Transfer refers to the influence of one language on another resulting from the presence of multiple languages in the mind. It is such an all-pervasive phenomenon that every bi- or multilingual speaker and language learner will have experienced it, whether they are aware of it or not. In language production, the phenomenon is especially prominent at early stages of acquisition, with learners producing utterances such as “The boy lost his frosh” (from German “Frosch”, meaning frog). In the case of multilinguals, transfer is particularly interesting, as the number of potential sources increases with the number of languages a person knows. This thesis explores how, when, and why one language is chosen over another as source for transfer of lexical items. A number of different factors are considered and a mixed-methods approach is used in order to best serve the particularities of each of the factors under investigation. Research on transfer and its underlying mechanisms engages with questions of how languages are organised in the multilingual mind, how we access them, and how prior knowledge affects the acquisition of a new language. The present thesis aims to contribute to this line of enquiry.

Hannah Neuser holds a degree in English linguistics from UCL (UK). Her main research interests are multilingual language learning and crosslinguistic influence in the acquisition of English. She likes travelling and discovering new cultures.
Source Language of Lexical Transfer in Multilingual Learners
A Mixed Methods Approach

Hannah Neuser

Academic dissertation for the Degree of Doctor of Philosophy in English at Stockholm University to be publicly defended on Friday 9 June 2017 at 13.00 in hörsal 7, hus D, Universitetsvägen 10 D.

Abstract
The study reported in this thesis investigates the source language of lexical transfer in multilingual learners using a mixed methods approach. Previous research has shown that the source language of crosslinguistic influence can be related to factors such as proficiency, recency/exposure, psychotopy, the L2 status, and item-specific transferability. The present study employed a mixed methods approach in order to best serve the particularities of each of the five factors under investigation. Multinomial logistic regression was employed to test the predictive power of the first four factors, thereby addressing the issue of confounding variables found in previous studies. A more exploratory qualitative analysis was used to investigate item-specific transferability due to the lack of prior empirical studies focusing on this aspect. Both oral and written data were collected, offering an analysis of modal differences in direct comparison. The results show a significant effect of proficiency and exposure, but inconsistent patterns for psychotopy. Most importantly, in this study of lexical transfer, a significant L1 status effect was found, rather than an L2 status effect. In addition, the statistical model predicted the source language of transfer better in the spoken than in the written mode. Finally, learners were found to assess, as well as actively improve, an item’s transferability in relation to target language norms and constraints. All of these findings contribute to our understanding of lexical organization, activation, and access in the multilingual mind.

Keywords: multilingualism, third language acquisition, lexical transfer, crosslinguistic influence, modal differences, proficiency, recency, exposure, psychotopy, L2 status, transferability, markedness, lexical organization, activation, lexical access.

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SOURCE LANGUAGE OF LEXICAL TRANSFER IN MULTILINGUAL LEARNERS

Hannah Neuser
Source Language of Lexical Transfer in Multilingual Learners
A Mixed Methods Approach
Hannah Neuser
To my parents.
I feel absolutely blessed by the amount of people that have shown me kindness and support over the past four years. With these words, I hope to express my gratitude to those who have helped me on this journey. First, I would like to thank my supervisor Philip Shaw, who has been there since the very beginning and who stuck it out till the very end. His feedback challenged me to be rigorous, to excise unsubstantiated claims and to restrain Neuserisms. Whatever strengths can be found in the writing are the result of his influence. I am also most grateful to my supervisors Camilla Bardel, for sharing her expertise in the field, Raffaella Negretti, for guiding me in my very first steps as a PhD student, and Maria Kuteeva, for keeping me on track and getting me to the finish line. I would also like to offer my sincere thanks to Nils-Lennart Johannesson, who had the patience to proofread this text.

Many others have guided me along the way. Richard Young offered me the opportunity to be a Visiting Scholar to the University of Wisconsin-Madison, which gave me insight into a new multilingual environment. My stay in the US also led me to Doug Hemken, who taught me everything I know about statistics and made me believe in the greatness of my data. I owe the core of this study to him. I would also like to offer a warm thank you to David Singleton for his continuous encouragement along the way, as well as to Jean-Marc Dewaele for agreeing to be the opponent at my mock defence and his valuable feedback at such a crucial point in time.

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While the decisive turning points of your PhD lie in some few moments, the bulk of the work lies in the many weeks and days and hours spent at your desk. I therefore would like to thank everyone at the Department of English at Stockholm University for being so welcoming, kind, and engaging. And I would like to thank my fellow PhD student Andrew Cooper in particular, for answering my many questions about linguistics and life in general. To all my friends, thank you for the many fika breaks, walks, lunches, pub quizzes, dinners, squash games, comedy nights, long conversations and everything else that kept me sane during this time.

Finally, I would like to thank my parents for their endless patience, as well as their unconditional love and support in every adventure I have ever embarked on, including this one. For my dad’s unfailing help with all things programming and my mum’s unfailing visits to the cold north.

I could not have done it without you.

Thank you.
What you seek is seeking you.

Rumi
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<tr>
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<td>Background language</td>
</tr>
<tr>
<td>BLC</td>
<td>Basic language cognition</td>
</tr>
<tr>
<td>CLI</td>
<td>Crosslinguistic influence</td>
</tr>
<tr>
<td>DV</td>
<td>Dependent variable</td>
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<tr>
<td>EFA</td>
<td>Exploratory factor analysis</td>
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<td>HLC</td>
<td>Higher language cognition</td>
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<td>IL</td>
<td>Interlanguage</td>
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<tr>
<td>KOPP</td>
<td>Knowledge of ortho- and phonotactic probability</td>
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<tr>
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<td>L2</td>
<td>Second language</td>
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<td>L3</td>
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<tr>
<td>MHM</td>
<td>Modified Hierarchical Model</td>
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<td>PCA</td>
<td>Principal component analysis</td>
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<td>RHM</td>
<td>Revised Hierarchical Model</td>
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<tr>
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<td>Source language</td>
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<td>SLA</td>
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1 Introduction

Multilingualism is an all-pervasive phenomenon in the world today, whether at a societal or individual level. With the majority of people being multilingual and not monolingual (Aronin & Singleton, 2008; Auer & Wei, 2007; Cook, 1992; Grosjean, 1982, 2010), and the typical learner acquiring a third or fourth rather than a second language (De Angelis, 2007a; Szubko-Sitarek, 2015), it is important to investigate linguistic issues from a multilingual perspective. Hammarberg (2010) writes that one needs to assume that “humans are potentially multilingual by nature, and that multilingualism is the normal state of linguistic competence” (p. 92). Despite the pervading nature of multilingualism in the world, research in applied linguistics and psycholinguistics in particular has mainly focused on how human language works in mono- and bilingual speakers (Cenoz, Hufeisen, & Jessner, 2003). While there has been a shift toward multilingualism in the last few decades, theoretical proposals and empirical studies often assume no difference between a second and a third or fourth language (e.g. Sharwood Smith, 1994).

One important aspect that is specific to bi- and multilingualism is the interaction of multiple languages in the mind, illustrated by the occurrence of transfer. At the beginning of the 20th century, transfer was often considered the result of sloppiness and a lack of sound thinking (Jarvis & Pavlenko, 2008). Later on, through the work of academics such as Uriel Weinreich (1953) and Robert Lado (1957), transfer came to be seen as “an unavoidable feature of language learning and use [which was now being explored] as a linguistic, psycholinguistic, and sociolinguistic phenomenon” (Jarvis & Pavlenko, 2008, p. 3). Research on transfer in second language acquisition (SLA) has come a long way since then and has offered invaluable insights into the cognitive processes underlying language learning. As multilingualism is being recognized as more of a norm than an exception, an increasing amount of research has focused on the specificities of third language acquisition (TLA). Transfer in particular is considered a highly insightful phenomenon, as it can guide our understanding of the full capacity of humans to acquire language (Wang,
The present study aims to contribute to this line of investigation, by exploring patterns of crosslinguistic influence in multilingual learners.

While transfer can occur at different linguistic levels (e.g. syntax and phonology), it is especially interesting in the case of lexis. Vocabulary is the main carrier of meaning and central to language learning. Lexical transfer therefore offers an excellent working ground to probe questions about the organization and underlying processes of the multilingual mental lexicon. The present thesis adopts a psycholinguistic perspective on transfer as a phenomenon subject to a range of effects, including cognitive, linguistic, social, and situational factors (Jarvis & Pavlenko, 2008).

The most central difference between transfer in SLA and transfer in TLA is the fact that the learner can draw on multiple background languages when encountering a gap in the target language (TL). This thesis therefore directly addresses what De Angelis (2007a) calls “the most challenging issue of all, which is how to predict multilinguals’ behaviour […] [and] which of the languages already in the mind is most likely to become the learner’s preferred source of information during the acquisition process.” (p. 28). L3 acquisition is a highly complex phenomenon due to the extensive number of additional variables and their potential interaction (Sanz, 2000).

While it is difficult to fully predict transfer behaviour and patterns in the choice of source language (SL), previous research has established a number of factors that seem to contribute to the selection process. The four most prominent factors are the level of proficiency in a background language, recency (or exposure), psychotypology, and the L2 status (Bohnacker, 2006; Cenoz, 2003a; De Angelis & Selinker, 2001; Williams & Hammarberg, 1998). High proficiency in a learner’s background language seems to lead to greater transfer from this language than from a background language at lower proficiency (§ 3.1.1). Similarly, the more recently a language has been used, the more probable it is that it will act as source for transfer (§ 3.1.2). Psychotypology represents a learner’s beliefs of how similar two languages are and research suggests that the closer a background language is considered to be to the target language, the greater the odds that it will serve as source for transfer. Finally,  

---

1 The word “choice” in this context is used with no implied connotation of consciousness.
the L2 status hypothesis states that transfer in TLA is more probably from other foreign/additional languages (i.e. L2s) than from the L1 (§ 3.1.4).

Another important factor that has been suggested to affect transfer is item-specific transferability (Jarvis & Pavlenko, 2008; Kellerman, 1977, 1986), where the specific form of a word can affect its degree of transferability into the TL (§ 3.1.5). This aspect has mainly been investigated in the context of second language acquisition (e.g. Bouvy, 2000), but has not yet been empirically explored as a potential predictor for the source language of transfer in third language acquisition. The present thesis therefore aims to investigate the predictive power of the following five factors:

- Proficiency
- Recency/exposure
- Psychotypology
- L2 status
- Item-specific transferability

The first four factors have predominantly been investigated in a qualitative manner and the present study therefore aims to establish whether inferential statistics (multinomial logistic regression in this case) can provide a useful approach to testing the significance of these factors. Item-specific transferability, on the other hand, will not be included in the statistical model. Given the difficulty in quantifying transferability and the general lack of previous studies that directly investigate its effects on the source language of transfer, a more qualitative approach will be adopted to explore its relevance in third language acquisition. A mixed methods approach is consequently employed, in order to best serve the particularities of each of the five factors investigated in this thesis.

Finally, transfer is traditionally considered an unconscious and automatic process and has mainly been investigated in the context of oral language production (e.g. Cenoz, 2001; De Angelis & Selinker, 2001; Hall & Ecke, 2003; Lindqvist, 2009, 2010; Lindqvist & Bardel, 2014; Schmidt & Frota, 1986; Singleton, 1987; Tremblay, 2006; Williams & Hammarberg, 1998). More recently, however, the perception of intentionality in transfer has changed and it is now commonly accepted that transfer can occur both spontaneously and strategically. This development raises interesting questions regarding the relevance of transfer in written production. With greater processing time available, the factors found to affect the source language of transfer in oral production may prove to have a differing effect on transfer in written production.
While a number of studies have investigated the SL of transfer in writing in isolation (De Angelis, 2005a; Ringbom, 1986, 2001; Sánchez, 2015b; Singleton & Ó Laoire, 2006; Tullock & Fernández-Villanueva, 2013), there is no study to date that has examined the comparability of transfer patterns in oral versus written production. In the present thesis, a direct comparison will be presented and potential differences in the predictive power of the five factors listed above by mode of production will be discussed.

The aims of this study are thus to 1) investigate the predictive power of proficiency, psychotypology, recency, the L2 status, and item-specific transferability on the source language of transfer in multilingual learners, and 2) explore whether there are any differences in how these factors predict the source language of transfer in spoken versus written production (see § 3.3 for the specific Research Questions). There are a number of contributions to the field of transfer research this study hopes to make. First and foremost, a quantitative approach to the first four factors can offer greater generalizability of previous findings, thereby increasing their potential impact on learning strategies and teaching methods. Furthermore, proficiency, recency, psychotypology, and the L2 status have often been confounding factors in previous studies (see chapter 3). By testing them in an integrated model, which controls for the other factors, we can determine each factor’s effect on the source of transfer in isolation.

