely from the L2, it also appears in the form of combined CLI together with L1-Mandarin influence, resulting in an intermediate value; or as hybrid transferred from the L2, created by L1 influence during L2 acquisition, which is then transferred into the L3/Ln.

However, of course with the existing methodologies or the comparably small excerpt of the present data, it is often impossible to determine exactly where the influence came from – or whether it occurred at all. For instance, perhaps some target-like syllable ratios can indeed not be explained as a result of transfer, but as correct TL acquisition; or the hybrid values displayed by the participants simply reflect chance results or idiosyncratic pronunciations. Consequently, the present findings have to be corroborated or refuted in further studies on a much wider empirical basis.

6.3 Coda Consonant Cluster Realisation

With regard to the third phonological feature analysed, i.e. the realisation of CCs, particularly in coda position, in order to explore lateral CLI from the L2 English onto the TL German, further interesting results were arrived at. The main aims of the analysis were (1) firstly, to compute the overall percentages of correctly and incorrectly produced onset and CCCs across both TL-German and L2-English tasks; (2) and secondly, to conduct a more qualitative analysis of alike or similar CCCs in both the L2 and L3/Ln to explore potential occurrences of LPT.

Concerning the first goal, the participants' English and German CC productions were viewed purely from a quantitative perspective. Overall, since CCs exist neither in onset nor in coda position in the present participants' L1 Mandarin due to its CV syllable structure, all correctly produced TL clusters in any position either signify correct acquisition or potentially positive transfer from the L2 English, where CCs exist. The results (see section 5.3) suggest that such positive lateral transfer from the L2 onto the L3/Ln could have occurred in 82.57% of all clusters in onset position, and in 54.69% of all TL-coda clusters. More strictly, however, LPT in the narrow sense of transferring a particular structure from the L2 into the L3/Ln, and not only as the sheer existence of clusters in the NNLs when there are none in the L1, of course is only possible if the same clusters exist in English and German and are also produced correctly in the learners' L2. Considering the percentages of correctly produced clusters in the L2 English, namely 71.45% of onset clusters and 40.59% of coda clusters, a slight discrepancy compared to the TL percentages appears. This suggests that likely not all correct clusters in the TL were transferred from the L2, as there are fewer correct clusters produced in English to transfer into German in the first place. Particularly the intermediate percentage of correctly produced coda clusters in the L3/Ln appears to support the targeted beginner's TL proficiency, which supposedly is conducive to drawing on the L2 or another NNL for filling knowledge gaps in the TL being acquired (cf. Hammarberg & Williams, 1993).

A much more extensive study based on learner corpus data from the LeaP-corpus (**Lea**rning **P**rosody corpus), the only of its kind so far, was conducted by Gut (2009). Among others, it focuses on investigating CCC realisation behaviour in native compared to non-native English and German on a large-scale empirical basis. Gut's quantitative and qualitative analyses of 131 learners with 32 different native languages showed a whole range of variations of CCs across various speaking styles. In combination with further interacting non-linguistic factors, like TL-exposure during a stay abroad or intensive training, the study yielded interesting results. Thus, Gut wanted to explore potential influences either of the structural differences of her learners' L1s, of the non-native TL itself or of universal processes on coda cluster realisations in their non-native L2 German or English. Her further aim was to corroborate previous findings on the existence of developmental stages in non-native CCC acquisition examining learner samples at varying points in time (cf. Gut, 2009: 129f). Among others, the study in fact gives concrete numbers to compare the percentages calculated in the present study to: looking at correct coda cluster retention, Gut arrives at 70.5% for non-native English as opposed to 73.8% for native English (Gut, 2009: 145), and at 63.39% for non-native German as opposed to 74.17% for native German (Gut, 2009: 150). Now, compared to the present study's participants, solely 40.59% correctly retain the coda clusters in their non-native English. That is a third less than Gut's participants, and even further removed from the given L1-English reference value calculated. Considering this, Gut's subjects must have been considerably more proficient in English to be able to retain such a high number of CCs. The present study's non-native German results, though, approximate Gut's findings a bit more: 54.69% coda clusters were retained correctly in their L3/Ln German, i.e. only around 10% less than Gut's non-native German learners.

However, a few aspects should be kept in mind when comparing Gut's results with those of the present investigation: Firstly, and most obviously, the LeaP-corpus comprises much more data than the present study. Consequently, the results also stand on a broader and firmer empirical basis. Further, Gut's data incorporates speech of L2 as well as of L3/Ln learners with various L1-backgrounds. As it is one of the basic premises of the present study to distinguish meticulously between monolingual, bilingual and multilingual learners and even to stick to a specific order of acquisition of languages, perhaps Gut's study is not that suitable after all to compare the present results to. Besides, with regard to further dimensions and CCC simplification strategies (e.g. differences in simplification strategies compared across word-final versus word-medial clusters), Gut's investigation of course offers many more possibilities for analysis than the comparably small database of the present study.

Further interesting observations of the present study, though, are the slightly differing orders of CC production in the different tasks, and particularly across the two different speaking styles of relatively free picture story retelling and semi-elicited read-out-loud tasks: curiously, for both correct and incorrect onset clusters, the story retelling occupies the penultimate position with the second-lowest number of occurrences. For the former correct clusters, this means that few can be found in the comparably free task of retelling. This goes conform with Hammarberg and Williams' (1993) claim of an increase of LPT when NNL learners are thrown back on their previously acquired languages in a cognitively rather demanding task like retelling. For the latter incorrect clusters, though, the very low amount of incorrectly produced onset clusters actually refutes this claim more than corroborating it.

A similar constellation can be seen in the coda cluster realisation: The fact that most incorrect coda clusters are produced in the picture-story narration task conforms to the proposed hypothesis by Hammarberg and Williams (1993; see also section 3.3.4); but that the highest percentage of correct coda clusters can also be found in the retelling again contradicts this. These instable results consequently do not allow for an unambiguous corroboration of the hypothesis of differences in the amount of LPT interdependent with the speaking style: i.e. there is not necessarily more lateral transfer the freer the task. On the other hand, speaking style or task dependency is most likely only one factor interacting with the occurrence of LPT (e.g. Hammarberg & Williams, 1993; Gut, 2009); so, for example, an increased TL-proficiency level, as seems likely given the amount of correctly acquired TL clusters, could have interfered and led to these mixed, contradictory results.

The same conflicting constellations apply when additionally drawing on the participants' proficiency level as an explanation for the calculated amount of correct or incorrect clusters, respectively: apart from the speaking style of free retelling that is allegedly predestined for increased LPT compared to the reading tasks, the already rather high percentages of correctly produced TL onset and coda clusters in fact refute the hypothesis of more LPT when the learner has a low TL proficiency. The required simultaneous high SL proficiency can only be substantiated partially with the results from the CC analyses: as was seen, the percentage of correct onset clusters is rather high, yet still lower than that of their L3/Ln German; the rate of correct coda cluster realisation, though, is probably too low for presumably advanced learners of English.

What is more, incorrect clusters as those in the retelling task actually do not automatically signify LPT. This leads to the next point, namely pinpointing in more detail, from a more qualitative perspective, all possible potential loci for actual LPT, i.e. not only for negative but also for positive transfer. As said (see section 5.3), the coda clusters existent alike across both English and German that are focused on offer loci for positive as well as negative LPT; the similarly realised clusters are loci for negative LPT.

Starting with differences in the rates of these same clusters produced correctly or incorrectly across the different tasks, the comparably high percentage of incorrect coda cluster realisations in the picture story retelling again corroborates the task dependency hypothesis (see section 3.3.4). Considering some individual TL-story narrations more closely, particularly P12_f, P13_f, P16_f, P1_m and P18_m display rather high percentages of incorrect cluster productions – in fact, the highest across all TL tasks. This again may also possibly confirm said interdependence of the type of task and the amount of LPT, as will be explored in more detail further on. When additionally taking the proficiency self-assessments of the above five learners into consideration (assuming proficiency is a significant factor), however, the explanation of the incorrectly produced TL clusters as a result of LPT does not seem so likely anymore: apart from P18_m, who considers himself to have a beginner's speaking proficiency in the L3/Ln and with no correctly produced coda cluster whatsoever, all other four learners indicate an advanced TL level as well as an advanced L2 proficiency. An exception is P16_f, who claims a beginner's TL-speaking competence and that of an advanced beginner, respectively, in the L2. So, it is to be seen further on whether the learners' advanced English proficiency was still able to exert influence on their overall equally advanced L3/Ln German, or whether they were possibly already beyond the proficiency threshold in the TL for LPT to occur at all.

Interestingly, with regard to the L3G_text task, P13_f shows a very low amount of incorrectly rendered TL-coda clusters – the only one to show less incorrect than correct ones. This suggests an already advanced TL proficiency, which is also corroborated when looking at L13_f's linguistic background: she had been residing in Germany for nine years at the time of recording and indicates an advanced speaking proficiency as a result of this immersion situation. Simultaneously, with 17 years of formal instruction in English and her English studies at university as well as a six-month stay abroad in the US, P13_f exhibits also an advanced proficiency in her L2. Now, although P13_f does not seem to show LPT, she nevertheless appears to support Hammarberg and Williams' (1993) threshold hypothesis: despite her advanced proficiency level in the L2-SL English, which usually promotes the occurrence of LPT, P13_f possibly has already crossed the proficiency threshold with regard to her non-native TL German. This thus counterbalances the transfer-promoting strength of her L2 proficiency level. The curious fact that all other learners produce a majority of incorrect clusters in the L3G_text task seems to hint at the lower beginner's proficiency, as intended when selecting the participants to be recorded; whether they also produced more instances of LPT is discussed subsequently.

Starting with the results of the analyses, the two particularly relevant constellations for LPT investigations are considered, i.e. the first and fourth of the matrix of potential constellations of CCCs produced alike in English and German (see section 5.3). There, the occurrence of positive as well as negative LPT may become apparent.

The first constellation, namely correct coda clusters in both the L2 English and the L3/Ln German, can be explained either by positive LPT or by correct acquisition of both L2 and L3/Ln coda cluster realisation. In fact, it was expected that, since speakers were selected with an advanced L2 proficiency, the amount of correct English coda clusters would be much higher for each participant, ideally close to around 70 to 80 per cent. However, solely five participants' L2 productions are classified as correct, with over 70 per cent of correctly produced coda clusters. So, this does not comply with the intended high potential non-native SL proficiency across all participants. Besides, apart from in P2_f, the corresponding L3/Ln tasks by these learners contain clusters overall assessed as incorrect. This constellation of correct L2 clusters and at the same time incorrect L3/Ln clusters rather suggests either CLI from the L1 Mandarin onto TL-coda cluster realisations or idiosyncratic TL productions. As said, only P2_f corresponds to this first constellation of correct clusters in both languages, thus suggesting potential positive LPT. Whether this is indeed the case or whether P2_f simply acquired coda cluster realisation correctly across both English and German unfortunately cannot be determined with the methods available to date. All in all, these results negate the possibility of positive LPT in the majority of learners, though. After all, this would require the correct production of coda clusters in the L2 English for them to be able to be transferred correctly onto the L3/Ln-TL German.

The cluster realisations as found in P7_f and P14_f rather reflect constellation three with their primarily incorrect L2 coda clusters and corresponding correct L3/Ln ones. Consequently, it suggests correct acquisition of CCC realisation in the L3/Ln straight away: although the examined clusters exist in the same form in both languages, they were not transferred from the L2 into the L3/Ln. Adducing the factor of proficiency, it appears as if the intended advanced L2 level and beginner L3/Ln level was not reached by these two participants.