In addition, item-specific transferability may prove to be an important additional factor. Currently, studies focus on language-general factors, i.e. factors that affect a background language as a whole (e.g. a language’s status as L1 or L2). This study conducts a qualitative analysis at the item-specific level, exploring the effects of form on the transferability of individual words and how this affects the predictability of the source language of transfer.

New insights are also hoped to be gained from the direct comparison of transfer in spoken and written production. Differences in the predictive power of each factor by mode of production would indicate processing differences, as well as potential differences in lexical access. Writing represents a more conscious task and transfer patterns may as a consequence differ from those observed in oral production. Finally, results from each of these five factors will be discussed in terms of psycholinguistic models of language organization, access, and activation in multilingual learners.
The thesis is structured as follows:

- **Chapter 2 (Theoretical Background)** offers a theoretical backdrop for the study, in which definitions of terms and constructs are offered (§ 2.1) and theoretical models of bi- and multilingual organization, access, and activation are presented (§ 2.2).

- **Chapter 3 (Previous Research into the Source Language of Transfer)** presents previous research into the source language of transfer in TLA, structured around the five predictive factors tested in the study, as well as by mode of production (§ 3.1). It concludes with the identification of those gaps in the literature this study aims to address.

- **Chapter 4 (Method)** presents the setting of the study (§ 4.1), the participant pool (§ 4.2), the development of the questionnaire and elicitation task (§ 4.3), as well as the procedure (§ 4.4). It also discusses data transformation and the criteria employed to code an item as transfer (§ 4.5). Finally, the statistical model (§ 4.6) and potential limitations of the method (§ 4.7) are discussed.

- **Chapter 5 (Results and Analysis)** first offers descriptive statistics that illustrate general patterns in the data (§ 5.1), as well as a preliminary analysis of the appropriateness of different L2 status measures (§ 5.2). The results for each research question are then presented in turn (§ 5.3 - § 5.6). Differences between the spoken and written mode are discussed within each subsection.

- **Chapter 6 (Discussion and Theoretical Implications)** offers an in-depth discussion of the results regarding the five factors from both the quantitative and qualitative analysis within the broader field of transfer research (§ 6.2). In addition, the usefulness of mixed methods in the context of a complex phenomenon such as transfer is considered (§ 6.1), as well as new insights that have emerged regarding modal differences (§ 6.3). Finally, the results are set within theoretical models of lexical organization, access, and activation (§ 6.4).

- **Chapter 7 (Conclusions, Contributions, and Future Directions)** presents concluding remarks regarding the findings of this study and how they contribute towards moving the field of transfer research forward (§ 7.1), followed by suggestions for future research (§ 7.2).
2 Theoretical Background

Before discussing previous research into the source language of transfer (chapter 3), the current chapter first introduces terminology and constructs that are relevant to the study presented in this thesis (§ 2.1). Each term is accompanied by a discussion of different definitions used in the literature, followed by the definition used in the present text. The chapter then continues to discuss psycholinguistic models of bilingual lexical organization (§ 2.2.1), access (§ 2.2.2), and activation (§ 2.2.3), which lie at the heart of subsequent models of multilingual language acquisition (§ 2.2.4) and theories of crosslinguistic influence.

The study presented in this thesis aims to contribute to this growing body of research by offering further insight into crosslinguistic influence in multilingual language use. The explanatory factors of the source language of transfer tested in this study directly relate to theories of activation (e.g. proficiency and recency), as well as lexical organization and processing (e.g. L2 status), and the results are thus expected to add new insights to our current understanding of transfer phenomena and contribute to the further development of theoretical models of multilingual lexical representation.

2.1 Terminology and constructs

Most variables or factors can be measured in more than one way and it is therefore common for different definitions to be employed to operationalize the same (or different aspects of the same) construct. The following section offers a brief account of available definitions, accompanied by a discussion of why a construct is operationalized in a particular way in this study. Only those terms that were judged central to the topic of this thesis are included.

2.1.1 Multilingualism

Different definitions of multilingualism exist deriving from the multitude of different research perspectives that investigate the phenomenon. The less common term plurilingualism is used by some authors, including the Francophone tradition, to refer to individual as opposed to societal multilingualism
Within psycholinguistics, however, multilingualism is generally used to refer to the individual level and is defined as the use of “three or more languages, either separately or in various degrees of code-mixing” (McArthur, 1992, p. 673). Some authors include bilingualism in their definition of multilingualism (e.g. Aronin & Singleton, 2008), while others use bilingualism and multilingualism as separate terms (e.g. De Groot, 2011). Using the term bilingual for users of two languages and multilingual for users of three or more languages is the more common practice among scholars within third language acquisition (Kemp, 2009) and the same terminology will consequently be used in this thesis.

Multilinguals may use multiple languages due to social, cultural, or economic reasons. They may either live in a multilingual society or be in contact with several monolingual communities and their languages generally serve different purposes. In addition, competence in each language may vary according to register, occupation, and education (McArthur, 1992), and it may fluctuate over time (Herdina & Jessner, 2002). Kemp (2009), therefore, argues that “[r]esearchers need to decide on the degree of proficiency and functional capability multilinguals are required to have for a language to count in their study […] Researchers should specify what they mean by ‘multilingual’” (p. 12).

Proficiency requirements move along a continuum of maximal proficiency to minimal proficiency (Cook & Bassetti, 2011), with scholars such as Baker (2011) criticising both a maximalist definition of native control and a minimalist definition as being too extreme. Wei (2008) considers “anyone who can communicate in more than one language, be it active (through speaking and writing) or passive (through listening and reading)” (p. 4) to be multilingual. Other definitions pertain more to the ease with which one can switch between languages (Lüdi & Py, 2009) or the everyday use of two or more languages (Grosjean, 2010).

In the present study, the three background languages under investigation fulfil the requirement of regular use, as the participants encounter these languages at school on a near daily basis (see § 4.2). However, no maximal (or even high) proficiency was required. Any language an individual can perform basic tasks in was taken into account. Variation in learners’ proficiency level in the background languages was even necessary in order to test its predictive power on the choice of source language of transfer.
2.1.2 Interference, transfer, CLI

The terminology surrounding transfer has changed over time and the present section offers an overview of these developments, as well as of the terminology used throughout the present text. One of the first terms used to describe L1 influence on L2 learning was *interference* (Lado, 1957; Weinreich, 1953), defined as “instances of language deviation from the norms of either language which occur in the speech of bilinguals as a result of their familiarity with more than one language” (Weinreich, 1953, p. 1). The term thus generally referred to negative transfer, i.e. learning difficulties and errors due to L1-L2 differences, and it disregarded positive transfer that emerged due to L1-L2 similarities. *Interference* is generally not used anymore and the phenomenon is now referred to as *transfer* or *crosslinguistic influence*² (CLI).

Regarding the term *transfer*, a great deal of terminological uncertainty remains, with Dechert and Raupach (1989) distinguishing no less than seventeen shades of meaning attributed to the term. Jarvis (2000) argues that the large number of conflicting findings about the importance of transfer in SLA is intrinsically related to the disagreement in defining the concept of transfer.

The following theoretical distinctions regarding the nature of transfer have been proposed. While these differ, they do not have to be mutually exclusive. First, transfer has been seen as a *process*. Weinreich (1953) initially proposed the notion of *interlingual identification* by which a learner identifies a linguistic item as equivalent in separate language systems. Such judgments may be subjective and thus not necessarily traceable for an outsider, as well as subject to change with increasing TL knowledge. This view also implies that there is a common psycholinguistic frame of reference, which allows the detection of language similarities (Alonso, 2002). One criticism against defining the underlying process by way of surface evidence is that the same surface evidence may result from different mental processes (Meisel, 1983), and so it remains difficult to draw conclusions regarding the exact type of process that underlies transfer.

Second, transfer has been seen as a *strategy* employed to overcome gaps in L2 knowledge (cf. Corder, 1983; Krashen & Terrell, 1983; Meisel, 1983; Meisel, 1983;)

---

² In some publications, *cross-linguistic* is hyphenised. In this text, it is never hyphenised when referring to the compound *crosslinguistic influence*, but is hyphenised in other constructions, e.g. cross-linguistic priming.
Newmark & Reibel, 1968). Meisel (1983) suggests that transfer strategies are only employed by certain types of learners and not by others. Furthermore, some may never use it, while for others the degree and kind of strategy used may vary over time. While the term *strategy* carries connotations of consciousness, Meisel (1983) stresses that “learners have a certain choice, conscious or not, of whether and how to use transfer” (p. 15). This is in line with Kellerman (1977) who states that transfer is a “psychological process whereby the learner, *consciously or not* [emphasis added], incorporates native language features into his target language production” (no page available).

Third, it has been suggested that transfer is a *constraint* by which L2 production occurs, rather than a process (Schachter, 1983). Schachter writes that transfer is not something the learner does, but is a constraint on the learner’s hypothesis testing process:

> What is currently viewed as evidence for the process of transfer is more appropriately viewed as evidence of a constraint on the learner's hypothesis testing process. It is both a facilitating and a limiting condition on the hypothesis testing process, but it is not in and of itself a process.

Schachter, 1983, p. 32

Learners are viewed to formulate and test hypotheses against linguistic input, and it is these hypotheses that are bound by transfer, as they originate from other available knowledge (i.e. previously acquired languages).

Last, it has been suggested that transfer is an *inert outcome* of a shared conceptual system, which underlies both L1 and interlanguage (IL) structures. (e.g., Jarvis, 1998; Pavlenko, 1997; cf. Kellerman, 1995; Slobin, 1993). “Inert, here means nonreactive and nondynamic. According to this view, L1 based conceptual influence can take place even when the learner has not made any overt comparison or interlingual identifications between L1 and L2 forms and features” (Jarvis, 2000, p. 299).

Jarvis (2002) points out that each of these views has merit and should be incorporated into any fully adequate definition of L1 influence. Alonso (2002) further argues that these four definitions of transfer are not mutually exclusive and that transfer can be a process by nature, but learners may use transfer as a strategy based on interlingual identification, with transfer constraints acting as filters allowing certain types of transfer but not others.
Nevertheless, it remains difficult to formulate a concise, yet comprehensive definition of transfer. Odlin himself points out the imprecision inherent in his commonly cited definition (Odlin, 1989, 2003), which will also be used in this thesis:

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, p. 27 (see also Odlin & Yu, 2016, p. 1)

Until we gain better understanding of bi- and multilingual processing, definitions of transfer will continue to be formulated in such general terms. In addition, there remains a lack of methodological guidance and consequently great variability in the field as to how instances of transfer are to be identified and how transfer should be quantified. These issues and how they were resolved in this study are addressed in § 4.5.3. Generally, transfer was operationalized in this study as the presence of non-target-like items in the TL, which can unambiguously be traced to one or more of a learner’s BLs.

Finally, transfer should be perceived in terms of general tendencies and probabilities, rather than invariant patterns. Any transfer behaviour observed should be considered a snapshot of processes occurring at that moment in time, given the particular circumstances surrounding the learner and the given task. The same individual may present different transfer patterns in a different task or at a different point in time. Nevertheless, transfer data (especially in great quantities) can provide useful information about general tendencies and the probabilities of certain transfer choices associated with a particular learner given their linguistic background.

One important point of criticism of the term transfer that has emerged in the literature is its one-sidedness, “for it implies that L1 influence merely entails the transfer of L1 patterns into L2 and fails to account for phenomena such as avoidance, overproduction and differing rates or paths of acquisition, which are today regarded as different manifestations of L1 influence” (Meriläinen, 2010, p. 11). The same critique holds for the use of the term in third language acquisition. This limitation led to the introduction of the broader term cross-linguistic influence (Kellerman & Sharwood Smith, 1986a).

The term crosslinguistic influence (CLI) was introduced by Kellerman and Sharwood Smith (1986b) to provide an umbrella term for the broad variety of
different phenomena associated with L1 influence, such as transfer, interference, interlanguage transfer, avoidance, borrowing, and reverse transfer from an interlanguage to a native language (De Angelis & Selinker, 2001). Given the multi-faceted nature of the phenomenon, Sharwood Smith and Kellerman’s term crosslinguistic influence has provided a more neutral and superordinate term, which contains all “those processes that lead to incorporation of elements from one language to another” (Kellerman & Sharwood Smith, 1986b, p. 1).

It needs to be noted that CLI is now often used interchangeably with the traditionally more narrow term transfer. This is evidenced in many current texts, either stated explicitly: “[the authors] use the terms transfer and crosslinguistic influence interchangeably as theory-neutral cover terms to refer to the phenomenon in question” (Jarvis & Pavlenko, 2008, p. 3), through specification: “cross-linguistic influence (which is a synonym for transfer)” (Odlin & Yu, 2016, p. 1), or implicitly through their choice of wording: “Most studies to date have focused on the prominent negative transfer [emphasis added] (interference) of another language in L3 production, although the positive effects of CLI [emphasis added] will usually outweigh the negative ones” (Ecke, 2015, p. 146).

Transfer is nowadays understood in a much broader sense than it used to be. Both transfer and crosslinguistic influence now present the most conventional terms for the phenomenon in question and consequently they will both feature in the present text. Following the general trend in the literature, they will be used interchangeably.

2.1.3 L1, L2, and L3

Before discussing the role of previously learned languages in third language acquisition, it is essential to clarify what we mean by L1, L2 and L3. Within third language acquisition (TLA) research, it has now become common practice to refer to a learner’s native language as L1, to any subsequently learned language(s) as L2, and to the language currently under investigation as L3 (Hammarberberg, 2010).

Regarding the use of the term L2 for multiple languages, Bardel (2015) highlights the importance of distinguishing the first additional language learned after the L1 from the second additional language learned after the L1, as the former is learned by a monolingual, while the latter is learned by a bi- or multilingual. If we take the example of a speaker of five languages, only the lan-
guage learned chronologically after the L1 would be an L2 (having been acquired by a monolingual), while their third and fourth and fifth language would be L3s (having been acquired by a bi- or multilingual). Hammarberg’s working definition is useful from a practical point of view, however, and in the specific context of CLI, the order of acquisition of post-L1 languages does not seem to affect transfer patterns:

[T]he status of a post-L1 language in relation to its ability to function as a source language for CLI is usually not determined as much by the order in which it was acquired as it is by other factors [...]. [...] the acquisitional order of the L1 truly does give it a unique status in relation to CLI, whereas the CLI effects of post-L1 languages usually cannot be pinned down to the specific sequences in which they were.

Jarvis & Pavlenko, 2008, p. 21

For the purposes of this study, Hammarberg’s (2010) definition (i.e. a learner’s native and first acquired language is an L1, any subsequently learned languages are L2s, and the language currently under investigation is the L3) was adopted as it represents the most commonly used and least ambiguous definition of language status in TLA research to date. In the case of simultaneous bilinguals, both native languages are referred to as L1.

Regarding what constitutes an L1, it is often assumed that a language learned naturally as an infant (before age 3) is your native language. However, a large number of fluent multilinguals in Europe come from an immigrant background and their L1, or the language they chronologically learned first, may not behave like the L1 of a non-immigrant who lives in their native country, where the majority language is their L1. There is extensive research (e.g. Abrahamsson & Hyltenstam, 2009; Bongaerts, 1999; Hyltenstam & Abrahamsson, 2003; Hyltenstam, 1992; Gisela Jia, 1998; Krashen, Scarcella, & Long, 1982; Lenneberg, 1967) on the qualitative differences between first and second languages, or early and late learned languages, and there is not enough space here to discuss the issue in detail, but it should be noted that there is still very little research on the reversibility of processing patterns due to L1 attrition and how this may impact transfer behaviour (Schmid & Köpke, 2009).

If we assume that an L1’s processing pattern can change over time, then this has a direct effect on how we should label L1s and L2s in the context of transfer. For example, one conceptualization of the L2 status hypothesis (see § 3.1.4.1 for a full review) is based on the assumption that L2s are processed
in the same way as an L3, while the L1 is processed differently. Most studies base their distinctions on order of acquisition, but this does not always reflect mode of acquisition or type of processing. An L2 may have been acquired formally but have reached near-native levels and thus high levels of automatization which may entail a shift from declarative to procedural memory, which would put the underpinnings of an L2 status hypothesis based on declarative vs. procedural processing in question.

It is therefore important in any research on the L2 status factor and hypothesized explanations thereof to establish the characteristics of each of the two languages before assigning them L1/L2 labels. Ideally, information on the age of acquisition, mode of acquisition, and type of processing (declarative vs. procedural) is acquired and each tested for their predictive power on the source language of transfer. Given that it is near impossible to establish whether a language, or individual linguistic levels, are governed by procedural or declarative memory, the two measures collected for this study were age and mode of acquisition. For the first measure, any language acquired before the age of three was coded as L1, and for the second measure any language learned naturally was coded as L1. Both measures were tested for their predictive power as separate variables (see § 5.2 for a detailed account).

2.1.4 Source and target language

In the context of SLA, the language of origin of transfer is generally called the source language (SL) of transfer. In the context of TLA, however, there are multiple potential source languages and so SL is used for the language actually relied upon for transfer in any given instance, while background language (BL) refers to all the languages available to the learner. Research has shown that all background languages are active during language production (Bardel & Lindqvist, 2007) and so each of them represents a potential source for transfer.

Target language (TL) is more generally used in the context of language acquisition, while recipient language is a term specifically used in the context of crosslinguistic influence. Given that within research on transfer, there is no difference between the target and the recipient language, it seems unnecessary to assign a special term (i.e. recipient language) for the particular context of transfer. We are not asking which of all the language available is receiving transfer, but choose a particular target language to investigate in any given study. Consequently, it was decided that for the purposes of this text the more general term target language will suffice.
2.1.5 Types of transfer

Transfer can occur at different linguistic levels, in different directions, in production and comprehension, and may be positive or negative. In this section, I will briefly discuss those types of transfer most relevant to the present study. The breadth of the phenomenon, however, is exemplified in the Table 2-1, which illustrates the large number of existing types of crosslinguistic influence. The ten dimensions shown demonstrate the rich complexity of crosslinguistic influence, which, mathematically speaking, can be combined to produce over 5,000 unique types of transfer (Jarvis & Pavlenko, 2008, p. 26).

<table>
<thead>
<tr>
<th>Area of language knowledge/use</th>
<th>Directionality</th>
<th>Intentionality</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>phonological</td>
<td>forward</td>
<td>intentional</td>
<td>verbal</td>
</tr>
<tr>
<td>orthographic</td>
<td>reverse</td>
<td>unintentional</td>
<td>nonverbal</td>
</tr>
<tr>
<td>lexical</td>
<td>lateral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>semantic</td>
<td>bi-/multi-directional</td>
<td></td>
<td></td>
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<tr>
<td>morphological</td>
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</tr>
<tr>
<td>syntactic</td>
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<tr>
<td>discursive</td>
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<td>pragmatic</td>
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</tr>
<tr>
<td>sociolinguistic</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2-1. Types of crosslinguistic influence

Jarvis & Pavlenko, 2008, p. 20

First, it is important to note that transfer we observe in production, may have occurred during acquisition. According to González Alonso (2012), the transfer instances we observe in language production are not always performance errors, i.e. slips-of-the-tongue, or issues of competence, i.e. filling a lexical gap in the target language, but can also be due to transfer that occurred during the learning stage. This is closely related to Groseva’s (1998), Herwig’s (2001), and Hall and Ecke’s (2003) models of lexical organization (§ 2.2.4), in which new input is connected to already established representations in the L1 and L2, even if these are not a proper match (e.g. in the case of partially overlapping meaning or false cognates). Once falsely connected during acquisition, errors will occur during production.

The second distinction relevant to this study is that of transfer in different modes of production. While studies on oral production dominate the field, we find evidence of transfer in both the spoken and the written mode of production. So far, no direct comparison of transfer patterns in the two modes has
been conducted and it thus remains to be established whether the two modes lead to different types and/or amounts of transfer. Given the significant differences in cognitive processes underlying speaking and writing, considerable divergences in transfer patterns may be found. The level of consciousness in spoken production is strongly governed by time and attention constraints, aspects less limiting in writing (Chafe, 1994; Mazur-Palandre, Fayol, & Jisa, 2012).

The great contrast in temporal constraints at play in the two modalities offers more time to devote to planning in writing, thus enabling lexical searches for less frequently used words (Clark, 1996, 1996; Fayol, 1997; Strömqvist et al., 2002; Strömqvist, Nordvist, & Wengelin, 2004). This is especially relevant within an activation framework, where certain items are highly active and therefore promptly employed in speech production, whereas the same item may be discarded in writing, where more time is available to reflect upon its appropriateness. This is not to say that all written production is planned and all spoken production is spontaneous (e.g. a prepared oral presentation vs. online writing); there is indeed a continuum of consciousness between the written and the spoken mode. Generally, however, speech tends to fall on the more spontaneous end of the spectrum, while written work tends to fall on the more planned end of the spectrum. It will be of great insight to see whether the five factors investigated in this study impact the SL of transfer differently in the two modes.

Related to transfer in different modes is the interplay between the visual and aural aspects of language representation in the mind. The organizational make-up of the multilingual lexicon seems to be governed by phonological, orthographic and semantic aspects. Dijkstra, Grainger and van Heuven (1999), for example, have shown that in a visual lexical decision task, phonological overlap across languages leads to inhibitory effects, while semantic and orthographic similarity leads to facilitatory effects in lexical retrieval. While this experiment did not require any kind of spoken or written production, it shows how the written nature of the stimuli elicited the phonology of the word and activated its respective crosslinguistic phonological neighbours. The potential presence of such patterns in this data set will be examined in a qualitative manner at the item-specific level in § 5.6.

A third distinction that is important to mention is that of positive and negative transfer, with most research focusing on negative transfer (e.g. Cenoz, 2001; Falk & Bardel, 2010; Williams & Hammarberg, 1998). The odds of transfer
producing a positive result are, of course, closely tied to the typological similarity between the languages in question. In the case of Romance languages, for example, transfer is often a reliable strategy. Positive transfer, however, is difficult to detect as it reflects the successful implementation of previous knowledge into the target language. Since there is no evident deviance from the TL, it is not possible to determine whether the correctly produced item is positive transfer or a demonstration of correct TL knowledge (Falk & Bardel, 2010). It should be assumed, however, that learners take advantage of the similarities they perceive between languages, such as cognate forms, and that positive transfer may indeed account for the majority of transfer effects (Jarvis & Pavlenko, 2008). One example is the advantage of L1 Swedish speakers over L1 Finnish speakers in their acquisition of English articles, which is now well documented (e.g. Jarvis, 2002; Odlin, 2012; Ringbom, 1987). Given the particular focus on the SL of transfer and the required methodological design, the present study limits itself to the investigation of negative transfer.

A fourth distinction to be highlighted is that of conscious versus unconscious transfer. Transfer may be a deliberate compensatory strategy in situations of deficient knowledge of the target language (e.g. Meisel, 1983) or it may be automatic and unconscious (e.g. Kellerman, 1995; Slobin, 1993). In addition, different source languages may serve different pragmatic purposes (e.g. self-repairs, asides, filling lexical gaps) (Williams & Hammarberg, 1998). While theoretical accounts of transfer distinguish between deliberate and unconscious transfer, empirical research and the explanatory factors tested therewith rarely involve such a distinction, mainly because it is extremely difficult to reliably identify which of the two types of transfer is being observed.

Jessner (2006) employed think-aloud protocols (TAP) to uncover some of the underlying processes and distinguished between explicitly and tacitly expressed crosslinguistic awareness. However, it remains to be established whether instances of transfer that were tacitly expressed (i.e. uncommented) were indeed also unconscious. The participant may not have commented on particular transfer instances for any number of reasons other than that it was processed unconsciously. In Fuster and Neuser (forthcoming), a stimulated recall was therefore added to the TAP, in order to gain further insight into the nature of uncommented transfer instances. Such a methodological design,

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3 Crosslinguistic awareness is defined as “the learner’s tacit and explicit awareness of the links between their language systems” (Jessner, 2008b).
however, requires a more qualitative approach to data collection. Given the predominantly quantitative nature of this study, no attempt at a conscious/unconscious distinction was made. It is, however, important to remain aware of differences in predictability based on levels of intentionality and to realize that the predictive factors tested in this study may affect the two types of transfer differently.

Finally, there is a distinction to be made for transfer at different linguistic levels. It is important to separate results from studies focusing on different linguistic levels, as transfer in syntax and lexis may not be governed by the same underlying processes. From a neurolinguistic perspective, Paradis (2004, 2009) argues that vocabulary and syntax, and any factors related to their production processes, need to be clearly distinguished. In his model of declarative vs. procedural memory (first proposed by Ullman, 2001), Paradis argues that the lexicon and knowledge of the relation between form and meaning of a word are governed by declarative memory in all languages. By contrast, L1 grammar is considered to be implicitly acquired and consequently governed by procedural memory, while L2 grammar is assumed to be based on explicit knowledge and thus governed by declarative memory.