Regarding constellation number four of incorrect clusters in the L2 and the L3/Ln, as mentioned in section 5.3, the remaining 11 learners (P3_m, P4_m, P5_f, P6_m, P9_m, P12_f, P13_f, P15_m, P16_f, P17_m and P18_m) are possible candidates for LPT, exhibiting such incorrect English and German clusters. Considering the learners' linguistic backgrounds, particularly the number of years of their formal instruction in English compared to that in German, actually positive LPT from their L2 onto their L3/Ln could be expected from several participants. P5_f, P15_m, P16_f and P18_m are not confident about their English speaking competence, claiming beginner to advanced beginner levels. But the majority (P3_m, P4_m, P6_m, P9_m, P12_f, P13_f and P17_m) indicate an advanced to even a native-like L2 speaking proficiency. Of these, however, solely P4_m, P6_m, P9_m and P17_m indicate a beginner to advanced beginner TL-proficiency. Nevertheless, they still produce incorrect clusters not only in the TL German (which is understandable due to their low proficiency level therein), but also in the L2 English, where they should exhibit an advanced proficiency level. Now, if the clusters existent alike in English and German are produced with the same incorrect form in both English and German, it suggests negative LPT as a source; however, if the realised L2 and L3/Ln-forms differ, L1-Mandarin influence or idiosyncratic interlanguage forms could be adduced as explanations.

Answering this question of whether negative LPT really is the source of the measured incorrect clusters across both the L2 and the L3/Ln, though, requires examining these clusters from a different, more qualitative perspective. Moreover, the fact that for the assessment as correct or incorrect clusters the cut-off line was drawn at more than 70% of all clusters produced correctly, or incorrectly, respectively, and at the same time disregarding the remaining minority of incorrect clusters, or correct ones, respectively, also calls for an additional qualitative analysis of the cluster realisations, which will be conducted further on.

Besides the discussed coda clusters with the same form in both English and German, the further exploration specifically of negative LPT in only similarly existent clusters too arrived at mixed results. First of all, the rather low number of tokens, of course, severely restricts the generalisability of the results. Of these, the slightly higher amount of incorrect realisations is most relevant for the exploration of negative LPT. Interestingly, taking the different tasks into consideration, the factor of task relatedness (cf. Hammarberg & Wiliams, 1993) again is not corroborated: The second-lowest percentage of incorrect TL clusters and thus loci for potential LPT is found in the picture-story retelling. If Hammarberg and Williams (1993) were correct, it actually should show the highest amount of LPT. Combined with further factors like the learners' proficiency level or the linguistic similarity between the L2 English and the L3/Ln German in this complex task of relatively free speech in the story narration, the learners with a low proficiency level in the non-native TL should be thrown back onto their advanced knowledge in their non-native source language to fill knowledge gaps in the TL. However, this is not the case for the realisation of the similar coda clusters: the fewest incorrect clusters are found in the L3G_sentences1 reading task, and the most in the L3G_sentences2 task; the L3G_picture story retelling lies somewhere in between.

Looking at some individual results across the different speaking styles, what has to be noted first is the very low number of tokens, namely at the most between one and two. So the results have to be approached very carefully. It is particularly interesting, though, to examine the background of those learners producing CCCs in the retelling as opposed to those producing CCCs in the read-out-loud tasks. P1_m, P7_f, P11_f, P12_f and P16_f only exhibit correct clusters in the story narration; this could possibly imply that they all have managed to develop an already more advanced TL proficiency. It is true for P1_m, P12_f and P16_f, judging from their length of residence in Germany between four to six years as well as from their self-assessment as advanced learners of German. P7_f and P11_f, however, consider themselves to be advanced beginners, and have also spent only about a month in the German-speaking environment at the time of recording. Likely, the latter two learners' correct coda clusters were exceptions. It is also surprising that P5_f, with exclusively incorrect tokens, had in fact been residing in Germany for 11 years and indicates an advanced knowledge in German as opposed to a beginner's level in the L2 English. However, it is conceivable that the two incorrectly produced coda clusters by P5_f are also only chance realisations.

Further loci for negative LPT were also examined for the just discussed coda clusters existent only in a similar form across both English and German with the help of a constellation matrix. Firstly, the failure of all participants to produce the LPT-relevant constellation two, namely correct L2 clusters and incorrect TL ones, suggests that there is no homogeneous, advanced L2 proficiency level in the participating learners. The participants invariably produce a majority of incorrect English coda clusters. So, the first potential locus for LPT in similar clusters becomes invalid. If Hammarberg and Williams' (1993) proficiency hypothesis is correct, particularly those seven learners who do not even render correctly a single L2 cluster are surprising, considering their language learning background: P4_m received formal English instruction for 16 years and indicates a self-assessed near-native competence (although, judging from the author's observations, this is not the case) besides an advanced beginner's level in the TL German. He was expected to be an ideal candidate for the occurrence of LPT from his strong non-native L2 onto his weak non-native German. P5_f assesses herself as beginner of English, but with an advanced German proficiency, which had been the language of her surroundings for 11 years. One the one hand, this goes conform with the observed 100% incorrect L2 clusters. On the other hand, she has also received seven years of formal instruction in English, from which an advanced proficiency level could be expected. P9_m, the same as P11_f, again appears to refute the strength of the proficiency factor: although both have been receiving formal instruction in English and also consider themselves to be advanced learners of their L2, they too fail to produce any correct L2 coda clusters; in their German, they indicate an advanced beginners' proficiency, with solely two years of instruction therein and a mere four weeks of residence in Germany at the time of recording. As regards P10_f, after a one-year stay in Germany and about 8 months of formal instruction in her L3/Ln German, as opposed to 10 years of English classes, her altogether incorrect L2 clusters conform to her self-assessment as an advanced beginner of English. P16_f's 10 years of formal L2 instruction could have been balanced out by her stay of 6 years in Germany, including about 5 years of formal instruction in German. This is also reflected in her subjective assessment as a beginner of English and advanced learner of German, and could thus explain her invariably incorrect L2 coda cluster realisations. P13_f's incorrect L2 clusters, however, are most surprising: she is a university student of English with 17 years all in all of formal instruction therein and a self-assessed proficiency level of an advanced English speaker; perhaps they are the result of her 9-year long – primarily immersion – stay in Germany.

What is more, the rates of incorrect clusters in the L2, which are supposed to be very low with an advanced English proficiency, are considerably higher than those found for the TL productions of similar coda clusters. This is the exact opposite to what would be expected of beginners of German with advanced English knowledge, if the proficiency hypothesis held true. Yet, it has to be taken into account that there are also much fewer tokens of similar coda clusters produced in the L3/Ln compared to in the L2, which probably also has an effect.

Relating to the second locus for negative LPT of similar coda clusters from the L2 into the L3/Ln, constellation four with incorrect clusters in both English and German learner productions can be found in a number of learners. This suggests the existence of negative LPT if the realised L2 and TL forms are the same. Alternatively, if the produced forms are dissimilar, it signifies L1-CLI or simply idiosyncratic productions. As regards the participants, they could be expected to possess a low proficiency in both languages, judging from the incorrect clusters they produce in their L2 and their L3/Ln. Like before, this would contradict the differences in proficiency levels aimed at in the learners. Considering their self-assessments, P1_m, P3_m, P4_m, P6_m, P8_m, P13_f and P17_m all indicate an advanced to even near-native L2 proficiency, which is not reflected in their incorrect cluster realisations. Moreover, they all received between 8 to 17 years of formal instruction in English (apart from P3_m with only 3 years; however, he is the only learner to find himself in an intense English immersion situation in Australia when being recorded), which supports the assumption of rather advanced proficiencies in their L2. Now, if it is indeed negative LPT these seven learners produced in their incorrect L2 and TL clusters, this weakens the argument of the importance of source language proficiency in triggering LPT. Consequently, particularly for the seven participants, a closer look at the actually produced clusters might be revealing, which will be seen further on. Regarding P5_f and P10_f, who also render incorrect L2 and L3/Ln clusters, they consider themselves a beginner and advanced beginner of English, respectively, despite the 7 and 10 years of formal instruction therein. It is also worth taking a closer, more qualitative look at their cluster productions. Again, for all realisations of these incorrect similar coda clusters, it must not be overlooked that there are only one to four tokens available, so that the results have to be interpreted carefully. Further, no premature conclusions should be drawn with regard to the participants' TL-proficiency level; perhaps in some cases the incorrect clusters were only chance productions.

A few exceptional cases of learners could actually also be regarded as pertaining to constellation four and thus represent further candidates for negative LPT: those that yield only incorrect L2 coda clusters; at the same time, they produce no L3/Ln clusters at all, which could be seen as total deletion of said clusters. The assumed prerequisites for the occurrence of LPT are given in two of the four concerned learners: firstly in P9_m, with nine years of formal instruction in English, reflected in his self-assessed advanced potential source language competence, and a simultaneous advanced beginner's level in the TL with two years of training. The second good candidate would be P18_m; although he classifies himself as an advanced beginner of English, the six years of formal instruction should suffice to exert influence on the TL German, in which he is an utter beginner with no previous training whatsoever, but only subjected to immersion due to his seven-month stay in Germany at the time of recording. The other two learners' background, however, does not suggest negative LPT as an explanation for the incorrect L2 and L3/Ln realisations: P14_f, despite having received 12 years of formal instruction in English, still considers herself an advanced beginner, whose proficiency might also not suffice to influence her alleged beginner level of the L3/Ln German; in German, she had been immersed already for 7 years at the time of recording. Further, P15_m appears to possess the exact opposite of the intended participant profile. He indicates an advanced beginner's level in English, which is possibly contradicted by the six years of formal instruction he has received therein, and an advanced proficiency in the envisaged TL German; though P15_m had only been exposed to nine months of formal instruction to the L3/Ln, he had been residing in Germany for 10 years already at the time of recording. However, whether it is indeed negative LPT, CLI from the L1 Mandarin or simply idiosyncracy that occasions incorrect clusters in both English and German needs to be decided by looking at the actual realisations, as will be done later on.

Besides the discussed LPT-relevant constellations, of which only the fourth one appears in the present learner data, solely constellation three was also produced by a few participants. The combination of incorrect L2 clusters plus correct TL ones potentially hints either at a correct acquisition of TL-coda cluster realisation, or possibly at lateral transfer from the L3/Ln onto the L2. The latter is conceivable as the incorrect L2 clusters could reflect a transfer of the similar, correctly acquired TL cluster; this could be verified looking at the respective L2 and L3/Ln tokens in detail to assess whether their forms are sufficiently similar so as to speak of lateral transfer from the L3/Ln.

The seemingly extreme cases who only exhibit either 0% or 100% of correct or incorrect TL clusters in the TL German also have to be considered with care: most of these values are based on a single occurrence, which might only reflect a singular slip-up. Regarding the exclusively incorrect TL productions, possibly P6_m might be an exception, as he produces at least four tokens of incorrect TL clusters; the 1.5 months of formal instruction in German supports the assumption of a relatively low proficiency level. Assuming the correctness of the proficiency hypothesis, subsequent incorrect coda cluster production is not surprising. Concerning the other extreme of only correct TL clusters, all three concerned learners only produce a single correct TL token. This does not suffice to draw conclusions from. Two of them, P11_f and P16_f, apparently pertain to the third constellation with their purely correct TL clusters and 100% incorrect L2-English clusters. However, they should be considered with extreme care: contrary to their single token of a correct TL cluster, they both produce 18 and 19 incorrect L2 clusters, respectively – a sufficiently high and significant number of occurrences to draw conclusions from, for instance concerning their proficiency level in the L2. Considering that they produce exclusively incorrect English clusters, it suggests these participants do not fit into the sought-after profile for the ideal prerequisites for LPT to occur.

As was hinted at repeatedly, a thorough examination of CCC realisation and potential interlingual influences thereon is only possible when examining the actual productions and not only drawing conclusions from numbers, which could possibly be deceiving in some cases. Hence, for the more qualitative analysis, the already discussed LPT-relevant constellations of the matrices for similar or alike CCC production in English and German are again referred to.