In line with Paradis, Bardel (2015) suggests that lexical items are more readily transferred into the L3 from all available background languages, due to their shared storage in declarative memory, unlike L1 and L2 grammar, which do not belong to the same memory store and thus demonstrate different transfer patterns (Bardel, 2015). Note that there remains a degree of controversy regarding Paradis’ conceptualization of L2 grammar as explicit knowledge. It seems doubtful that the use of L2 grammar always requires access to conscious rules. Therefore, until we have gained better understanding of the differences and similarities between the processes underlying syntax and lexis and consequently the comparability of transfer behaviour at the two linguistic levels, lexical and syntactic transfer should be investigated separately and in their own right. The present study therefore focuses exclusively on lexical transfer and the literature review in chapter 3 engages only with previous research directly concerned with lexis.

2.1.6 Types of lexical transfer

The present section presents a taxonomy of different types of transfer (see Figure 2-1). While the inferential statistical analysis (§ 5.3 - § 5.5) of this study does not distinguish between types of lexical transfer, it will be considered in the qualitative analysis of item-specific aspects in § 5.6. A complete
break-down of the distribution by type of transfer and word class is offered in Appendix A.

Lexical transfer, as operationalized in this study, includes both content and function. System transfer (i.e. spelling) is also included. With regards to the different types of lexical transfer, the most central distinction usually made is between formal and semantic transfer. Ringbom (1987) suggests that the distinction is not always clear-cut, but that items fall on a continuum, where there can also be simultaneous form and meaning transfer. The following section will present both form- and meaning-based types of transfer, such as borrowings, semantic extension, and direct translations. Categorization is based on what is transferred (i.e. are formal or semantic aspects transferred), not based on why transfer occurred (e.g. due to form similarity, meaning is transferred) (see case of lexeme matchings in § 2.1.6.2).

![Figure 2-1. Types of lexical transfer.](image)

2.1.6.1 Formal transfer

One of the two most common types of formal transfer is borrowing (Bouvy, 2000) (also referred to as code-switches by e.g. Ringbom, 2001). Borrowings are non-adapted language switches (Bardel & Lindqvist, 2007; Dewaele, 1998; Lindqvist, 2009; Williams & Hammarberg, 1998), in which a complete language shift occurs with no modification of the source item according to L3 orthographic norms.

“I am usually very pigg after the diet”  
(Swedish pigg = English refreshed)

From De Angelis, 2007, p. 42

They are especially common during initial stages of L3 acquisition (Dewaele, 2001; Hammarberg, 2001; Lindqvist, 2006). The fact that they are more frequent during early stages of L3 development is mainly due to the fact that the gap in TL lexical knowledge is so overwhelming. In addition, a lack of awareness of target language ortho-phonological rules limits the learner in adapting
items to the TL. Borrowings can occur as individual items or multi-word expressions and are easily identifiable due to their non-adapted source language form.

Terminology is far from consistent and most of the terms used in transfer research carry certain connotations from other fields of enquiry. While a borrowing is a well-established term in SLA research, meaning one particular kind of lexical transfer (i.e. the use of a non-target language item in its original source language form), it also has a long standing in research on language use at the societal level and language change. In Poplack and Sankoff (1984), borrowings are considered lexical items that are assimilated over time and eventually become fully established loanwords in the recipient language. They are considered distinct from code-switches or transfer/interference in their longevity as they become generally accepted within the speech community. On the other hand, the term code-switches (as used by Ringbom, 2001) also carries additional connotations as the term is strongly embedded in sociolinguistic research on code-switching between two interlocutors that share the same language knowledge. Whether an author uses borrowings or code-switches when reporting on a transfer study mainly depends on their personal preference. In this study, the term borrowing will be used throughout.

Foreignisings are the second most common type of transfer. They are also referred to as hybrids, blends, word constructions, lexeme copying, coinages, lexical inventions, or relexifications. Through continued exposure to the TL, learners may develop greater awareness of how source items should look according to TL rules. A foreignising is thus a SL item that has undergone certain morphological, orthographic, and/or phonological changes in order to increase its acceptability in the TL (De Angelis & Selinker, 2001; Dewaele, 1998; Hammarberg, 2001; Singleton, 2001; Williams & Hammarberg, 1998).

“In the morning I was tired and in the evening I was piggy”
(Swedish pigg = English refreshed)

From De Angelis, 2007, p. 42

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4 Some of these terms include both instances of incorrect knowledge of a TL lemma leading to non-target-like forms, without there being traces of crosslinguistic influence however, and instances that carry evidence of crosslinguistic influence. The term “foreignising”, as it is used here, only pertains to the latter.
New word forms may be created from items in one source language or from multiple source languages at the same time (Bardel, 2015). Appropriately foreignising a source language word requires a certain awareness of what is acceptable according to target language orthographic and phonological rules. A well-achieved foreignising is therefore testimony to the learner’s high awareness of TL acceptabilities, and may lead to positive transfer in the case of cognates. A learner may not know that a word from his L1 or L2 also exists in the L3, but might make an informed guess based on prior evidence of language similarities. The use of a borrowing instead of a foreignising does not necessarily indicate low awareness of TL rules, however; the learner may simply have judged the item to be too different and consequently does not even attempt to foreignise as it would take too many changes to make the item fit TL norms (see § 5.6.2.1 for a detailed analysis of the number of changes commonly applied).

Another type of formal transfer, which is rarely mentioned, is spelling interference (Bouvy, 2000), which by definition is only relevant in written production. Such transfer is especially common with cognates that have the same meaning and a form that is close in both languages, yet not identical, e.g. “better” (from Dutch “beter” for better), or “bet” (from German “Bett” for bed). One issue with spelling interference is that it is often indistinguishable from potential (partial) positive transfer. The question that arises is whether the learner has knowledge of the target item and merely demonstrates spelling interference or whether the learner has no knowledge of the TL item and simply offers a borrowing or foreignising, which, when applied to a cognate, results in partial positive transfer. One might also observe spelling errors that are based on source language phonology. Odlin and Yu (2016) argue that when a Finn misspells English grass as “crass” or “krass”, this shows phonological, not orthographic, transfer since Finnish does not distinguish between the phonemes /k/ and /g/ (see § 4.5.3 for a detailed account of the coding criteria applied in this study).

2.1.6.2 Semantic transfer

Within semantic transfer, one of the most common types is lexeme matching (Bouvy, 2000), also referred to as interlingual identification (e.g. Weinreich, 1953) and deceptive cognates (e.g. Ringbom, 2001). They represent the use of a word that indeed exists in the TL and that happens to closely match the intended SL word’s form, but does not carry any shared meaning (i.e. false friends), e.g. “arm” (for English poor, from Dutch “arm”), “handle” (for Eng-
lish *trade*, from Dutch “handel”), “tell” (for English *count*, from Dutch “tellen”), or “loan” (for English *wages*, from Dutch “loon”). Lexeme matchings can occur with words that look similar in form by chance (false friend) or with cognate words. If a learner produces a lexeme matching with a true cognate, this results in positive transfer; if, however, the learner matches an SL item onto a false friend or false cognate5, this leads to negative transfer.

“Ci sono libri italiani nella *libreria*”
(“There are Italian books in the *bookshelf*”)
(from English *library*, matched to Italian *libreria*, which means *bookshelf*)

From Bardel, 2015, p. 118

“He is sitting in the forest and looking in to the true”
(for English *hole*, from French *trou*, matched to English *true*)

Participant B06 of this study

Lexeme matching is often categorized as formal transfer (e.g. Bardel, 2015; Ringbom, 2001), as it is due to the similarity in form that learners create associations between semantically different source language and TL items. However, what is actually being erroneously transferred is the meaning of the source language word and not its form. Consequently, it is here categorized as semantic transfer.

A second type of meaning-based transfer are semantic extensions, the meaning of L1 words is extended to L2 words that actually have a more limited semantic scope. In other words, the learner transfers polysemy or homonymy in a source language to the target language, thus giving it additional meanings that it does not have (Bardel, 2015). Semantic extensions are also referred to as generalizations (Bouvy, 2000), as they represent the use of a target language word of a more restricted usage, with its broader source language meaning.

“He bit himself in the *language*”
(from Finnish *kieli* = both English *tongue* and English *language*)

From De Angelis, 2007, p. 42

5 True cognates: form + meaning + etymology +
False cognates: form + meaning N/A etymology -
False friends: form + meaning - etymology N/A
The final type of semantic transfer are **direct translations**, also referred to as **loan translations** (e.g. Ringbom, 1987) or **calques** (e.g. Agustín Llach, 2010), which represent the word-by-word translation of a compound in a source language, e.g. “child wagon” (from Swedish “barnvagn” = *pram*, where “barn” = *child* and “vagn” = *wagon*).

“My uncle never married: he remained a youngman all his life”
(from Swedish *ungkarl* = English *bachelor*,
where *ung* = young and *karl* = man)

From Ringbom, 2001, p. 64

The present section presented a taxonomy of types of transfer, as they are defined in this study. As was mentioned in § 2.1.6, all types were included in the statistical model, but the latter does not distinguish between them. The categorization presented here is nevertheless relevant as it illustrates all instances that are considered lexical transfer for the purposes of this study. Furthermore, they will be relevant in the qualitative analysis of item-specific transferability (§ 5.6).

### 2.2 The bi- and multilingual mental lexicon

Crosslinguistic influence occurring in multilingual language production is a by-product of the active cohabitation of various linguistic systems in the multilingual mind (González Alonso, 2012) and transfer data consequently constitutes “an enormously rich source of information that we have only begun to explore” (de Bot, 2004, p. 18). Transfer poses an interesting challenge to models of multilingual language processing, with **lexical transfer** having received considerably more attention in third language acquisition research than syntax or phonology (García-Mayo, 2012). One important reason is the desire to gain greater understanding of multilingual lexical representation, a field which brings together aspects of linguistic theory, language acquisition theories, and psycholinguistic models of processing (de Bot, 2004; Dewaele, 2001; Green, 1998; Grosjean, 2001; Paradis, 2004; Poulisse & Bongaerts, 1994). Transfer research is thus deeply embedded in psycholinguistic approaches to language acquisition, and the present chapter consequently focuses on psycholinguistic models of lexical representation.

Third language acquisition is an extension and integral part of SLA. Due to its development from within SLA and its close connection to bilingual language processing, different theoretical models of bilingual lexical organization
(§ 2.2.1), lexical access (§ 2.2.2), and language activation (§ 2.2.3) are discussed first, before delving into multilingual models of language use (§ 2.2.4) that have emerged from previous research in SLA. Each of these models represents an attempt at conceptualizing the complex, multi-faceted cognitive processes of language production which underlie transfer.

2.2.1 Bilingual lexical organization

The most central question concerning the organization of the bilingual mental lexicon is how words from different languages are connected to each other and whether they are expressions of the same underlying concept. A great number of hypotheses regarding bilingual lexical organization have been postulated over the past 60 years and there is not enough space here to review all of them. I will therefore focus on a small selection of hierarchical models (in which languages are connected and ordered according to a certain hierarchy, e.g. subordinate), as they “probably provide the clearest and most elegant solution to the bilingual storage problem [...] at the present time” (Heredia, 2008, p. 62).

2.2.1.1 Weinreich’s (1953) model

Different models and hypotheses have been proposed to answer questions of interconnectedness between different languages in the bilingual’s mind, led by Weinreich’s (1953) seminal proposal of three different types of possible relationships: coordinate, compound, or subordinate. He uses the concepts of the linguistic sign (the signifier) and the semantic content (the signified) to illustrate different patterns of relationship between the two languages. The coordinate bilingual connects a signifier from each language to their own, separate signified (Figure 2-2 (a)). The compound bilingual attaches the signifiers from two different languages to the same concept/signified (Figure 2-2 (b)), while the subordinate bilingual links the signifier of the second language to the signifier of the first language, rather than directly to the signified concept (Figure 2-2 (c)).