To cover all potential occurrences of LPT, first of all, constellation one of clusters existent in the same form across both English and German, i.e. the locus for potential positive LPT or correct acquisition, is examined more closely. As was said in section 5.3, the focus lies on the investigation of negative LPT. It is impossible to decide in the present data whether the correct realisations of clusters existent in the same form in English and German are the result of correct acquisition in both languages, or whether they indeed stem from positive transfer of the correctly acquired cluster in the L2 onto the non-native TL. Thus, the detected correct alike clusters in the L2 and the L3/Ln could be the result of either.

Firstly, extracting all correct TL-clusters, the comparison of the canonical pronunciation with the actual realisation of the single alike coda clusters in English and German yielded some interesting results: unambiguously, 58.2% appear to belong to this constellation one and thus potentially represent positive LPT – or, of course, correct acquisition. If positive LPT is taken as explanation and Hammarberg and Williams' (1993) proficiency hypothesis is correct, the relatively low percentage suggests that the majority of participants were unable to reach the required level in English.

Yet, whether the 58.2% of correct L2 and L3/Ln-clusters indeed allow the inference that most participants do not possess the required advanced proficiency in the L2 English, cannot be accepted as such without further deliberation. The occurrences that pertain to constellation one at first glance are not as homogeneous as assumed; so, a further differentiation is necessary. The more differentiated analysis in fact reduces the 58.2% further down to 35%. These unambiguously produce for one given canonical coda cluster solely one kind of L2 cluster plus one corresponding TL cluster, so they can be directly interrelated (Example /kt/: [kt] as in English *hoo**ked*** and German *sau**gt***). These 35% would be the unambiguous cases of positive LPT or correct acquisition. The majority of speakers, who seemingly does not possess a sufficiently advanced non-native source-language proficiency, produces correct as well as incorrect types of L2 clusters besides the correct ones in the TL. These unstable realisations hint at an equally unstable L2 proficiency level which is possibly still developing. Considering that the corresponding TL clusters are entirely correct, it is also conceivable that the L3/Ln proficiency has already surpassed that of the L2. That means it could have crossed the threshold for it to become the source language for phonological transfer, so the correct L2 clusters could also reflect lateral transfer *from* the L3/Ln onto the L2, rather than vice versa. Of course, on the other hand, the correct German clusters could stem from positive LPT from the L2 as well. What is more likely, though, besides potential transfer from the L3/Ln into the L2, is correct acquisition of coda cluster realisation – in German as well as partially in English. In the analysis, this simultaneous occurrence of correct and incorrect clusters in the L2 besides correct TL clusters was differentiated further according to the number of additional incorrect L2 cluster types, ranging from one to three besides the correct one. Obviously, the more different, incorrect realisations exist in the L2 next to the correct one, the less stable the learners seem to be in their English, and the less likely LPT appears of the correct L2 clusters. With solely one incorrect type besides the correct cluster, it is still conceivable that it might be a slip-up, particularly if only very few tokens were produced. As the numbers show, this is probably the case for the overwhelming majority of speakers, namely for 79.31%. These should not be disregarded as potential positive LPT, though, whereas the 3.45% of three different types of incorrect coda clusters rather suggest correct acquisition in the L3/Ln and no transfer from the L2.

In the analysis of correct TL cluster realisation, this variable production of clusters in the L2 plus correct TL clusters was considered a combination of constellations one and three. The latter third constellation of incorrect L2 clusters and corresponding correct L3/Ln ones also appears in the learner data on its own. In this case, according to the posited matrix (see section 4.2.6.3), we are definitely dealing with correct acquisition in the L3/Ln: there is no correct cluster – though theoretically existent in the same form – in the L2 to be transferred. A further splitting up of even several different types of incorrect L2 coda clusters supports the assumption that in some participants the L2 proficiency is in fact not that of advanced learners. Finally, the failure to produce even a single corresponding L2 cluster for a correct TL one is either a clear case of correct acquisition in the L3/Ln and a simultaneous total deletion of the concerned cluster, or a simple slip in the L2 production. Yet, the single occurrence of all alike coda clusters produced is not really significant and thus negligible.

The second LPT-relevant locus subjected to the qualitative analysis concerns itself with negative transfer again in coda clusters actually existent in the same canonical form in both English and German. With regard to the investigation of negative LPT, which is the kind of LPT comparably easiest to identify unambiguously, the incorrectly produced TL-German CCCs are particularly relevant. Based on these, the percentages of incorrect productions transferred from the L2 English onto the TL German, i.e. negative LPT, as opposed to idiosyncratic productions, possibly developmental interlanguage forms or coda cluster tokens influenced by the L1 Mandarin were determined.

Looking at all produced coda clusters, 32.35% unambiguously represent negative LPT, with the same, incorrect realisation in both English and German. Considering that all participants were chosen with a particular linguistic background in order to test hypotheses of different variables promoting LPT, 32.35% is not very much. Apparently, the learner profiles must not have fit exactly. This is not surprising considering the myriad of factors hypothesised to be interrelated with the occurrence of LPT. On the other hand, considering that the actual existence of LPT is still being debated, the fact that about a third of all incorrectly produced TL clusters that are existent alike in English and German are produced in the same incorrect form in English seems to be sufficiently high to prove its existence. Of course, the still not overwhelmingly high number also hints at the fact that the occurrence of LPT is not straightforward, but depends on an interplay of various factors.

Besides the clear negative LPT, a minority percentage of 16.67% of all incorrect TL cluster productions in the form of simplified clusters hints at influence from the L1 Mandarin: since no CCs exist at all in the participants' L1, the simplified TL clusters point to Mandarin influence. Instead of transferring the clusters which exist in the same form in the L2 and the L3/Ln from English, most learners strive to reduce the more complex two-consonant coda clusters that appear in the elicitation material to a single consonant. This typically reflects Mandarin CLI, which results in a simple syllable structure – usually an open CV syllable; Mandarin Chinese only allows V+/n/ and V+/ŋ/ codas. All in all, with regard to the simplification processes, the learners show paragoge six times. This breaks up the CC and maintains the open CV structure. In one instance, the final consonant is devoiced; one further token is found of a combination of reducing the existent coda cluster plus adding a schwa, which consequently opens up the closed syllable coda again. Finally, in nine instances in the coda clusters one of the primarily two-consonant clusters is deleted. However, in the majority of these nine tokens, the speakers produced closed codas ending in consonants a Chinese syllable does not allow – English and German syllables, though, do. So, although not complete clusters can be argued to have been transferred, two explanations are conceivable. Either the German syllable structure was acquired successfully – at least to a certain degree: consonants are produced at the end of a syllable that a monolingual Mandarin native speaker would not produce. Or the English syllable structure was acquired successfully to a certain degree and perhaps transferred onto the TL German. Unfortunately, it cannot be decided unambiguously which explanation is the correct one. Only four syllable codas agree with the consonants allowed in a Mandarin coda, namely /n/ and /ŋ/, which could be explained by transfer from the L1.

Coming back to the above-mentioned LeaP-study by Gut (2009), potential influence of the learners' L1-structural properties on their coda cluster retention rates in the NNL was actually refuted. Apparently, the fact of whether the L1 permits coda clusters, as in Gut's group 1 of German learners, or not, as in group 2, does not have an effect on cluster realisation, according to her findings (cf. Gut, 2009: 157). The two German-learner groups only differed in the amount of the simplification strategy paragoge used to simplify clusters, with a higher simplification rate in group 2, whose L1s disallow coda clusters (cf. Gut, 2009: 158). Further corroborating evidence for the L1 being only one of various constraints on cluster realisation in a non-native language comes from comparing coda cluster productions in multilingual learners of both English and German; these differed in the L2 as opposed to the L3, as well as from the high variation of retention rates found within learners of the same L1 (cf. Gut, 2009: 158).

Finally, the rest of the produced clusters belong to the last and largest group of coda cluster realisations, i.e. idiosyncratic productions that can neither be attributed unambiguously to L2 English nor to L1 Mandarin. Such idiosyncratic realisations such as the above described singular coda cluster productions or insertions of individual consonants could be caused by different factors. Some could be argued to be due to a certain degree of LPT: although none of the TL coda clusters were produced correctly, several other consonant combinations were produced. Again, the simple fact that any CCs are produced at all suggests that this ability to combine consonants could have been transferred from the L2 English. In a few cases (e.g. [ntʃ], [nd] or [nz]), this is even rather likely: the produced CCs that are incorrect manifestations of those in the TL German, though, exist as such in the L2, and consequently could have been transferred into the L3/Ln.

What could also be taken into account when trying to explain CCC realisations is how the acquisition of such clusters proceeds in a non-native language. There are longitudinal studies, at least for Second Language Acquisition (e.g. Hansen, 2001; Abrahamsson, 2003), investigating the acquisitional stages of L2 coda consonants, analogously to First Language Acquisition. These studies in fact detected a U-shaped development, i.e. after an initial stage of target-like coda production the learner’s performance usually dips, resulting in incorrect codas, before target-like productions finally increase again. With regard to the incorrect coda realisation strategies, apparently the preferred phonological simplification process at the beginning of acquisition is deletion, changing later on primarily to paragoge before the learner manages to produce correct codas (cf. Gut, 2009: 128). Thus, prior to clusters, L2 learners tend to produce only single-consonant codas at first. For two-consonant coda clusters, Hansen (2001) found similarly changing patterns in their realisations, with paragoge and sometimes epenthesis at first during acquisition, followed by substitution when the learner is more advanced.

Unfortunately, there is not much longitudinal material, not to speak of longitudinal phonological data, available at all for Third or Additional Language Acquisition (Hammarberg & Williams, 1993; Wrembel, 2012). To explore the development of coda cluster production in multilinguals, detailed longitudinal data from a large number of participants would be extremely advantageous. Only with such properly controlled data would it be possible to perhaps corroborate, or refute, the above-mentioned U-shaped development in multilinguals' coda cluster acquisition. The present data are not suitable for that, either: it neither can be assessed whether a specific order of preference for certain simplification strategies that are interdependent with the single developmental stages indeed also holds for multilingual learners.

Overall, the simple fact that any consonant combinations are produced that do not exist in the participants' L1 Mandarin suggests either a certain degree of LPT, as mentioned, or "semi-correct" TL acquisition. The learners consequently could be at a certain point in their TL acquisition where they are about to develop CCCs correctly. When a cluster like *[gt] for /kt/ is produced, for instance, the L1-Mandarin learner of English and German could have achieved the developmental stage of being able to produce any CCs at all (i.e. the combination *[gt]). His proficiency level is not as advanced yet, though, that this cluster is produced correctly (i.e. as [kt]). However, as we are dealing with the production of clusters existent in the same form across the L2 and the L3/Ln and the TL clusters are only produced incorrectly, it could also mean that the learners have either not reached the developmental level in their L2 yet to enable them to produce correct English CCCs; or they are in the midst of this U-shaped development, where they produce many incorrect clusters. The incorrect clusters they still show could thus have also been transferred into the TL, which would constitute LPT again. Others, however, indeed can only be explained as idiosyncratic productions.

Of course, one weakness of the empirical study needs to be taken into account: namely the fact that only a rather limited number of CCCs overall was produced in the L2 English, both in the same form and existent only in a similar form as in the TL German. This fact has to be considered both for the production of correct and incorrect TL coda clusters.

6.4 Summary of the Findings: Answering the Research Questions

The main aim of the present empirical, cross-sectional study primarily was to answer the question of whether LPT exists at all or not. Taking the results of the present study into consideration, the answer would be, “Yes, but …”, because it requires a rather differentiated explanation. This will be given subsequently when summarising the answers to the single research questions as established in section 4.1.

(1) Does lateral CLI on the level of phonology exist?

The overall answer to this question is: Yes, lateral CLI on the level of phonology does exist. However, it can not only be found as straightforward transfer from the L2 onto the TL resulting in the same forms across both languages. This is only one facet of LPT. As was demonstrated in the discussion of the results of the empirical study (see sections 6.1–6.3), CLI from the L2 onto the TL also became evident resulting not only in the same form as in the L2, but in a hybrid L2/TL-concoction. LPT moreover appeared in the form of combined CLI together with the L1 Mandarin, and thus produced intermediate TL-forms. A further manifestation of LPT was shown in the transfer of an L1/L2 hybrid feature resulting from an underlying L1 influence during L2 acquisition. This hybrid form was transferred from the L2 onto the L3/Ln TL, which thus also constitutes LPT. Finally, in some instances, such as syllable pairs consisting of a syllable with a deleted vowel followed by a full-vowelled syllable, the sheer existence of a feature signified LPT: For instance, this syllable constellation was non-existent in native speech of both the L1 and the TL but existed in the L2. As it was nevertheless produced in the TL by the learner, this can also be classified as LPT from the L2.

However, results in general were actually quite heterogeneous, differing according to the phonological feature investigated: LPT in its various manifestations was only one phenomenon of interlingual influence that occurred. Underlying L1-influence on the TL as well as possibly also lateral transfer from the L3/Ln onto the L2 could be detected, too. Besides that, of course, target-like L3/Ln productions as a result of correct acquisition were produced, as well as idiosyncratic non-target-like interlanguage forms.

(2) If it does exist, does lateral phonological CLI manifest itself in both segmental and suprasegmental features?

The empirical study of the present study with the investigation of vowel reduction, CCC realisation and speech rhythm proves that phonological CLI can manifest itself in both segmental and suprasegmental features. Firstly, it was detected in vowel reduction: Starting with the three syllable types examined, i.e. full-vowelled syllables (sfv), reduced-vowelled syllables (srv) and syllables containing a deleted vowel (sdv), LPT was measured on the sfv and srv syllable lengths. For both syllable-type lengths in the TL, though, a high variation across participants was found, suggesting rather heterogeneous productions. With regard to the overall amount of not fully articulated syllables produced in the TL, the present learners' low percentage suggests L1 influence. Further, LPT was also found in the SR measurements: Firstly, the L2/TL hybrid mean SR_1 value in the L3/Ln suggests LPT from the native-like L2 production, despite the fact that no target-like L3/Ln value is attained. For SR_2 calculations, LPT can also be detected, in that the non-target-like L2 mean, which exhibits an underlying L1 influence, was transferred into the L3/Ln and led to a hybrid TL SR_2. As regards TL-SR_3 values calculated on the basis of srv followed by sfv syllables, LPT is shown in two different ways: Here, the sheer existence of pre-stress vowel reduction in the TL in these syllable pairs, which actually only exists in English native speech, signifies LPT. Its existence is further corroborated by the very similar, though non-target-like, TL-SR_3 values to L2 native values. The same goes for pre-stress vowel deletion, as found in the sdv+sfv syllable pairs used to calculate SR_4. The simple fact that such pairs are produced in the TL – although non-existent in the participants' L1 and L3/Ln – suggests transfer from the L2. Looking at the actual values, though, LPT is not substantiated. Instead, they seem to be the result of L1 influence or idiosyncratic interlanguage productions. In general, variation across participants can of course be found for the four syllable ratios. Thus, not only clearly L2-influenced manifestations but also ratios resulting from combined L1/L2 influence were detected, and L1-influenced ratios within Mandarin native-speaker range and hybrid L1/TL values, as well as target-like L3/Ln ratios.

Concerning any covariation of SRs with speaking style, SR_1, SR_2 and SR_3 values were found to be rather similar across both the reading condition and the retelling tasks, and thus suggest no such covariation. No reliable statement can be made for SR_4 due to the low number of tokens. As regards the absolute values in the two different conditions, LPT appeared in SR_1 calculations across both the reading and retelling tasks, the same as for SR_2. Again, the sheer existence of syllable pairs containing pre-stress vowel reduction or deletion to calculate SR_3 and SR_4 constitutes LPT. Actual SR_3 values confirmed this occurrence of LPT in the reading condition and also in the form of combined L1/L2 influence in the retelling. SR_4, on the other hand, showed a certain degree of LPT only in the hybrid TL value as a result of combined L1/L2 influence in the read-out-loud tasks; the mean SR_4 for the retelling was influenced by the L1.

A second segmental manifestation of LPT besides in vowel reduction became evident in coda cluster realisation: According to the purely quantitative analyses, very generally positive LPT – or correct acquisition straight away – can be argued to have occurred; similarly to the above-mentioned pre-stress vowel reduction and deletion, the sheer existence of correct CCCs in the TL, when they are non-existent in the L1 but existent in the L2 as in the present learners, stipulates LPT. In order to cover all potential loci for LPT, though, first of all CCCs that exist in the same form across both the L2 and the TL were examined. From the purely quantitative view, only very few productions were found to conform to the first constellation of correct coda clusters in both the L2 and the L3/Ln. This would constitute either positive LPT or correct coda cluster acquisition in both NNLs. Thus, positive LPT could not be found in numerous learners. From a qualitative perspective, it translated to about a third of all correctly produced TL clusters as instances of unambiguous positive LPT or correct acquisition, deriving from a direct interrelation of one correct L2 cluster and one corresponding correct L3/Ln cluster. However, where the correct TL cluster was paired with one correct plus between one to three further types of incorrect L2 clusters, several explanations are conceivable: The correct L2 CC besides a single incorrect L2 cluster type could reflect lateral transfer from the L3/Ln; it could also be the result of correct L2 CC acquisition including subsequent positive LPT onto the TL to arrive at the correct L3/Ln CCC. With two or even three incorrect L2 types besides the correct cluster, though, the two aforegoing explanations seemed less likely. Such unstable L2 cluster productions rather implied correct TL acquisition and no transfer from the L2. Five learners pertaining to constellation two, with correct L2 CCCs and incorrect CCCs in the L3/Ln, further exhibited either L1 influence or idiosyncratic productions. Additionally, two learners showed immediate correct CCC acquisition in the TL within constellation three besides incorrect L2 clusters. The majority, though, exhibited LPT to varying degrees in constellation four with incorrect coda clusters across both languages, which is the result either of negative LPT, L1 influence or idiosyncratic interlanguage productions; disambiguation was achieved in the qualitative analysis: About a third of all clusters unambiguously constituted negative LPT. Some (about one-sixth) represented L1 influence in the form of cluster simplifications. Yet overall, primarily idiosyncratic interlanguage forms were produced – some of which, though, could again be manifestations of LPT, namely the non-target-like consonant combinations in the TL. The simple ability to produce CCs, which are non-existent in the participants' L1, could have been transferred from the L2; but also some of these concrete TL-consonant combinations exist as such in the L2, and thus strengthen this claim of resulting from LPT even more.

Besides CCCs that exist in the same form, similarly existent coda clusters across both the L2 and the TL were examined, too. Relevant for potential occurrence of LPT, or more specifically negative LPT, were incorrect TL-coda-cluster realisations exclusively (corresponded to constellations two and four). However, no correct L2 clusters whatsoever required for constellation two were produced. Constellation four, consisting of incorrect coda clusters in both languages, finally rendered several instances of negative LPT in the similar CCCs that were produced alike in the L2 and the TL. Besides, L1 influence or idiosyncratic productions were also found in this constellation where the produced incorrect clusters were dissimilar across English and German. The only further constellation to be produced too, number three, with incorrect L2 and correct TL CCCs, yielded some instances of correct TL acquisition as well as instances of LPT from the L3/Ln onto the L2.

Regarding any covariation of CCC production and speaking style, no relationship was found. There were no explicit differences between the amounts of incorrect CCCs in the reading conditions as opposed to those in the retelling.

The third and final feature to have been examined was the suprasegmental feature of speech rhythm, where LPT was also found in the learners' productions. Applying the two rhythm metrics %V and nPVI-V to elicit any LPT, such influence from the L2 onto the L3/Ln could be posited with nPVI-V. According to %V, however, the learners had acquired target-like rhythm straight away in the L3/Ln. As was argued (see section 6.1), %V likely does not measure the same as nPVI-V, it is not controlled for speech rate and thus probably unsuitable for measuring learner speech rhythm altogether. Consequently, according to the measurements applying the valid metric nPVI-V, LPT has occurred. On the other hand, the target-like

%V values were also argued to possibly be the result of combined transfer from the L1 and the L2 onto the TL. The L1/L2 hybrid form produced in the TL accidentally falls into the TL-native-speaker range, but nevertheless would still constitute LPT to a certain degree. Seeming the results for the rhythm measurements with these two metrics were rather heterogeneous (possibly inherent to the metrics, of which one – or both – might be unsuitable to assess learner speech rhythm) across the participants, individual learners exhibited more or less LPT – or none at all, depending on the metric: The majority was argued to show LPT, but combined L1/L2 influence too appeared quite frequently. Some learners, though, also relied on their L1.

As concerns covariation of speech rhythm and speaking style, according to %V measurements that arrived at target-like values for both the reading condition and the retelling, rhythm and speaking style seem to be independent. The target-like %V was considered to be due either to correct TL acquisition, overarticulation or combined L1/L2 transfer. Measured with nPVI-V, a slight covariation is recognisable: the reading condition exhibited LPT, whereas the retelling did only to a certain extent, arriving at an L2/L3 hybrid.

(3) Given LPT exists, is it promoted by certain factors?

As the investigation has also shown, LPT indeed interacts with specific factors that can facilitate its occurrence. In the present study, particularly two factors were considered in more detail, although by no means exhaustively, namely proficiency and task relatedness. Firstly, with regard to proficiency, as was discussed in section 3.3.1, one has to distinguish between proficiency in the source language and proficiency in the target language. What the empirical study has demonstrated is that often the occurrence of LPT is interdependent with a high SL proficiency and a simultaneous low TL proficiency. This was shown, for example, in the syllable-ratio calculations: numerous participants (e.g. P3_m, P4_m, P14_f and P16_f) conformed to the high SL/low TL proficiency constellation and produced LPT. Particularly P3_m's profile, for instance, complied with these requirements: as the only participant living in an English native-speaker environment, he additionally claimed a very rudimentary knowledge of the TL German; and indeed he exhibited LPT in his syllable ratios. Proof also came from a different angle in P16_f, who displayed the exact opposite constellation, namely low SL/high TL proficiency. Apparently, her more proficient NNL at the point of recording was not the

L2, but the L3/Ln. LPT in the syllable ratios occurred – though from the L3/Ln TL onto the L2 SL.

However, there were even more cases that refuted the claim of more LPT with a high SL/low TL proficiency. For example, regarding the production of CCCs, several participants who were supposed to be advanced learners of English and beginners of German judging from their language learning history and their self-assessments, in fact failed to produce even one single correct L2 CC and still exhibited LPT from the same L2. Similarly, LPT also occurred in syllable ratios, for instance in P13_f, who assessed herself as an advanced learner of both the L2 and the L3/Ln in accordance with her linguistic background of several years of formal education in both languages. It must be kept in mind, though, that proficiency and how you operationalise it is only one conditioning factor that has to be taken into consideration when investigating phonological transfer in multilingual learners.

Another factor looked at more closely was that of task relatedness. Section 3.3.4 postulated that LPT is more frequent the freer the task a language learner has to perform. For instance, a story retelling is a cognitively more demanding task than a read-on-your-own task, and consequently more LPT will occur there. Actually, this was not really confirmed by the present data. Regarding the production of speech rhythm as measured with %V and nPVI-V, for example, some learners managed to produce target-like rhythm in the retelling task but exhibited LPT in the TL reading condition. Task relatedness most definitely interacts with further factors, such as the afore-mentioned TL-proficiency level, and concurs with them in triggering LPT.

Such other factors promoting LPT were sometimes mentioned by some participants in the interview. For example, P8_m said how he consciously rejects similarities between his L1 and the unrelated L2 (factor: metalinguistic awareness), and at the same time how he focuses on the similarities he perceives between his L2 and the L3/Ln (factor: psychotypology). These and more factors interact in P8_m and lead to the occurrence of LPT.