According to Weinreich (1953), these types of relationships are not mutually exclusive but may co-exist in an individual; some words may form coordinate associations, while others may form compound or subordinate associations. Weinreich’s model of lexical organization is the basis of many subsequent elaborations in both bilingualism and multilingualism. His application of Saussure’s (1966) distinction between signifier and signified to bilingual lexical organization represents what later models call lexical and conceptual levels of representation respectively (De Groot & Hoeks, 1995; Kroll, 1993;

(a) coordinate

(b) compound

(c) subordinate

Figure 2-2. *Weinreich’s three types of lexical associations.*

Illustration from Wei, 2009, p. 10

Most models since Weinreich’s (1953) three-fold model have focused on two of the suggested relationships: compound and subordinate associations between words (Costa, 2005; Kroll & Stewart, 1994). The hypothesis that two words from different languages may potentially link to two separate concepts altogether has often been discarded in subsequent models. Most assume that “while phonological and morphosyntactic forms differ across languages, meanings and/or concepts are largely, if not completely, shared” (Pavlenko, 2009, p. 125). This view is supported by evidence from picture naming tasks and translation studies, which show that bilinguals can translate most words and that there is evidence of crosslinguistic interference in picture naming tasks (Kroll & Sunderman, 2003). Weinreich (1953) did not discuss developmental aspects, nor potential differences across linguistic categories (Pavlenko, 2009), aspects which later versions of the model aimed to incorporate.
2.2.1.2 The Revised Hierarchical Model (RHM)

Within a two-level (i.e., lexical and conceptual) model of bilingual lexical organization as suggested above, the question arises as to how activity is mediated between two languages. Are there direct links between the words of translation equivalents or are they only connected through their shared underlying concept? The word association hypothesis (or lexical association hypothesis) states that words of a first and second language are connected to each other, rather than each being individually associated with a common conceptual store, reflecting Weinreich’s subordinate type of lexical association (relationship (c) in Figure 2-2). The concept mediation hypothesis, on the other hand, assumes words from both languages to each be directly connected to their shared conceptual meaning, similar to Weinreich’s compound relationship between words (relationship (b) in Figure 2-2).

Potter, So, Von Eckardt, and Feldman (1984) tested the two competing hypotheses’ validity against each other in a picture naming and translation task study. The assumption is that a picture naming task requires access to the conceptual store, while a translation task only requires access to the conceptual store if the concept mediation hypothesis is correct. Consequently, longer reaction times in the picture naming task are expected in the word association model, while similar reaction times are expected in the concept mediation model. Indeed, they found clear evidence for the concept mediation hypothesis, even in participants with low L2 proficiency. This, however, appeared to be contrary to these learners’ own perception of their L2 lexical retrieval, which they often describe to be via the L1 word rather than directly through its conceptual meaning.

Subsequent studies investigated whether there are changes in lexical retrieval paths with increased L2 proficiency and found conflicting evidence of a developmental shift (Chen & Ho, 1986; Chen & Leung, 1989; Kroll & Borning, 1987; Kroll & Curley, 1988; Mägiste, 1986). It appears that word association is most appropriate to describe lexical organization at lower levels of proficiency, while concept association best describes vocabulary processing at higher proficiency levels. Kroll (1993) and Kroll and Stewart (1994) consequently proposed the Revised Hierarchical Model (RHM) (Figure 2-3), which includes a developmental dimension, in which a shift from lexical to conceptual mediation takes place in connection with increased proficiency, and which includes an asymmetrical degree of strength between L1 and L2 lexical links.
They do not advocate a complete shift from lexical to conceptual mediation, but rather argue that the original lexical links remain present in a weaker form with increased proficiency, which explains the continued stronger connection from the L2 to the L1 than vice versa. The model thus accounts for longer latencies in translation tasks from L1 to L2 than from L2 to L1 by proposing an underlying asymmetry in the strength of links between words and concepts in the two languages. Due to the L1 word having a stronger association to the meaning (or concept) than the L2 word, there is a slower translation pattern from the L1 to the L2, as it is conceptually mediated, while L2 to L1 translations can be achieved directly, through lexical connections alone.

While the Revised Hierarchical Model answers some of the questions posed by previous models (e.g. the strength asymmetry found for L1-L2 connections), other aspects, such as partial conceptual equivalence, are not taken into account. Subsequent models (e.g. Pavlenko, 2009) therefore aimed to present a more comprehensive model.

2.2.1.3 The Modified Hierarchical Model (MHM)

Pavlenko (2009) has presented an in-depth discussion of both methodological and theoretical issues of previous studies and models of bilingual lexical representation and in response proposes the Modified Hierarchical Model (MHM). There is not enough space here to summarize the paper in full, but one important point I would like to highlight as it directly relates to transfer is that of priming effects in cognates. It is often assumed that “there should only be cross-language priming if both languages access a common conceptual memory representation” (Kroll, 1993, p. 57). This is supported by studies such as de Groot and Nas (1991), who found that there was priming for English-Dutch cognates (e.g. *rose-roos*), but no priming for non-cognates (e.g. *bird-*)
vogel), thus suggesting that cognates share a conceptual representation in the mind, while non-cognates do not. However, some studies also found priming effects for false friends, which seems to suggest that these facilitation effects may be due to form similarity (for a more detailed review of cognate representation studies, see Sánchez-Casas & García-Albea, 2005).

Pavlenko’s (2009) main criticism of previous methodologies is the assumption that faster reaction times are taken to mean stronger connections between word forms (interlingual connections), which in turn are attributed to shared meaning. However, it is not clear whether stronger connections indeed are a function of shared meaning (i.e. shared conceptual representations), as “the strength of interlingual connections may be affected by a host of other factors, including bilinguals’ levels of proficiency in the languages in question, the context of their acquisition, the context of their use, the level of activation of respective languages, similarity of word forms and the frequency of co-activation of particular word pairs (de Groot, 1995, 2002; Kroll & Tokowicz, 2005; Marian, 2009)” (Pavlenko, 2009, p. 127).

The Modified Hierarchical Model (Figure 2-4) proposed by Pavlenko (2009) aims to retain the strength of previous models, while redressing some of their weaknesses. It builds on Kroll and Stewart’s (1994) RHM, as well as de Groot’s (1992) Distributed Feature Model. Conceptual representation in this model can be either fully shared, partially shared, or completely separate.
Pavlenko (2009) discusses the implications of the model on both positive and negative transfer:

1. **conceptual equivalence** facilitates L2 vocabulary learning through positive transfer; the main learning task in this context is the establishment of links between L2 words and already existing concepts;

2. **partial non-equivalence** facilitates learning through partial overlap (positive transfer), yet also complicates it when learners assume complete equivalence and display negative transfer; the main L2 learning task in this context is conceptual restructuring;

3. **non-equivalence** simultaneously complicates learning, as learners have to develop new categories, and facilitates it through the absence of competing representations; the L2 learning task here involves development of a new linguistic category that allows learners to map a new word onto real-world referents; this task may be easier in the case of new objects and more challenging in the case of abstract or emotion categories.

Pavlenko, 2009, pp. 152–3

De Groot’s (1992) Distributed Feature Model also incorporates full and partial conceptual overlap, but it is the addition of language-specific lexical concepts, which do not share any conceptual features as they do not exist in the other language, which marks an important addition in Pavlenko’s (2009) Modified Hierarchical Model. It is commonly assumed that the formulation of a new message starts in the conceptualizer (i.e. the non-language-specific conceptual system) and activates lexical links in both languages. If, however, a concept is language- or culture-specific, activation of lexical links in the other language will fail, leading to breakdowns in fluency. In such a situation, a bilingual may resort to code-switching, lexical borrowings or loan translations, in order to convey the intended underlying meaning (i.e. concept) (Panayiotou, 2004; Pavlenko, 1997, 2002; Pavlenko & Driagina, 2007).

Studies have further found that this activation process is directly connected to the environment, which can activate concepts from one language, while inhibiting others and making them less accessible (e.g. Hong, Morris, Chiu, & Benet-Martinez, 2000; M. Ross, Xun, & Wilson, 2002; Trafimow, Silverman, Fan, & Law, 1997). Similarly, some studies suggest that transfer may be task-dependent, whereby the same speaker may rely on transfer in one task but not another (Jarvis, 2003; Stepanova Sachs & Coley, 2006). Pavlenko (2009) highlights the dynamic nature of conceptual representations, as they function
in a context-dependent manner (Barsalou, 2003; Malt, Sloman, & Gennari, 2003). If transfer is context- and task-dependent due to differences in activation levels, the source language of transfer may be equally affected by the environment in which language production takes place. This will be further discussed with regards to the findings of this study in § 6.3.2.

The models presented here all contribute to a better understanding of how the bilingual mental lexicon may be organised. However, given the degree of complexity associated with all types of cognitive processes and especially language, any theoretical model represents a highly simplified version of reality. Furthermore, both studies on and models of lexical organization present but a snapshot of how individual words from two languages may be connected, but they do not concern themselves with fluent speech production or with how these words are accessed in real time. The subsequent section (§ 2.2.2) will therefore present different perspectives on bilingual lexical access during language production.

2.2.2 Bilingual lexical access

One of the main questions in research on bilingual speech production is how the speaker can access one language over another in any given situation and when (or where) exactly this choice of language takes place. The question remains whether “we first access the lexicon from one language and then the next, or is there a parallel search through all languages, words not being organised primarily through language, but e.g. through frequency” (de Bot, 2004, p. 18). In his Speaking Model, Levelt (1989) suggests that language production starts with a communicative intention, which is processed at a conceptual level before the appropriate (necessarily language-specific) lemma is chosen. The choice of language thus seems to occur before the lemma stage, at the conceptual level. How this works, however, remains unclear. De Bot (2004) writes that concepts can be seen as bundles of semantic/conceptual features, where concepts that overlap in meaning share certain features (De Groot, 1992). By activating a particular concept, all of its related features are also activated, but also other concepts that are linked to those features. ‘Language’ may be one such feature.

Generally, then, it is assumed that the conceptual level is shared across languages and that there is some mechanism that allows one language to be chosen as the most appropriate in speech production. On the other hand, the lexical level is assumed to be separate across languages. This assumption, however, is challenged by the occurrence of intentional, as well as unintentional,
language switches (e.g. code-switching, transfer), which indicate at least some degree of interconnectedness between languages at the lexical level. The question of whether language access is selective or non-selective has developed into a significant dichotomy in the research literature, with fierce defenders on either side of the argument.

2.2.2.1 Non-selective access

The integrative view holds that the different languages in a bi- or multilingual’s mind belong to one integrated whole and are not stored or accessed separately (Cook, 1992; de Bot, 2016; de Bot, Lowie, & Verspoor, 2007; A. Dijkstra, 2003; Franceschini, 2016; Franceschini, Zappatore, & Nitsch, 2003; R. J. Harris, 1998; Toolan, 2008; van Hell & Dijkstra, 2002). Words from different languages are activated simultaneously until a certain point in the selection process, at which the correct language is then chosen (see Dijkstra, 2003, below for an account of how this occurs). One of the most prominent defenders of an integrative view is Cook (1991, 1992), who proposed the concept of multi-competence, as opposed to mono-competence, to refer to the complete integration of language competence (lexical competence included) across all languages in the multilingual mind. He argues that “codeswitching would be impossible if the languages were not intimately related rather than two compartmentalized systems” (Cook, 1992, p. 570). A number of reaction time experiments have shown that cross-linguistic priming has facilitative effects even when there is no semantic relationship between the L1 and L2 word. Beauvillain and Grainger (1987) found that bilinguals access the meaning of interlingual homographs in both their languages rather than just the language currently in use. For example, they found that French “four” (English: oven) facilitated the recognition of the subsequent word “five” in an entirely French environment. De Bot et al. (2007) consequently argue that, given such evidence, it becomes difficult to maintain a position of separate lexicons.

This view is further supported by Van Hell & Dijkstra (2002), who found faster reaction times to L1 stimuli that were cognates in other high-proficiency languages. They also argue that these results show parallel activation of the non-target language suggesting that lexical access is fundamentally non-selective, although only so for higher proficiency languages. Further evidence of cross-language activation was also found by Kroll, Bobb, and Wodniecka (2006), as well as by earlier studies that showed cross-language frequency effects on reaction times (e.g. Caramazza & Brones, 1979).
Additional evidence of an integrated lexicon comes from Franceschini et al. (2003), who report that lexical processing seems to be localized in the same area of the cerebral cortex for all languages. Caution is required, however, as physical localization may not always coincide with network associations across languages. The localist perspective supported by neuroimaging work is not in line with the more functional approach in psycholinguistics (de Bot, 2004), with the two types of evidence often producing conflicting results. For example, results from aphasia patients support a pro-separation account of lexical access, while the results in Franceschini et al. (2003) support a pro-integration account. However, these results may not actually be conflicting, but may simply be indicative of two types of studies that do not measure the same thing.