Further factors were also controlled for to a certain extent in the present empirical study: age of learning, by selecting only adult learners to be recorded; order of acquisition, by ensuring the chronological acquisition order of Mandarin as L1, English and followed by German as TL; objective language distance, by choosing an L1 unrelated with the L2 and L3/Ln, and simultaneously related NNLs to be examined for LPT; recency of use, in that the recordings were always carried out in the exact same order and preliminary small talk was held in the TL, thus trying to avoid activating any other language; and finally, orthography, by carefully compiling the elicitation material for the reading condition. However, these factors were tried to be controlled for as rigorously as possible, but the present author does not presume to make any valid claims about them. Instead, they rather serve as incentives and suggestions for further empirical research, applying a stringent methodology examining groups of learners with differing constellations of factors.

(4) Do these factors differ in their strength of being able to trigger LPT because they stand in a hierarchy?

It indeed appears that the individual factors promoting LPT stand in a hierarchy effected due to the factors' differing strength of being able to evoke LPT. What has to be kept in mind is that the present empirical study was not primarily geared towards eliciting factors that allegedly trigger LPT, and to find out which is the strongest in occasioning LPT. Consequently, only a tentative suggestion may be made as regards the impact of the factor of proficiency as opposed to that of task relatedness. Thus, an assessment of their relative strength to evoke LPT may be attempted within the realm of the present study.

In general, task relatedness seems to be a weaker factor than proficiency level. This is primarily underlined by the lack of covariation between the reading condition or the retelling task and syllable ratios, CCC production or speech rhythm as measured with %V in the present data. Only a certain relationship was found between the speaking style and rhythm assessed in terms of nPVI-V. Interdependence between proficiency in the source and target language and the occurrence of LPT, however, featured more conspicuously and prominently in the study. This is simply due to the fact that the factor proficiency was relevant for and applicable to a much wider context than task relatedness: to factor in the latter was only necessary when investigating the co-occurrence of different speaking styles and LPT; source- and target-language proficiency, though, and its potential covariation with LPT, was relevant for the entire data sample analysed.

As was discussed in section 3.3.6, very few of the handful of studies on LPT also venture to hypothesise about the relative strength of certain factors in triggering LPT. For instance, according to Llama et al. (2010), "L2" status is more significant in promoting LPT than typology. Wrembel (2010), moreover, believes various factors have to accumulate in a learner before any LPT is triggered at all. There is not much more known about the strength of the single factors, particularly on the level of phonology, although they very likely differ in how easily they occasion LPT.

(5) If they do, how does this hierarchy look like?

Based on the present empirical study as well as a handful of previous investigations of individual factors promoting LPT, a hierarchy of these factors could only be hypothesised at this point. What complicates matters is the fact that actually to date, only very few factors, i.e. proficiency in the source and target language(s), recency of use, "L2" status and task relatedness, have been examined in empirical studies and postulated to occasion LPT. Whether this is in fact true, which further factors are significant in promoting CLI also on the level of phonology, and which potential additional, new factors exist that have not been investigated yet (e.g. orthography) are only some questions that remain to be answered in this regard.

Regarding an assessment of the position of the two factors of proficiency and task relatedness within such a hierarchy, unfortunately not much can be stipulated unambiguously based on the present data. As mentioned, according to the analyses, task relatedness seems to be a weaker factor than proficiency level, and consequently must also be situated lower in the hierarchy of triggering LPT. How the other four factors claimed to be significant fit in would be pure speculation at this point without the necessary empirical basis.

Thus, as pointed out above, more specialised studies specifically geared towards the exploration of single factors and their nature are required to make a statement about the composition of a hierarchy of factors. In order to properly establish such a hierarchy of factors promoting LPT, it would be advantageous to conduct a multitude of individual, methodologically sound studies, each focusing on solely one or two factors. By contrasting two groups of learners that only differ in these one or two factors, it is possible to learn more about the nature of the respective factors. To enhance this knowledge, triangulation would be commendable, carrying out studies that apply and examine all possible combinations of factors. Eventually, the single results could be put together like pieces of a jigsaw puzzle to create the above-mentioned hierarchy of factors. What could complicate this task, though, is the degree to which such a hierarchy is individualised. This means, particularly with highly individual factors like psychotypology or metalinguistic awareness, it is conceivable that they occupy a different position in a hierarchy depending on the learner, and consequently also display different levels of strength in promoting LPT. In the extreme case, a hierarchy of factors may always only be compiled with a view to an individual learner.

(6) How does this compare to the factors identified in the vanguard LPT study by Hammarberg and Williams (1993)?

The factors that Hammarberg and Williams (1993) include – partly consciously, partly unconsciously – in their accidental LPT study, i.e. proficiency level, task relatedness, order of acquisition, linguistic distance and psychotypology, are likely only chance encounters, but are surely not controlled for meticulously. For example, Hammarberg and Williams neither point out the exact chronology of acquisition of their subject's NNLs, nor elaborate on the proficiency level of her further NNLs French and Italian, which are anyway disregarded for the analyses. It is only mentioned in a later study, for instance, that the subject spent one year in France during her studies, arriving at an advanced but non-fluent proficiency level (cf. Hammarberg & Williams, 2008: 305). Further, the subject's languages investigated, i.e. L1 English, L2 German and L3/TL Swedish, happened to be closely related. However, in order to investigate specifically LPT between the NNLs in a targeted manner, it is commendable to choose participants with an L1 typologically different from the envisaged non-native source and target languages. Thus, the source of transferred structures is easier to identify.

Admittedly, Hammarberg and Williams were the first to explicitly mention phonological transfer from the L2 onto the L3/Ln. Not much was known then about this phenomenon or any conditioning factors from previous studies that inadvertently might have also examined LPT (e.g. Chamot, 1973; Rivers, 1979).

Concerning source-and target-language proficiency, Hammarberg and Williams clearly stipulate an effect in the two recordings of the read-out-loud tasks *Hunden 1* and *Hunden 2* (cf. Appendix C3). The two authors observed the noticeable German influence from their subject's near-native L2 onto the L3-Swedish speech in the initial stages of acquisition gradually disappear. Instead, it was replaced by increasing L1-English influence concomitant with the development of a more advanced TL proficiency (cf. Hammarberg, 2001: 34). The present cross-sectional study could not examine the development of learner productions across a longer period of time. However, a regards the relationship between proficiency and LPT, this study arrived at pretty heterogeneous results: LPT occurred not only in participants that conformed to Hammarberg and Williams' subject's proficiency profile (high SL/low TL proficiency), but also in participants with equally advanced or equally low proficiencies across both the source and target language, as well as in participants with the inverse constellation of low SL/high TL proficiency; the latter, however, tended to exhibit LPT from the L3/Ln-TL then, and not from the L2.

Particularly with regard to task relatedness, which was shown to not have an as unambiguous effect on the amount of LPT as claimed by Hammarberg and Williams (1993), the present study cannot corroborate their findings in many instances. For example, no differences in the amount of potential task-related LPT was recognisable in terms of vowel reduction and the specific type of task carried out; where Hammarberg and Williams found clearly more LPT in their subject's free speech, the present study rather yielded heterogeneous syllable ratios across the two speaking styles. The lack of a significant difference between speaking styles in terms of the amount of LPT in this study suggests that Hammarberg and Williams' findings might be an artefact either of their methodology or of their single subject. It thus requires further systematic empirical investigations, on a larger empirical basis, with more participants and a stringent methodology, in order to arrive at clear results.

7. Conclusion

As one of the first methodologically stringent empirical explorations of the existence and nature of LPT, the present study has provided at least some insight into this phenomenon. Analysing the speech of 18 multilingual learners, the suprasegmental feature of speech rhythm (sections 4.2.6.1, 5.1 and 6.1) as well as the two segmental features of vowel reduction (sections 4.2.6.2, 5.2 and 6.2) and coda CC realisation (sections 4.2.6.3, 5.3 and 6.3) were examined in detail. The most basic question that could thus be answered is that LPT in fact does exist. This simultaneously provided evidence against claims in previous studies that CLI from one NNL onto another on the level of phonology does not exist or is negligible as the influence comes primarily from the L1 (e.g. García Lecumberri & Gallardo, 2003; Llisterri & Poch, 1987; Pyun, 2005; Ringbom, 1986, 1987).

Firstly, it must be acknowledged that LPT is a multifaceted phenomenon in the realm of a strand of research that is still in the course of establishing itself; there is neither a uniform, generally agreed-upon terminology (section 2.1), nor a commonly accepted view on what kind of learners actually qualify as suitable multilingual subjects of investigation, or even what the overall object of investigation – multilingualism – constitutes per se (section 2.2). A similar myriad of definitions and conceptualisations becomes evident when narrowing the field of multilingualism research down to the investigation of CLI (sections 3.1.1 and 3.1.2) and eventually to the investigation of lateral phonological CLI. A precise working definition is consequently required (e.g. Kemp, 2009; section 3.1.3) in order to cover the various facets and types of transfer and thus do this complex phenomenon justice.

The complexity of the phenomenon is also illustrated by the overall heterogeneous results of the empirical study (sections 4, 5 and 6): besides clear LPT (or also LPT in the form of combined L1/L2 CLI or a transferred L2 hybrid with underlying L1 influence), forward transfer from the L1 was observed, as well as singular idiosyncratic forms or hypercorrect interlanguage productions. These findings not least also show that clear-cut answers to LPT as pretended to exist, for instance, in Hammarberg and Williams' (1993) vanguard study simply do not exist. LPT's manifestations are manifold – as diverse as the individual profiles of the multilingual learners exhibiting them.

What has also been touched upon, if not systematically investigated, are the different factors that interact with the occurrence of LPT (sections 3.2 and 3.3; e.g. also Hammarberg & Hammarberg, 1993; Tremblay, 2007; Gut, 2010; Llama et al., 2010; Wrembel, 2010). Primarily source- and target-language proficiency as well as task relatedness were considered in relation to the analysed learner productions. Of course, there is still much more scope for investigation, as was pointed out frequently; particularly the factors that potentially promote LPT should be looked at closely in their own right. With results from carefully designed empirical studies, it will be possible to confirm the hypothesis of a hierarchy of factors as well as the presumably varying levels of strength of the single factors in triggering LPT.

Contrary to prior studies, the present study put particular emphasis on a valid, reproducible and stringent methodology for the investigation of LPT (section 4.2). Previously, studies were conducted often in the form of case studies with a single participant (e.g. Chamot, 1973; Rivers, 1979; Hammarberg & Williams, 1993), mentioning few, random phonological features; additionally, they mostly provided only introspective and consequently rather subjective and impressionistic "analyses". However, the present study applied a novel methodological approach to the investigation of LPT in various respects: Firstly, the productions of 18 participants (nine female, nine male) – many more than in most existent studies on LPT – were examined. Secondly, these participants were selected with regard to a number of factors (e.g. age, order of acquisition, linguistic distance). Thirdly, the elicitation material and the recording procedure itself was carefully prepared and controlled for different factors (e.g. order of acquisition, recency of use, orthography). Fourthly – one of the most important aspects –, data was elicited and analysed from all of the participants' relevant languages, i.e. from the L1, the potential non-native source language L2 and from the envisaged non-native target language L3/Ln. In a study involving multilingual learners, and particularly when investigating a phenomenon like LPT, it is crucial to consider the individual learners' previous linguistic knowledge in its entirety in order to capture every potential source language. For instance, combined L1/L2 influence on the L3/Ln, resulting in some kind of hybrid form, could only be identified as such in a learner if the researcher has access to his individual L1, L2 and TL data produced. Fifthly, and finally, the analyses in the present empirical study were conducted in a quantitative and qualitative manner so as to triangulate the results. On the one hand, a proper empirical investigation of LPT must aspire to operationalising an objective and reproducible quantification of instances of LPT. On the other hand, as was also seen in the present study, quantitative analyses in the realm of the investigation of CLI should always be triangulated with a more qualitative analysis of the results. Often, crucial differentiating nuances may only be detected that way or potentially deceiving absolute numbers may be mitigated.

Of course, this kind of methodology that tries to take into account the learners' previous linguistic knowledge, the individual learning background and thus also the different factors that potentially promote the occurrence of LPT is rather time-consuming. But in order to gain in-depth knowledge and understanding of the complex phenomenon of LPT it is indispensable to apply a more sophisticated method than most transfer studies to date.

Naturally, the methodology as suggested and used in the present empirical study is still open for improvement. First and foremost, the test population should be extended to provide a wider basis in terms of more tokens to base the analyses on. This goes hand in hand with the need to explore a much larger number of phonological features – although this could already be remedied to a certain extent upfront: researchers should simply pay more attention to better gearing the stimulus material for the empirical study towards eliciting a specific feature. Overall, more and even better controlled data (as well as more resources in terms of time or automation for annotating and analysing it), particularly from the L1 and the L2, would have been convenient for the present analyses. It thus would have enabled more sound results based on a wider data basis. Until a generally valid methodology is in use and consequently easily comparable results across studies become available, it would be a good idea to not only record and analyse all of the learners' languages, but also record and analyse native speaker reference data. Thereby, a consistent method of analysis across the multilingual learners' languages as well as a high level of comparability with L1-reference data would be guaranteed. This ties in with the suggestion that data from further language combinations would also be commendable. So far, an obvious overweight of studies involving English is discernible in the few LPT studies (e.g. Gut, 2010; Hammarberg & Williams, 1993; Llama et al. 2010; Wrembel, 2010, 2012, 2015; Wunder, 2011).

What is eventually required after studies carried out on a data basis as broad as possible that have proven satisfactorily the sole existence of LPT for the whole research community, though, are also more specific studies.

Still applying a broad empirical basis in order to focus on one particular aspect – for instance be it the impact of the factor of proficiency level or whether order of acquisition is higher up in the hierarchy of strength than typology – will enable to put together the individual results like a jigsaw puzzle that will ultimately result in the bigger picture that constitutes LPT.

Although another puzzle piece was contributed with the present study, there are of course also some limitations to it. One of the most crucial drawbacks are the possibly unsatisfactory proficiency self-assessments of the participants. As was discussed, their correctness was put into question numerous times in the analyses. Quite likely these self-assessments did not coincide with the actual proficiency levels in several cases. Ideally, all potential participants should have undergone a proficiency test prior to being recorded in order to determine their suitability for the study in terms of homogeneous source- and target-language proficiency levels. However, there are two major difficulties. Firstly, to date there is no valid test of phonological proficiency around that could have been applied prior to the study and be easily and quickly evaluated, which leads to the second difficulty: carrying out a proficiency test (across all NNLs, of course) that at least approximates a valid, objective assessment of proficiency level would take unreasonably long to evaluate for a solely preliminary analysis to the actual study.[51]

Further, the 18 recorded participants constitute no random selection: Subjects for the empirical study were tried to be acquired via posters, leaflets and e-mails as well as through personal appeals in different classes at university. However, particularly personal contacts with a couple of Chinese native speakers helped to eventually gain access to this rather shy community, which tends to keep to themselves. Consequently, the present test population cannot really be classified as a true random sample. The "selection" was in fact rather controlled by the participants who consented to be recorded. This possibly also entails other shortcomings of the study:

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[51] For example, when designing such a phonological-proficiency test for the L2, one could look at developmental sequences in L1 acquisition of same L2 and determine which phonological features (obviously apart from the ones that would be investigated in the actual empirical study) are acquired at which stage. Based on these, test materials could be developed, depending on which proficiency level is aimed at. Then the recordings could be carried out and the data analysed for the amount of correctly/incorrectly produced features. Subsequently, the learners could be assigned to different proficiency levels according to which and how many features they have already acquired correctly. However, this would certainly be a rather time-consuming matter.

Firstly, those Mandarin speakers who contacted the present author of their own accord probably share certain character traits, like a willingness to take risks or extroversion, which might also have a certain impact on the occurrence of transfer. Further, due to this self-selection, possibly greater differences between the individual learners, for example in terms of affective factors, could appear and may have had an impact on these interlingual influences, too (cf. Richter, 2008: 147f).

On the other hand, it is rather impossible to cover all potentially relevant factors with regard to evoking LPT in a single study. What could have been improved in the present study, though, is that at least a small number of factors could have been controlled for much more meticulously and analysed. This would have worked well if two groups of participants differing exclusively in one or two factors had been recorded. That way, a direct comparison and elicitation of potential covariation with the one or two factors examined would have been possible. Similarly, another limitation of the study is the fact that it had to rely on previously established native speaker reference values, if existent. It would have been advantageous to record and analyse such native speaker comparison groups oneself in order to ensure that all data would have been analysed and evaluated in the same way and thus guarantee valid and objective results.

Very specifically relating to the present data analysis, sometimes there were simply too few tokens to base the analysis – not to mention statistical tests – on. For instance, a rather limited number of CCCs overall was produced in the L2 English, both in the same form and existent only in a similar form as in the TL German. Moreover, sometimes certain forms could not be analysed unambiguously because it could not be decided whether, for instance, they were the result of positive LPT or target-like acquisition. Perhaps a more sophisticated methodology in the future will be the solution.

Notwithstanding the mentioned weaknesses or that some previous findings could not be replicated (e.g. regarding Hammarberg and Williams' [1993] factor of task relatedness: lack of a clear covariation of LPT and task relatedness in the present data), the findings of the present study still are significant enough to have implications for further research on LPT as well as for the learning and teaching of NNLs. Positive application or conscious promotion of LPT, or CLI overall, for instance, could aid in trying to prevent foreign accent: Metalinguistic awareness could be raised for the extraordinarily difficult features in a TL-phonological system, i.e. especially for very similar, but not identical sounds, which constitute potential loci for negative LPT. Learners would thus be directed to more awareness of the probability of CLI in general, be it positive or negative. Incorporating further prior linguistic knowledge of learners and trying to channel it in the classroom by contrastively showing up what can and what cannot be transferred could thus help facilitate the acquisition of a new phonological system. Simultaneously, knowledge about the interdependence of LPT and specific factors could be applied to enhance the positive effect even more. – There is still much more scope for the investigation of a whole range of fascinating facets, possibilities and applications of LPT.

The hunt for lateral phonological CLI in multilinguals in this study overall was successful. But as there is still so much to discover, the present author, and further researchers hopefully too, will definitely return to these grounds to continue the hunt – just like Her Royal Highness Queen Elizabeth II has for many, many years ...

8. References

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Appendix

A) Stimulus materials
- A1 L3/Ln German read-on-your-own text task
- A2 L3/Ln German picture-story retelling task
- A3 L3/Ln German read-on-your-own sentences 1
- A4 L3/Ln German read-on-your-own sentences 2
- A5 L2 English read-on-your-own text task
- A6 L1 Mandarin read-on-your-own text task
- A7 Interview questions
- A8 Questionnaire (in German)

B) Participants' background data
- B1 Overview of metalinguistic learner data
- B2 Participants' proficiency self-assessments

Appendix A1: L3/Ln German read-on-your-own text task

Bitte lesen Sie den Text laut vor:

Kinderstube im Beutel

Wenn ein Känguru-Baby geboren wird, ist es ganz winzig: gerade mal so groß wie ein Daumen. In wenigen Minuten hangelt sich der frischgeborene Wurm durch das Fell der Mutter in den Bauchbeutel und saugt sich dort an der Zitze fest.

Einmal drin im Beutel, bleibt "Joey" – so nennen Australier alle Känguru-Jungen – dort, bis er vollständig entwickelt ist. Kängurus gehören zu den Beuteltieren. Sie sind Säugetiere, wie es sie ursprünglich überall auf der Welt gab. Als sich vor etwa 60 Millionen Jahren Australien von den restlichen Kontinenten trennte, begann eine völlig eigenständige Entwicklung der Tier- und Pflanzenwelt. Australien wurde zur Hauptregion der Beuteltiere; es gibt sie aber auch zum Beispiel in Südamerika.

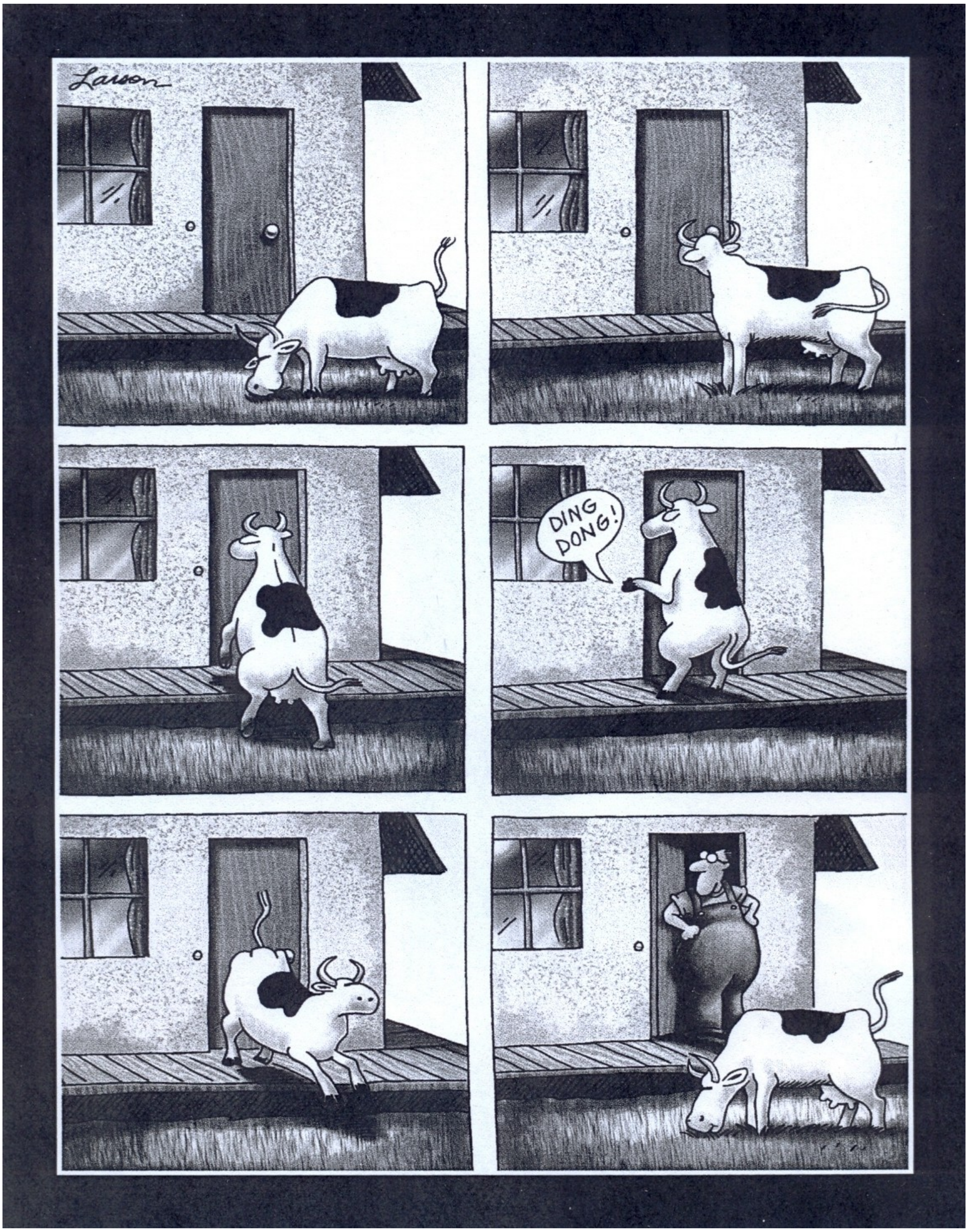
Im Gegensatz zu anderen Säugetieren fehlt den Beuteltieren das Nährgewebe, von dem sich der Nachwuchs bis zur Geburtsreife ernährt. Känguru-Junge kommen deshalb schon nach 35 Tagen auf die Welt und müssen sich im Beutel der Mutter erst noch fertig entwickeln. Nach der Geburt ist "Joey" blind und unbehaart; seine Hinterbeine sind noch ganz schwach. Es dauert mindestens sechs Monate, bis das Junge erstmals einen Blick aus dem Beutel auf die Außenwelt wagt.