As described above, the integrative camp assumes that languages are activated simultaneously until one language is chosen at a certain point in the speech production process. Dijkstra (2003) supports the view that words are ‘tagged’ for language affiliation, allowing the speaker to choose the intended word in the right language. This seems to echo de Bot’s (2004) suggestion that language may be one of the underlying features of a word (§ 2.2.2), with the only difference that Dijkstra’s ‘tag’ appears at the lexical level, not the conceptual level.

2.2.2.2 Selective access

On the other side of the debate, languages in the bi- and multilingual mental lexicon are considered to be separate from each other, with clear delineations between them, where “inter-relationship, inter-connection and interdependence imply, not amorphousness, but a multi-dimensional structure, a plurality of elements, which are linked to each other and dependent on each other, but differentiable” (Singleton, 2016a, p. 505).

The first argument in favour of the separation hypothesis is the fact that there are marked formal differences between languages. Singleton (2003) writes that “an individual faced with the task of working out the morphological structure of unfamiliar words will refer to the phonological composition of more familiar items and then analogize (see Bybee, 1988; Stemberger & Macwhinney, 1988)” (p. 168). Consequently, due to each language’s idiosyncratic phonological rules, such analogizing must be based on a search within the lexicon of one language only, thus suggesting that mental lexicons are indeed separate.
Secondly, there is extensive evidence from aphasia patients who have lost and recovered languages selectively (e.g. Grosjean, 1982; Paradis & Goldblum, 1989; Schwyter, 2011; Whitaker, 1978). Grosjean (1982) presents a case of a native speaker of Swiss German, who, following a head injury, lost all of his languages. He subsequently recovered French first, a language he had learned as an adult, then High German, but never his native Swiss German. Similarly, Whitaker (1978) reports a case of a native English speaker, who recovered his additional languages first and his native language last. In other cases, long-term deficits in a native language have been detected but not in any of the additional languages (see Paradis & Goldblum, 1989).

The fact that languages can be lost and recovered selectively following neurological damage is strong evidence against a fully integrated mental lexicon across different languages (De Angelis, 2007b; Singleton, 2003). Singleton (2016a) stresses, however, that these cases of selective recovery and non-parallel aphasia are not taken as evidence “that languages are sited in different physical locations in the brain (see e.g. Fabbro, 2001)” (p. 507). Evidence from neuroimaging studies suggests that lexical processing is localized in the same area of the cerebral cortex for all languages (§ 2.2.2.1., e.g. Franceschini et al., 2003), and so any explanation of selective aphasia recovery needs to account for such localist evidence. Pfenninger (personal communication) suggests that aphasia reflects damage to control mechanisms located in the pre-frontal cortex, with each language nevertheless having its own processing dynamic. Such an account would explain neuroimaging results, while maintaining a functionalist account of differentiable mental lexica.

Third, the simple fact that speakers are able to stick to one language in regular usage is indicative of separate mental storages for languages. Similarly, it has been shown that the expectation of hearing a particular language may lead to incomprehension when another is heard, even when the individual has knowledge of both languages (Singleton, 2016a). Not just the listener but also the person producing language needs to take contextual aspects into account for communication to be successful. The multilingual speaker is therefore acutely sensitive to what the interlocutor will and will not understand and correctly chooses the appropriate language amidst the various languages at their disposal. Such evidence is taken to further suggest that access to the mental lexicon is selective.

Finally, while crosslinguistic influence is often listed as an argument in favour of an integrative view (as it reflects a high degree of cross-lexical connectivity), it is equally used as an argument in favour of the separatist view. When
an individual encounters a new language, they make quick judgments about its relationship to prior knowledge and previously learned languages, thus making use of lexical resources already available during the acquisition process of new words and this particularly when languages are typologically close. This is further evidenced by an increase in transfer relative to psychotypological beliefs (Kellerman, 1977, 1979, 1983; Ringbom, 1987; Singleton, 1987; Singleton & Little, 1984).

Singleton (2003), however, argues that the fact that there are effects of psychotypology, “runs counter to the notion of straightforward total integration within the mental lexicon” (p. 169). Especially in the case of multilingual learners and multiple available sources, “[s]uch choice of the most promising source available […] bespeaks a high degree of linguistic sophistication and – since choice implies separability and separation – it runs counter to the notion that cross-lexical interplay is simply a matter of blurred boundaries between languages” (p. 60). In addition, code-switching and transfer appear to be sensitive to the particularities of the languages involved. Myers-Scotton (2003) found that in Arabic-English code-switching, there is an untypically large number of embedded English inflectional phrases in the Arabic matrix language. He argues that using whole phrases with a tensed verb from a different language reflects the speaker’s awareness of the incongruity between the Arabic frame and the nature of English verbs. Singleton (2016a) takes such sensitivity to crosslinguistic incongruities as further evidence of the boundedness of languages in the mind.

2.2.2.3 A consolidation

There are strong arguments on either side of the discussion and rarely do researchers advocate models of full integration or full separation, but rather defend a position of greater tendency toward one or the other (e.g. Cook, 1991, 1992; Dijkstra, 2003; Singleton, 2016). Cook (2003), for example, defends the position of non-selective lexical access and an integrated mental lexicon, yet refrains from claiming complete crosslinguistic unitariness.

[T]otal separation is impossible since both languages are in the same mind […] [but] […] total integration is impossible since L2 users can keep the languages apart […]. [B]etween these two extremes and probably untenable positions of total separation and total integration, there are many different degrees and types of interconnection.

Cook, 2003, p. 7
Alternatively, De Angelis (2007b) suggests that the multilingual mental lexicon may partly be integrated and partly separated. Furthermore, the arguments on both sides presented above mainly focus on languages as a whole, but rarely address the item-specific level of individual words and how they are connected cross-linguistically. The discussion above also does not take into account potential differences in the strength of a connection, which in turn were part of models of lexical organization presented in § 2.2.1.

Paradis (1987) published an article on the representation of two languages in one brain, in which he is particularly concerned with determining whether the two seemingly exclusive positions of a common versus a shared linguistic store are indeed mutually exclusive. He proposes the Subset Hypothesis (Paradis, 1987), which postulates that the two languages in a bilingual’s mind belong to the same overall system, but the elements of each language form a separate network of connections. The concept of subsets thus combines views of an integrated lexical repository and separate lexicons (in the form of subsets). Individual items in the lexicon are tagged for their language membership and other shared characteristics, such as a formal vs. informal register.

Individual words can consequently belong to multiple subsets at the same time. The concept of subsets is supported by studies on aphasia patients, who lose and regain languages selectively. Paradis infers that each language must have its own subset of neural traces, allowing bilinguals to access their languages separately, while a larger set accounts for bilingual language mixing. Similar to de Groot (1993) and Kroll and Stewart (1994), Paradis emphasizes that language organization can change over time and vary from one individual to another. He too suggests that there is a shift based on proficiency level, such that low proficiency learners have an extended, or L1-L2 mixed, system, and shift towards two separate subsystems with increasing proficiency. While these initial inter-linguistic links become more loose over time, they do not, however, disappear completely in all cases and may even retain a strong connection, as is the case with cognates. Figure 2-5 illustrates how the two networks connect both inter- and intra-linguistically, with links that can differ both qualitatively and quantitatively. Some connections may be semantic, others phonological, each with varying degrees of strength.

Given the nature of the present study and its focus on the choice of source language in transfer in multilingual learners, but also on the impact the form of a particular lexical item can have on its transferability (§ 5.6), a network model, such as the one presented by Paradis, appears rather convincing. While it incorporate Singleton’s (2016a) argument that choice necessarily implies
separability and separation, it also takes into account crosslinguistic connections at the item-specific level (see Dijkstra and van Heuven, 1998, in § 2.2.3.2).

If we assume that the prevalence of one background language over another as source for transfer is systematic and predictable (as this study aims to demonstrate), this would imply some level of differentiation between different language systems. However, the impact of item-specific features on the choice of source language in transfer remains to be determined. If we were to find that it is more the particular word form than its language membership that influences the probability of a word being chosen for transfer, this would then call for models of crosslinguistic organization based on individual words and their closeness (i.e. strength of connection) to both intra- and inter-linguistic lexical neighbours.

2.2.3 Bilingual language activation

Within a network approach to multilingual lexical organization, activation (de Bot, 2004; A. Dijkstra & van Heuven, 1998; Green, 1998; Paradis, 1987) of
different language sets and individual items has developed as one of the most prominent and convincing propositions for lexical processing and crosslinguistic influence in particular. De Bot (2004) writes that languages differ in their level of activation, depending on the “amount of contact and use, level of proficiency reached, maybe method of instruction, age of acquisition and many more variables” (p. 26). The list of factors impacting levels of language activation strongly resembles those factors found to influence the choice of source language in transfer (proficiency, recency, psychotypology, L2 status) (see § 3.1). Proficiency is one of the most well-established determining factors in research on the SL of transfer. In addition, the amount of contact and use listed by de Bot is operationalized as both recency and exposure in transfer research, while method of instruction and age of acquisition are encompassed by the L2 status hypothesis, and

The only factor discussed in transfer research but not within activation models is psychotypology, which I will discuss with regards to item-specific activation in § 2.2.3.2. In the context of transfer in multilingual learners, language activation thus appears to be directly related to the processes involved in the choice of source language (or source item) (Dewaele, 1998).

Generally, researchers present a model that takes a language as an entity which is either active or in some way inhibited (De Bot, Lowie, & Verspoor, 2005; Faerch & Kasper, 1986; Green, 1986). Others, however, zoom in onto individual words and their crosslinguistic links to other words (e.g. de Bot, 2004; A. Dijkstra, 2003; A. Dijkstra & van Heuven, 1998). They discuss the process underlying the simultaneous activation of two items from different languages, without the activation level of the whole language set necessarily being raised. In the subsequent sections both these types of activation models are presented.

### 2.2.3.1 Language-general activation

As previously discussed, a number of models of lexical organization follow Weinreich’s example and directly connect words (or lexemes) to their associated concepts (de Groot, 1993; De Groot, 1992; Kroll, 1993; Kroll & Stewart, 1994), while others distinguish an additional level, the *lemma*, which mediates between the lexeme and the concept (de Bot, 2004; de Bot, Paribakht, & Wesche, 1997; Kempen & Hoenkamp, 1987; Kempen & Huijbers, 1983; Levelt, 1989). Lemmas are considered to contain information about semantic and syntactic features, as well as all the information associated with the correct pragmatic usage of the word. This information is contained in different *nodes* attached to the lemma. In the context of multilingual language processing, one
important addition to the lemma is that of a *language node* (or language tag) (de Bot, 2002, 2003; Lowie, 2000; Woutersen, 1997).

It is argued that the language node helps to activate one language subset, while inhibiting another, thus allowing the bi- and multilingual to distinguish between their languages (Faerch & Kasper, 1986; Green, 1986). De Bot et al. (2005) offers the ‘ping-pong’ metaphor to explain how individual items may still pop up during language-general inhibition. He argues that there is no on/off switch for a whole language, but that inhibition of a language subset rather works like holding down ping-pong balls in a bucket of water: you can hold down most of the ball with your hand but once in a while one ball may pop to the surface. Complete inhibition of a whole language subset thus seems impossible, especially in the case of a stronger language with a high level of activation.

Generally, it appears that highly activated languages are more difficult to inhibit, which explains greater amounts of transfer from a stronger (i.e. high proficiency, high exposure) language into a weaker language than vice versa. As such, transfer from a much used L1 with a high level of activation is more probable than transfer from a language learned many years ago with a very low level of activation. One of the “hotspots of current research” (de Bot, 2004, p. 26) is whether increasing the activation level of one language means simultaneously lowering the activation level of other languages. While languages differ with respect to their default level of activation, there must be some mechanism that allows us to speak a language with a lower default level of activation, otherwise the strongest language would always be selected.

Other remaining issues are switching costs (i.e. needing more time to switch) from an L1 to an L2 and vice versa. There are greater switching costs associated with switching from an L2 to an L1 than the other way around (e.g. Costa, Santesteban, & Ivanova, 2006; Meuter & Allport, 1999). This seems counter-intuitive, since switching to the stronger language (i.e. the one with the higher level of activation) should be easier (i.e. faster). De Bot (2004) suggests that this phenomenon can be explained if we assume that deactivating the L1 during L2 speech requires active inhibition and great effort, thus making the reactivation of the L1 slow. The L2, on the other hand, does not require much deactivation during L1 speech, since the L2 is already less active than the L1, and thus reactivating it takes less effort.

Grosjean (1998) takes a more situational perspective on the language selection process and proposes a continuum of different language modes. He argues that
bilinguals base their language choice on a number of external factors, such as
the type of person addressed and their relationship to them (whether it is a
colleague, family member, superior, etc.), the topic of conversation, and the
location or setting in which the interaction takes place. In particular, the lan-
guages the interlocutor speaks impact language choice, as it offers opportunity
for language switching. His language mode hypothesis holds that bilinguals
may be in a completely monolingual language mode when speaking to a mon-
olingual of one of the languages they know, but may adopt a bilingual lan-
guage mode when interacting with someone of the same language combina-
tion, using code-switching and borrowing. He further argues that this is a con-
tinuum and bilinguals do not always find themselves at the endpoints pre-
sented above, but may occupy intermediary positions. Such a hypothesis has
great methodological implications for research on the source language of
transfer, as the language of the environment, the languages the researcher con-
ducting the experiment knows, and the language of instruction may impact the
language mode the participant is in, thus skewing activation levels and conse-
quently conclusions drawn from the results. These external factors and their
effect on SL patterns in this study are discussed in § 6.3.2.

In summary, the models presented so far consider languages as a whole and
do not delve into individual interlinguistic links between words. There may,
however, be potential differences in the strength of connection between dif-
ferent interlingual pairs and consequently differences in levels of co-
activation. In the following section, item-specific approaches to activation are pre-
sented.

2.2.3.2 Item-specific activation

If we assume that all subsets belong to the same lexicon, this would mean that
lexical items of all languages are stored in one lexicon (Poulisse & Bongaerts,
1994). However, if we consider lexical access in terms of item-specific activa-
tion, rather than subset activation, then the crucial question would not be
whether the lexica of different languages are integrated or separate, but
“whether lexical items from different languages are related to each other,
whether they can activate each other equally and whether they can be activated
simultaneously” (Poulisse & Bongaerts, 1994, p. 40). Item-specific activation
may thus prove to be a crucial element for models of multilingual lexical pro-
cessing.

One of the first studies to provide support for a network model more focused
on individual items than whole subsets is Poulisse and Bongaerts (1994). They
specifically aimed to find a theoretical explanation that could account for the unintentional language switches in their data. Given the low proficiency and low exposure to the target language at beginner stages, the frequency with which learners encounter L2 items is much lower than that of L1 items. Consequently, they argue that L1 lexical items will always reach the required level of activation before the L2 item does. This frequency effect may in some cases override L2 item activation by its L2 language tag, leading to L1. With increased L2 proficiency, the frequency effect lessens and the odds of an L1 word being selected diminish accordingly. They further support their assumption of a frequency effect by referring to Giesberg’s (1989) finding that there is more transfer of L1 function words than content words, presumably due to their higher frequency. Within an activation framework, high-frequency words and words that have recently been used require less effort to activate for lexical access and thus slip in more easily than words with a higher activation threshold. More recently, Dijkstra (2003) has suggested that frequency may also explain the much lower amount of reverse transfer (i.e. transfer from an L2 to an L1). He argues that at low levels of proficiency, L2 items may have lower levels of activation due to reduced frequency of use, thus producing less transfer from L2 to L1.

The effect of frequency of use of an item on its activation level is also the core of Paradis’ (1997) Activation Threshold Hypothesis. Paradis (1997) argues that if an item is regularly activated through frequent usage, its activation threshold is lowered and it becomes more readily available to the user in subsequent language production. By contrast, an item that is rarely used has a high activation threshold due to its inactivity and is more difficult to reactivate, i.e. find and select in a lexical search. While the subset hypothesis offers a strong explanatory model for selective language use and the inhibition of whole systems, the activation threshold hypothesis allows from non-target languages to be equally active and available as target language items (depending on their frequency of use).

Similar to Poulisse and Bongaerts (1994) and Paradis (1997), De Bot (2004) argues that translation equivalents are activated in parallel, as information about semantic equivalents is contained in each lemma. It is further argued that the amount of information available for each lemma and the degree of activation both depend on the individual speaker’s experience of input and output over time and their recent exposure (De Bot et al., 2005). De Bot (2004) and de Bot et al. (2005) suggest that recency of use in particular may lead to higher levels of activation of a cross-linguistic item.
The proposal of item-specific frequency and/or recency effects thus offers a hypothesis that can account for changes over time, depending on exposure, recency, and proficiency, phenomena such as code-switching and transfer, as well as priming effects, while at the same time accounting for the fact that people can generally keep their languages apart. With regards to the qualitative difference between intra- and inter-linguistic links, Herwig (2001) argues that it seems more plausible to assume that it is a difference of strength and quantity rather than quality, with intra-linguistic associations growing stronger and multiplying through frequent use, increased proficiency, and process automatization, while interlinguistic connections grow weaker due to scarce cross-linguistic usage.

A second factor affecting item-specific activation that has been discussed in the literature is form similarity of cross-linguistic items. The fact that lexical items can activate words from other languages lies at the heart of the Bilingual Interactive Activation (BIA) model proposed by Dijkstra and van Heuven (1998) (see also van Heuven, Dijkstra, & Grainger, 1998). It is the bilingual version of the Interactive Activation (IA) model by McClelland and Rumelhart (1981), and the basis of the Multilingual Interactive Activation (MIA) model later suggested by Dijkstra (2003). If one conceptualizes the mental lexicon as a network in which all items have a number of words they are attached to, both intra- and inter-linguistically, on the basis of meaning, form or other similarities the items in question may share, then code-switching, transfer, and cross-linguistic priming effects can easily be accounted for.

Dijkstra and van Heuven (1998) include visual aspects of word recognition in their development of the BIA model, which introduces the activation of orthographic neighbours in language recognition. According to this model, visual word recognition occurs at three levels of representation: the feature, letter, and word level. In addition, a fourth level is included, which contains information about language membership of the item, in the form of language tags. This model thus suggests an integrated lexicon at the first three levels (feature, letter, word), but a separate network at the language membership node.

During the selection process, words from other languages may be activated simply because of their higher frequency of use or their strong similarity to the target word. Dijkstra (2003) argues that during initial stages of recognition, a high number of different word candidates are activated in parallel, especially candidates that are orthographic neighbours. If, for example, the word wind is presented, then neighbours such as bind, kind, wand, wild and wink (A. Dijkstra, 2003) are also active, while other less similar items are inhibited.
Such activation may also occur across languages. At the phonological level, de Bot (2004) supports the assumptions that phonological similarity co-activates elements from different languages.

Earlier, I discussed how many of the activating factors presented by de Bot (2004) (e.g. frequency of use, proficiency, method of instruction, age of acquisition) (see § 2.2.3) reflect factors found to influence the source language of transfer in third language acquisition (e.g. exposure, recency, proficiency, L2 status). Another important factor that is considered to influence the SL of transfer is typology. This factor seems to be closely related to the results of studies on item-specific activation. If we assume that orthographic and phonological neighbours are activated cross-linguistically, then we have to assume that for some language pairs there will be many co-activations and for some very few, based on their degree of typological similarity. If two languages are closely related and consequently share many orthographic or phonological neighbours which are activated during TL production, this activation should lead to greater amounts of transfer from that language.

2.2.3.3 Conclusion

The models and frameworks presented here aim to explain how lexical selection may be governed by the activation and inhibition of language subsets, and how the insufficient inhibition of a non-selected language may lead to transfer (§ 2.2.3.1). It was also discussed how individual cross-linguistic items may be activated by orthographic or phonological neighbours in other languages, independent of the level of activation of the language as a whole and how such item-specific activation may be linked to frequency and recency of use (§ 2.2.3.2). De Bot (2004) believes that the evidence gathered from item-specific cross-linguistic activation indicates that lexical access is non-selective in nature. He further stresses, however, that this does not mean that words from whatever language have an equal chance of being selected. Languages continue to function as sets that can be activated and inhibited as a whole, thereby increasing and decreasing an item’s chances of being selected. If a language as a whole is strongly inhibited, even a high-frequency word or close orthographic neighbour may not be activated cross-linguistically.

Finally, De Angelis (2007b) cautions her readers that hypotheses which are perfectly plausible in the case of bilinguals and trilinguals, often fail to be so for speakers of five or ten languages. She mentions the case of Harold Williams who spoke 58 languages and questions the plausibility of neighbourhood activation and the necessary inhibitory power required to achieve the selection
of the appropriate item in polyglots such as Williams, and this especially so in the case of typologically close languages (see also Dijkstra, 2003). The number of competitors activated during language production would increase exponentially in the case of an individual who speaks ten, 20 or more languages, requiring great amounts of processing power to resolve the competition caused. Models of lexical organization, as well as lexical access, therefore should aim to be explanatory of not just bilinguals and trilinguals, but of all language users, independent of the number of languages they know. The following section discusses theoretical models of lexical organization specifically aimed at multilingual users.

2.2.4 Theoretical models of multilingualism

De Angelis (2007b) and Singleton (2003) point to the lack of theoretical models of language learning beyond the L2. All of the above-mentioned models of lexical storage and access presumed the involvement of only two languages and often implied that the acquisition of a third would occur in the same way (Hufeisen, 2004; Szubko-Sitarek, 2015). This perception is, however, changing with more and more research emerging which specifically focuses on third language acquisition and multilingual learners (e.g. Aronin & Ó Laoire, 2001; Hall & Ecke, 2003; Herdina & Jessner, 2002; Meißner, 2004).

One important question that any model of lexical storage and access needs to be able to answer is how a third or fourth or fifth language can successfully be incorporated and explained by the proposed model. Would L3 words create direct connections to L1 words or L2 words at initial stages of acquisition? Is this choice potentially based on typological proximity? If one assumes a second language learner with a largely subordinate organization, characteristic of early stages of acquisition, who then learns a third language, will this language create subordinate links with L1 or L2 items? This scenario would lead to a three-level model, in which an L3 word is connected to its concept via the L2, which in turn is connected to its underlying concept via the L1. A newly acquired L3 word may also create associations with both languages but at varying strengths or it may connect to individual items that appear closer in form, independent of language-general typological closeness. All of these possibilities and the complexity thus added to any explanatory model need to be considered.

Furthermore, most empirical evidence in favour of an integrated or separate lexicon comes from bilingual participants, while studies with multilingual speakers remain scarce. In order to gain greater understanding of multilingual
lexical organization and transfer as evidence of a highly connected mental lexicon, more empirical studies with multilingual participants need to be conducted. The present study therefore focuses specifically on multilingual learners and the consequences of multiple background languages being available for transfer.

One of the questions that models of multilingual lexical organization try to answer is how the newly acquired language is integrated into the existing L1-L2 structure. Multilingual accounts of lexical organization are most often an extension of bilingual models, rather than radically different models. Groseva (1998), for example, developed the *Foreign Language Acquisition Model*, in which all additional languages are evaluated against the L2, not the L1. A learner’s L2 “carries all the special features of the target language and includes interference phenomena from the L1 as well as learning and communication strategies that are special and had proved to be successful for the learner in the L2” (Groseva, 1998, p. 22, translation in Tápainé Balla, 2012, p. 32). Given the similarity between the L2 and L3 learning process (especially regarding the higher degree of consciousness), it is argued that the L2 serves as a model for all subsequent foreign language acquisition. Such a model thus suggests that learners employ what is already available to them from prior language learning.

Another model, also based on learners’ urge for efficiency, is proposed by Herwig (2001). She argues that any new linguistic system will start as an extension of an already established system, where new elements are stored as variations of existing items (i.e. phonemes stored as allophones, morphemes as allomorphs, L2 syntactic rules as exceptions to L1 rules, etc.). Hall and Ecke’s (2003) *Parasitic Model* echoes this view, proposing that “the learners’ search for, detection, and use of similarity between new information and already represented information is a general cognitive principle that they use to integrate novel word structures into a network of stable representations and access routes” (Ecke, 2015, p. 149). New representations in the third language are connected to well-established representations in the L1 and the L2; new L3 entries thus behave in a parasitic way upon their L1 and L2 hosts. L3 items are initially retrieved via their L1 or L2 hosts and thus depend on these cross-linguistic links. In both Herwig’s (2001) and Hall and Ecke’s (2003) model, increased proficiency eventually allows L3 elements to become functionally distinct from their L1 or L2 hosts. Generally, the models presented here explain the greater proneness to transfer at early stages, due to the weak functional segregation between linguistic systems.
All of the models above rely, in some way or another, on the assumption that there is a hierarchical relationship between different languages, where new words become parasites on established words or where prior knowledge influences the acquisition of a new language but not vice versa. While they present a developmental aspect from dependence to independence for the new language, they do not contain a possible change in hierarchical relations. De Bot et al. (2005), however, state that the mental lexicon “is a dynamic system […] that […] is subject to a great number of internal and external factors, is chaotic, not predictable, self-organising, and always subject to change” (De Bot et al., 2005, p. 50). Any framework used to investigate multilingualism therefore needs to accommodate variability.