Je älter Känguru-Junior wird, desto mehr turnt er im Beutel herum bis er – schwupps! – plötzlich herausfällt, dann aber wie der Blitz zurück in die Bauchtasche der Mama klettert. Mit der Zeit wird Joey mutiger, seine Ausflüge werden länger. Es wird auch immer schwieriger, in den Beutel zurück zu klettern, weil das Junge immer größer wird. Wenn die Mutter eine Gefahr verspürt, ist Joey jedoch sekundenschnell im Beutel verschwunden. Nach etwa acht Monaten wagt der Kleine noch ein paar letzte Versuche, in Mamas Tasche zu schlüpfen, gibt dann jedoch auf. Er ist jetzt erwachsen.

(Modified from: http://www.geo.de/GEOlino/natur/tiere/1348.html, 06.07.2016)

Appendix A2: L3/Ln German picture-story retelling task

Bitte erzählen Sie auf Deutsch eine kurze Geschichte zu folgenden Bildern:



Appendix A3: L3/Ln German read-on-your-own sentences 1

Bitte lesen Sie die Sätze laut vor:

Brauchst du heute meinen Wagen?

Nachts brauchst du neun Stunden Schlaf, sagt mein Arzt.

Tanja glaubt dein Tisch hat sich bewegt …

Thomas sagt die Stadt kann keinen Euro mehr zahlen.

Was für ein schönes Blumenbeet!

Klaus denkt sie bleibt gefangen im Bann der Königin.

In dieser Höhle lagert der Staat schon seit Jahren Tonnen von Rum ...

So kommt ein Mann zu Ruhm und Ehre!

Paul glaubt an Bord des Schiffes spukt es …

Kann man heute ein Pferd mit der Bahn transportieren?

Oh nein, wenn mein Zahnarzt bohrt ist das die totale Hölle!

Kannst du bis zum Bett spucken?

Papa Peter tut nicht viel, außer vielleicht einmal ein Putzmittel kaufen.

Appendix A4: L3/Ln German read-on-your-own sentences 2

Bitte lesen Sie die Sätze laut vor:

– Wie machst Du das? Deinen Schneemann finde ich immer am schönsten.
– Keinen Schimmer. Irgendwie funktioniert das einfach.

– Du hast neun kleine Brote gebacken? Wer soll denn die bitteschön alle essen?!
– Da kann man doch leicht was davon eingefrieren, nur keine Angst.

Kannst Du Julchens Spritze mit dem Impfstoff bitte später setzen? Ich glaube sie muss sich noch von der gestrigen erholen und der Arzt kommt erst abends.

Du braust blaues Bier in eurer Brauerei? Wie funktioniert denn so was?!

Karl, kämm Dir mal die Haare und komm bitte sofort her! Am Nordpol kannst du vielleicht so rumlaufen, aber nicht in meinem Haus!

Appendix A5: L2 English read-on-your-own text tasks

Bitte lesen Sie den Text und die Sätze laut vor:

Koalas

Millions of koalas once lived in Australia. About 100,000 survive today. What's happening to these popular critters?

Wildfires raged in Australia during January 2002, destroying 600,000 acres of forest. The flames' victims included countless koalas. These tree-climbing mammals live only in Eastern Australia. But the fire alarms caught the attention of koala-lovers around the world.

The wildfires, however, were just part of a much larger problem: forests are vanishing throughout Eastern Australia. Cute and popular as koalas are, they're having trouble hanging on.

Koalas' problems stem from being picky eaters. These marsupials like just one thing: they're hooked on eucalyptus, an Australian tree. Koalas use their big noses to sniff out tasty leaves. "If you offered them something else", says zookeeper Jennifer Toll. "They wouldn't know what to do with it. They'd starve before they'd eat a carrot."

Koalas weigh only twenty pounds. But they gobble almost three pounds of food a day. That's like a sixty-pound kid eating nine pounds a day! Eucalyptus leaves, you see, aren't very nutritious. So koalas need supersize servings to get enough energy.

Even eating as much as they do, koalas don't have much energy. So they rest about 20 hours a day. That doesn't make it any easier to search for mates, especially when their territories are so scattered.

As a result, the koala population plunged. No one knows exactly how many koalas survive today. What does the future hold for koalas? Can humans find ways to help them hold on? Australians hope so. "The koala", an Australian once said, "is essential to how we see ourselves." Saving koalas is possible. But it will take time, work, hard choices – and plenty of eucalyptus leaves.

(Modified from: http://magma.nationalgeographic.com/ngexplorer/0303/articles/mainarticle.html; 06.07.2016)

Paul can’t remember why he had to struggle so terribly hard to get the string orchestra to play what he wanted at his very own wedding.

Come and play the recording to me!

“Point Break” is one of his favourite films – it should have deserved nine Oscars, Tim once said.

– Please, tell me – what do you plan to do for your thirtieth birthday?
– Can’t you just wait and see what’s going to happen? Gosh, you really lack patience …

Longing for the cruel sun to stop burning down, Robert took up his backpack and started walking again.

An impressive black car was parked in front of the old crook’s brothel, which had to close down nine years ago.

I would love to hear this new band on record! What was their name again? “Raffle Lords” or something?

Appendix A6: L1 Mandarin read-on-your-own text task

Bitte lesen Sie den Text und beide Sätze laut vor:

有一回，北风跟太阳正在那儿争论谁的本领大。说着说着，来了一个过路的，身上穿了一件厚袍子。他们俩就商量好了，说，谁能先叫这个过路的把他的袍子脱下来，就算是他的本领大。北风就卯足了劲儿，拼命的吹。可是，他吹得越厉害，那个人就把他的袍子裹得越紧。到末了儿，北风没辙了，只好就算了。一会儿，太阳出来一晒，那个人马上就把袍子脱了下来。所以，北风不得不承认，还是太阳比他的本领大。

Pinyin transcription:

Yǒu yì huí, běi fēng gēn tài yang zhèng zài nàr zhēng jùn shuí de běn lǐng dà. shuō zhe shuō zhe, lái le yí ge guò lù de, shēn shàng chuān le yí jiàn hòu páo zi. tā men liǎ jiù shāng liang hǎo le, shuō, shúi néng xiān jiào zhè ge guò lù de bǎ tā de páo zi tuō xià lái, jiù suàn shì tā de běn lǐng dà. běi fēng jiù mǎo zú le jìnr, pīn mìng de chuī. kě shì, tā chuī de yuè lì hài, nà ge rén jiù bǎ tā de páo zi guǒ de yuè jǐn. dào mò liǎor, běi fēng méi zhé le, zhǐ hǎo jiù suàn le. yì huǐr, tài yang chū lái yí shài, nà gè rén mǎ shàng jiǔ bǎ páo zi tuō le xià lái. suǒ yǐ, běi fēng bù dé bù chéng rèn, hái shì tài yang bǐ tā de běn lǐng dà.

(English translation:)

The North Wind and the Sun were disputing which of them was stronger, when a traveller came along wrapped in a warm cloak. They agreed that the one who first succeeded in making the traveller take his cloak off should be considered stronger than the other. Then the North Wind blew as hard as he could, but the more he blew, the more closely did the traveller fold his cloak around him; and at last the North Wind gave up the attempt. Then the Sun shone out warmly, and immediately the traveller took off his cloak. And so the North Wind was obliged to confess that the Sun was the stronger of the two.

1. 小朋友们爱玩纸飞机和气球。
Pinyin: Xiǎo péng yǒu men ài wán zhǐ fēi jī hé qì qiú.
(Translation: The children like playing with paper planes and balloons.)

2. 我们喜欢去公园放风筝，荡秋千和打羽毛球。
Pinyin: Wǒ men xǐ huan qù gōng yuán fang fēng zheng, dàng qiū qiān hé dǎ yǔ máo qiú.
(Translation: We love kite flying, seesawing and playing badminton in the park.)

Appendix A7: Interview questions

1. Welche Sprachen haben Sie gelernt (in chronologischer Reihenfolge)?
2. Sprechen Sie neben Mandarin noch weitere chinesische Dialekte? In welcher Provinz sind Sie aufgewachsen?
3. Welche Sprachen haben Sie in der Schule gelernt? Wurden sie auch im Unterricht verwendet?
4. Haben Sie in Ihren Fremdsprachen nur Sprechen gelernt oder auch Schreiben? Gleichzeitig oder nacheinander?
5. Was für ein Lerntyp sind Sie? Fällt es Ihnen zum Beispiel leicht, in einer Fremdsprache einfach drauf loszureden?
6. Welche Ihrer Fremdsprachen finden Sie ähneln sich am meisten? Warum?
7. Haben Ihre Sprachkenntnisse Ihnen weiteres Fremdsprachenlernen erleichtert?
8. Welche Ihrer Fremdsprachen glauben Sie beherrschen Sie am besten?
9. Glauben Sie, Sie haben einen Akzent in einer Ihrer Sprachen? Hört man, dass Sie kein Muttersprachler sind? In welcher(n)?
10. Wie wichtig ist für Sie persönlich eine quasi-muttersprachliche Aussprache in einer Fremdsprache?
11. Was war/ist Ihre Motivation, Ihre jeweiligen Fremdsprachen zu lernen (z.B. Pflichtfach in der Schule, berufliche Gründe, Kommunikation mit Brieffreund, etc.)?
12. Haben Sie Interesse an oder Erfahrung mit Musik? Sind Sie musikalisch?
13. Wissen Sie, was ein Vokal ist? Haben Sie den Begriff schon mal in der Schule oder im Studium gehört?

Appendix A8: Questionnaire

Name:	
Alter:	
Geschlecht:	männlich ☐ weiblich ☐
Beschäftigung:	☐ Student Studienjahr: ____________ Fächer: ______________________________________ ______________________________________ ☐ andere: ______________________________________ ______________________________________
E-Mail*:	

* zwecks eventueller Rückfragen

Bitte geben Sie Ihre **Muttersprache** (= L1) und **ALLE** gelernten **Fremdsprachen** (= L2, L3, L4, etc.) in <u>chronologischer Reihenfolge</u> an und beantworten Sie bitte die Fragen (→ Mehrfachangaben möglich). Vielen Dank!

Muttersprache:	
L2:	
L3:	
L4:	
L5:	
L6:	
L7:	

L2:			
Kompetenz:	in SCHRIFT: ☐ Anfänger ☐ fortgeschrittener Anfänger ☐ fortgeschritten ☐ fast muttersprachlich	LESEN: ☐ Anfänger ☐ fortgeschrittener Anfänger ☐ fortgeschritten ☐ fast muttersprachlich	SPRECHEN: ☐ Anfänger ☐ fortgeschrittener Anfänger ☐ fortgeschritten ☐ fast muttersprachlich
Alter bei Lernbeginn der Fremdsprache:			
Fremdsprache **gelernt**	☐ in der Schule Falls JA: Wie lange? ____________________ ☐ Volkshochschule, Abendkurs etc. ☐ Selbstlernkurs ☐ zu Hause (Muttersprache eines Elternteils, etc.) ☐ andere: ____________________		
Kontakt mit Fremdsprache:	☐ nur im Unterricht ☐ zu Hause ☐ Auslandsaufenthalt (Urlaub, Erasmus, etc.) Wann? ____________________ Wie lange? ____________________ ☐ andere: ____________________ ____________________		
Fremdsprach-**gebrauch**:	☐ aktiv (d.h. sprechen in Fremdsprache, schreiben...) ☐ passiv (d.h. lesen in Fremdsprache, Filme ansehen, Musik...)		
	☐ nur im Unterricht ☐ zu Hause ☐ mit Freunden ☐ in der Arbeit ☐ TV/Internet ☐ andere: ____________________ ____________________		

L3:			
Kompetenz:	in SCHRIFT: ☐ Anfänger ☐ fortgeschrittener Anfänger ☐ fortgeschritten ☐ fast muttersprachlich	LESEN: ☐ Anfänger ☐ fortgeschrittener Anfänger ☐ fortgeschritten ☐ fast muttersprachlich	SPRECHEN: ☐ Anfänger ☐ fortgeschrittener Anfänger ☐ fortgeschritten ☐ fast muttersprachlich
Alter bei Lernbeginn der Fremdsprache:			
Fremdsprache **gelernt**	☐ in der Schule Falls JA: Wie lange? ______________________ ☐ Volkshochschule, Abendkurs etc. ☐ Selbstlernkurs ☐ zu Hause (Muttersprache eines Elternteils, etc.) ☐ andere: ______________________		
Kontakt mit Fremdsprache:	☐ nur im Unterricht ☐ zu Hause ☐ Auslandsaufenthalt (Urlaub, Erasmus, etc.) Wann? ______________________ Wie lange? ______________________ ☐ andere: ______________________ ______________________		
Fremdsprach-**gebrauch**:	☐ aktiv (d.h. sprechen in Fremdsprache, schreiben...) ☐ passiv (d.h. lesen in Fremdsprache, Filme ansehen, Musik...)		
	☐ nur im Unterricht ☐ zu Hause ☐ mit Freunden ☐ in der Arbeit ☐ TV/Internet ☐ andere: ______________________ ______________________		

<table>
<tr><td>L4:</td><td colspan="3"></td></tr>
<tr><td>Kompetenz:</td><td>in SCHRIFT:

☐ Anfänger
☐ fortgeschrittener Anfänger
☐ fortgeschritten
☐ fast muttersprachlich</td><td>LESEN:

☐ Anfänger
☐ fortgeschrittener Anfänger
☐ fortgeschritten
☐ fast muttersprachlich</td><td>SPRECHEN:

☐ Anfänger
☐ fortgeschrittener Anfänger
☐ fortgeschritten
☐ fast muttersprachlich</td></tr>
<tr><td>Alter bei Lernbeginn der Fremdsprache:</td><td colspan="3"></td></tr>
<tr><td>Fremdsprache gelernt</td><td colspan="3">☐ in der Schule
Falls JA:
Wie lange? ______________________________

☐ Volkshochschule, Abendkurs etc.
☐ Selbstlernkurs
☐ zu Hause (Muttersprache eines Elternteils, etc.)
☐ andere: ______________________________</td></tr>
<tr><td>Kontakt mit Fremdsprache:</td><td colspan="3">☐ nur im Unterricht
☐ zu Hause
☐ Auslandsaufenthalt (Urlaub, Erasmus, etc.)

Wann? ______________________________

Wie lange? ______________________________

☐ andere: ______________________________

______________________________</td></tr>
<tr><td rowspan="2">Fremdsprach-gebrauch:</td><td colspan="3">☐ aktiv (d.h. sprechen in Fremdsprache, schreiben...)
☐ passiv (d.h. lesen in Fremdsprache, Filme ansehen, Musik...)</td></tr>
<tr><td colspan="3">☐ nur im Unterricht
☐ zu Hause
☐ mit Freunden
☐ in der Arbeit
☐ TV/Internet
☐ andere: ______________________________

______________________________</td></tr>
</table>

Appendix B1: Overview of metalinguistic learner data

Partici-pant	Sex	Age at recording (in years)	Linguistic background*	Length of residence in Germany	Length of formal instruction	
					L2 E (in years)	L3/Ln G (in months)
P1_m	M	22	L1Man_L2E_L3G_L4F	4 years	8	24
P2_f	F	22	L1 dialect/Man_L2E_L3Jap_L4G	1 year	10	48
P3_m	M	28	L1Man_L2E_L3G_L4Span	4 years	3	6
P4_m	M	28	L1Man_L2E_L3Jap_L4G	n.i.	16	0
P5_f	M	28	L1Man_L2E_L3Jap_L4G	3 years	10	1.5
P6_m	M	24	L1Man_L2E_L3G	1 year	12	n.i.
P7_f	F	21	L1Man_L2E_L3G	1 month	10	24
P8_m	F	26	L1Man_L2E_L3G_L4F	4 years	8	n.i.
P9_m	M	22	L1Man_L2E_L3G	1 month	9	24
P10_f	F	23	L1 dialect/Man_L2E_L3G	1 year	10	8
P11_f	F	21	L1Man_L2E_L3G	1 month	8	24
P12_f	F	30	L1Man_L2E_L3G	9 years	17	24
P13_f	F	39	L1Man_L2E_L3G	7 years	12	n.i.
P14_f	M	25	L1Man_L2E_L3F_L4G	1.5 years	11	12
P15_m	M	29	L1Man_L2E_L3G	10 years	6	9
P16_f	F	31	L1Man_L2E_L3G	11 years	7	n.i.

Partici-pant	**Sex**	**Age at recording (in years)**	**Linguistic background***	**Length of residence in Germany**	**Length of formal instruction**	
					L2 E (in years)	**L3/Ln G (in months)**
P17_m	M	28	L1Man_L2E_L3G	7 months	6	0
P18_m	F	28	L1 dialect/Man_L2E_L3G	6 years	10	60
n=18	**9M, 9F**	**Age range: 21–39**		**Mean: 3.6 years**	**Mean: 9.6 years**	**Mean: 18.9 months**

* Key: E = English, F = French, G = German, Jap = Japanese, Man = Mandarin Chinese, L1 dialect = Chinese dialect, Span = Spanish.

Participant	AOL/ first exposure		Contact with NNL		Use of NNL	
	L2 E	L3/Ln G	L2 E	L3/Ln G	L2 E	L3/Ln G
P1_m	10	18	In class	Stay abroad (since 2007→ 4 yrs)	Active & passive use; in class, at home, TV/WWW	Active & passive use; in class, with friends, TV/WWW
P2_f	12	18	In class	In class, 1 term stay abroad (10/2009–03/2010)	Passive use; in class, TV/WWW	Active & passive use; in class, with friends, TV/WWW
P3_m	16	21	In Australia at time of recording	---	Active & passive use	---
P4_m	12	21	At work (since 2008 → 2 yrs)	In class, stay abroad	Active & passive use; at work, TV/WWW	Active & passive use; in class, everyday life
P5_f	12	25	In class, at home	Stay abroad (since 2008→ 3 yrs)	Active & passive use; at work, TV/WWW	Passive use; at work, TV/WWW
P6_m	13	22	In class/uni (since 2008→ 2 yrs)	At home, stay abroad (since 2009→ 1 yr)	Active & passive use; in class, with friends, at work, TV/WWW	Active & passive use; at work, TV/WWW

Participant	AOL/ first exposure		Contact with NNL		Use of NNL	
	L2 E	L3/Ln G	L2 E	L3/Ln G	L2 E	L3/Ln G
P7_f	10	19	In class	Uni, 1 term stay abroad (10/2010–04/2011), at home	Passive use; TV/WWW, films	Active & passive use; with friends, at home, TV/WWW
P8_m	10	18	In class	Stay abroad (since 2006→ 4 yrs)	Passive use	Active & passive use;
P9_m	9	20	In class	Uni, 1 term stay abroad (10/2010–04/2011)	Active use; with friends, TV/WWW	Active use; with friends, at work, TV/WWW
P10_f	14	22	In class	Stay abroad (10/2010–10/2011 →1 yr)	Active & passive use; in class, with friends, TV/WWW	Active & passive use; in class
P11_f	11	19	In class	Uni, 1 term stay abroad (10/2010–04/2011)	Active & passive use; TV/WWW, music, films	Active & passive use; TV/WWW, music, films, reading, with friends

Participant	AOL/ first exposure		Contact with NNL		Use of NNL	
	L2 E	L3/Ln G	L2 E	L3/Ln G	L2 E	L3/Ln G
P12_f	13	20	In class, stay abroad (6 months USA)	In class, stay abroad (10/2001–06/2010)	Active & passive use; in class, TV/WWW	Active & passive use; in class, with friends, at work, TV/WWW
P13_f	15	32	In class	In class, stay abroad (since 2003→ 7 yrs)	Active & passive use; in class, with friends	Active & passive use; in class, with friends
P14_f	13	23	In class	Stay abroad (since 2008→ 1.5 yrs)	Active & passive use; in class, at work	Active use; with friends
P15_m	12	18	Stay abroad, at work (since 2007 → 4 yrs)	Stay abroad (since 2001→ 10 yrs)	Active & passive use; in class, with friends, at work, TV/WWW	Active & passive use; in class, with friends, at work, TV/WWW
P16_f	13	20	In class	Stay abroad (since 2000→ 11 yrs)	Passive use; in class	Active use; with friends, at work
P17_m	13	28	In class	Stay abroad (since 2010 → 7 months)	Active & passive use; at work, TV/WWW	Passive use; at work

Participant	AOL/ first exposure		Contact with NNL		Use of NNL	
	L2 E	**L3/Ln G**	**L2 E**	**L3/Ln G**	**L2 E**	**L3/Ln G**
P18_m	12	23	n.i.	Stay abroad (since 2005→ 6 yrs)	Passive use; in class	Active & passive use; with friends, at work, TV/WWW
n=18	**Mean: 12.2 yrs**	**Mean: 21.5 yrs**				

Appendix B2: Participants' proficiency self-assessments

Self-assessed proficiency levels in English and German across writing, reading and speaking skills as indicated in the questionnaire and the interview:

Partici-pant	Self-assessed proficiency* in L2: (writing/reading/speaking)	Self-assessed proficiency* in L3/Ln: (writing/reading/speaking)
P1_m	L2E: adv/adv/adv	L3G: adv/adv/adv
P2_f	L3E: adv beg/adv/adv	L5G: adv/adv/adv
P3_m	L2E:adv/adv/adv	L3G: beg/beg/beg
P4_m	L2E: nn/nn/nn	L4G: adv beg/adv beg/adv beg
P5_f	L2E: adv/adv/beg	L3G: adv/adv/adv
P6_m	L2E: adv/nn/adv	L4G: beg/beg/beg
P7_f	L2E: adv beg/adv beg/adv beg	L3G: adv beg/adv beg/adv beg
P8_m	L2E: adv/nn/adv	L3G: beg/adv beg/adv beg
P9_m	L2E: adv/adv/adv	L3G: adv beg/adv beg/adv beg
P10_f	L3E: adv beg/adv/adv beg	L4G: adv beg/adv/beg
P11_f	L2E: adv beg/adv/adv	L3G: adv beg/adv/adv beg
P12_f	L2E: adv/adv/adv	L3G: adv/adv/adv
P13_f	L2E: adv/adv/adv	L3G: adv/adv/adv
P14_f	L2E: adv beg/adv/adv beg	L3G: beg/adv beg/beg
P15_m	L2E: adv/adv/adv beg	L3G: nn/nn/adv
P16_f	L3E: adv beg/adv/beg	L4G: adv/adv/adv
P17_m	L2E: adv/adv/adv	L4G: beg/beg/beg
P18_m	L2E: adv beg/adv beg/adv beg	L3G: 0/0/beg

* Key: 0 = no knowledge, beg = beginner, adv beg = advanced beginner, adv = advanced, nn = near-native.