Herdina and Jessner (2002) offer such a model, which is specifically aimed at multilingual lexical organization, rather than a development or extension of a previous bilingual model. Their Dynamic Model of Multilingualism (DMM) envisages a multilingual system that is not the mere combination of multiple monolinguals, but takes into account the whole “complex dynamic system with its own parameters, which are not to be found in the monolingual speaker” (p. 19). Dynamic Systems Theory has a long-standing history in the natural sciences, but has only recently been applied to language acquisition (Jessner, 2008a). Within DMM, the multilingual lexical system is not conceptualized as one unitary system, but rather as made up of separate, yet highly interactive language-specific subsystems.

The most important change in perspective which the DMM offers is that it does not attribute ex officio prominence to the L1 as the most established system. While prior models often present the L1 as the superior system and consequently as the one wielding influence on other subsequent systems, DMM stresses mutual interaction of all components, where “each variable affects all the other variables in a system” (van Geert, 1994, p. 50), thereby accounting for attrition, reverse transfer, and other changes in the organization of the multilingual lexicon.

Another model focusing on third language is Hufeisen’s (1998) Factor Model (Figure 2-6). Hufeisen presents a whole range of factors that are involved in the process of language learning. While certain neurophysiological, socio-cultural, affective, and cognitive factors are relevant in L2 and L3 acquisition to the same extent, she adds foreign language specific factors to the model, which include the individual learning experiences and strategies, previous interlanguages and the interlanguage of the target language. It is these factors that distinguish third language acquisition from second language acquisition. The
presence of another foreign language (L2), as well as strategies and experiences related to the acquisition of this prior foreign language all add to the idiosyncratic experience of learning an L3.

2.3 Conclusion

The present chapter has offered a broad overview of relevant terminology and constructs (§ 2.1), as well as theoretical models of bi- and multilingual lexical representation central to this study (§ 2.2). Models of lexical organization (§ 2.2.1), access (§ 2.2.2), and activation (§ 2.2.3) were discussed, as well as models specific to multilingual language acquisition (§ 2.2.4). Transfer has been shown to be an important emergent property of the co-habitation of different languages in the bi- and multilingual mind. It consequently represents an excellent empirical working ground to investigate lexical representation and access during language production. Research on transfer in multilingual learners, in particular, has the potential to challenge established theoretical models, which are often limited to bilingual lexical representation and do not account for additional languages in the mind.

The debate around how exactly the multilingual mental lexicon is organised is far from being settled, and theoretical models often lack the necessary dynamism to account for a constantly changing mental lexicon. Considering the great number of factors influencing the language learning process and subse-
quent language representation, any proposed model needs to provide sufficient flexibility to account for developmental, as well as individual variability. Most importantly, any model of lexical organization cannot only work at a language-general level but needs to also consider item-specific associations. Given the complexity of the issue, however, it remains difficult to provide such a comprehensive model and more simplified accounts will need to suffice for the time being.
3 Previous Research into the Source Language of Transfer

The most important difference between transfer in second and third language acquisition is the fact that multilinguals experience influence not only from their L1, but also from one or more non-native languages when acquiring a new language (Szubko-Sitarek, 2015). In a bilingual system, crosslinguistic influence only takes place between the L1 and L2, while in a multilingual system, interaction can take place across multiple paths (L1-L2, L2-L3, L1-L3) and in both directions, as well as simultaneously from multiple SLs.

With additional languages available to the multilingual learner, an important new area of investigation has emerged: the source language in transfer. While it is commonly accepted that multilingual learners exhibit transfer from multiple languages, there remains uncertainty about what combination of factors influences the predominance of a source language. Heidrick (2006) therefore writes that “[t]he basic task […] of TLA researchers is to understand how, when, and why one language is chosen over another” (p. 1). Understanding which factors influence the choice of source language in any given individual is therefore the focus of this thesis. A great amount of research (Cenoz, 2001; Falk & Bardel, 2010; Odlin & Jarvis, 2004; Williams & Hammarberg, 1998) has focused on identifying such factors and the present chapter will provide a detailed account of this body of research. It will first discuss previous research into the five predictive factors under investigation, namely proficiency (§ 3.1.1), recency (§ 3.1.2), psychotypology (§ 3.1.3), the L2 status factor (§ 3.1.4), and item-specific factors of transferability (§ 3.1.5), followed by the justification for this study (§ 3.2) and the research questions investigated by it (§ 3.3).

3.1 Predictive factors

A range of factors conducive to the occurrence of transfer have been discussed in the literature. For example, target language proficiency has been found to affect the amount of transfer a learner produces (Lindqvist, 2009; Poulisse, 1990; Ringbom, 1986, 1987; Williams & Hammarberg, 1998), as well as the
particular type of transfer that is most predominant. At lower levels of proficiency, form-based transfer, such as borrowing and foreignising, is the most common type (Pfenninger & Singleton, 2016), while meaning-based transfer is more common at higher TL proficiency levels, as learners continue to lack the required deep lexical knowledge (Ringbom, 2007). Other factors listed by Jarvis (2000) that are considered to have an effect on the amount of transfer in SLA are: personality, motivation, and language aptitude; social, education, and cultural background; language background; type and amount of TL exposure, task type and area of language use. Given that the focus of the present thesis is on factors influencing the choice of source language in TLA, rather than the overall amount of transfer in either SLA or TLA, I will not go into further detail regarding these factors.

An extensive list of contextual and psycholinguistic factors predicting the source language of transfer have also been. For example, the linguistic context in which a conversation takes place has been found to influence the choice of source language (Dewaele, 2001). As previously discussed (§ 2.2.3.1), Grosjean (1998, 2001) proposed a model of a language mode continuum, in which contextual factors (such as the interlocutor, the situation, the topic, the type of task) determine the level of activation of different languages. The language generally used outside the experiment setting, or the language of instruction for a given experiment, can thus make that particular language more available as source for transfer. It has also been suggested that the languages the interlocutor knows may influence the choice of source language of transfer (Grosjean, 1998). On the other hand, Bardel and Lindqvist (2007) found that all languages are active in L3 production, independent of whether the interlocutor shares the same language knowledge or not.

The study conducted for this thesis is necessarily subject to these contextual factors and their potential effects need to be considered. They will be further discussed from a methodological perspective in § 4.4 and their implications for the results of this study will be discussed in § 6.3.2. However, given that the focus of this study is on psycholinguistic factors, the following review will present previous research on the most important psycholinguistic factors tested in this study, namely: proficiency in the background languages (§ 3.1.1), recency (§ 3.1.2), psychotypology (§ 3.1.3), the L2 status (§ 3.1.4), and item-specific transferability (§ 3.1.5).

Similarly, given that this study investigates lexical transfer, the literature review below only covers studies concerning this linguistic level. It is important not to generalize results from one linguistic level to another, as the underlying
cognitive processes may significantly differ (Paradis, 2004, 2009). Studies about linguistic levels other than lexis may nevertheless be cited for the purpose of comparison or discussion. A second important distinction that needs to be made, and which is often not specifically stated in literature reviews, is that between spoken and written production. Differences in processing mechanisms between speaking and writing are well documented (§ 2.1.5) and need to be taken into consideration when discussing research results.

It is thus essential to clearly state whether the evidence in support of a particular factor was gathered from data on lexical or syntactical transfer, as well as whether the data represents spoken or written production. Consequently, the ensuing review will distinguish results about individual factors by mode of production, as well as linguistic level. Furthermore, since these factors are not always defined and measured in the same way, each section starts with a presentation of how different authors conceptualize and define a particular construct, followed by the definitions judged to be the most appropriate for the particular context of this study.

3.1.1 Proficiency

The first factor that has been found to be determining which background language will be chosen as source for transfer is proficiency in the BL (Bardel & Lindqvist, 2007; Lindqvist, 2010; Lindqvist & Bardel, 2014; Tremblay, 2006; Williams & Hammarberg, 1998). Below, different conceptualizations of proficiency in the context of the SL of transfer are discussed (§ 3.1.1.1), followed by a review of studies from both oral (§ 3.1.1.2) and written production (§ 3.1.1.3). Each of the studies reviewed brings forth important implications which need to be considered in order to fully understand the circumstances under which proficiency has an effect.

3.1.1.1 Conceptualizations of proficiency

Proficiency in a background language is considered one of the most important factors impacting whether a given language is chosen for transfer or not. First and foremost, lower levels of proficiency in a language necessarily entail a smaller vocabulary. With a decreased pool of potential transfer candidates, the probability of this language being used as source for transfer is also reduced. In addition, there are two different conceptualizations of what type of proficiency level affects transfer. First, there is the absolute level of proficiency, where it is assumed that a certain threshold or level of proficiency needs to be reached before any transfer from that language can occur (Serrander, 2011; Szubko-Sitarek, 2015). Then there is the relative level of proficiency, where it
is assumed that independent of its objective level, whichever of the background languages has the highest level of proficiency will be chosen for transfer (Lindqvist, 2009).

However, it is not yet clear whether the L1 should be included when comparing proficiency levels across background languages, or whether the predictive effects of proficiency are only relevant in determining which of multiple L2s will predominate as source for transfer. Finally, the effects of proficiency in the background languages may be related to the level of proficiency in the target language, so that when the TL is at low proficiency, then background languages that are also at low proficiency may be preferred as source for transfer (Bardel & Lindqvist, 2007).

Furthermore, questions remain regarding proficiency in what area has an effect and how proficiency was measured in different studies. Is it general language proficiency that determines lexical transfer, or is it lexical diversity, lexical depth and breadth that have an effect? Also, if we study transfer in spoken production, should we only measure spoken proficiency and fluency, and if we study written production, should we include orthography in measures of proficiency? Generally, proficiency is established through questionnaires, self-assessment, or personal comments (Bardel & Lindqvist, 2007; Lindqvist, 2009, 2010; Williams & Hammarberg, 1998) and in some cases through proficiency tests (Tremblay, 2006). Unfortunately, it is rarely indicated what type of proficiency was tested and how it was measured. In addition, it is usually not indicated whether it was an overall level of proficiency that was assessed or specific aspects of proficiency, such as vocabulary size, spoken fluency, or writing skills (with some exceptions, e.g. Bardel & Lindqvist, 2007, stating that they used self-estimation to assess overall proficiency levels).

In SLA research, it is common to measure linguistic competence, where the aim is to establish how accurate/correct their language usage is. However, since the focus of this study is on lexical transfer, general communicative competence was deemed more relevant. For example, immigrants may produce grammatically correct sentences in their L1 (home language), despite not being able to perform a variety of communicative tasks (e.g. writing a formal letter). In the present study, a competency-based definition of proficiency was therefore used, where proficiency is understood as the ability of an individual to perform a variety of tasks in written and oral form in a given language (see § 4.3.2.1 for a detailed account of the self-assessment tool used in this study).
3.1.1.2 SL proficiency in spoken production

The following studies have investigated the effects of proficiency on the source language of transfer in spoken production. The majority of transfer research has focused on oral production, using a variety of different elicitation tools, including interviews, free speech and picture story descriptions. Williams & Hammarberg (1998) is the most seminal study on transfer in third language acquisition and has launched a whole field of research into factors that impact the choice of source language. In their longitudinal study, Sarah Williams (SW), one of the co-authors, was recorded over a period of two years during her acquisition of Swedish. She was a native speaker of English, but also spoke L2 German (near-native), L2 French (advanced), and L2 Italian (elementary). She had lived in Germany for six years right before she moved to Sweden and the start of the recordings.

They found the greatest amount of transfer in the default supplier role (as opposed to instrumental switches) to come from L2 German, and not other L2s in her repertoire, which is the L2 she was most proficient in. This L2 influence, however, gradually diminished with increased L3 proficiency. If we consider proficiency across all BLs, SW’s L1 English should have been equally activated, but this was not the case. They argue that since both languages are at a similar typological distance to the TL and are used with equal frequency and recency, this difference may be due to German’s status as L2 (see § 3.1.4 on the L2 status hypothesis).

Tremblay (2006) explored the effects of proficiency levels in an L2 in isolation from proficiency in the L1. The study looked at two groups of English native speakers, who were learning L3 German, where one group had low proficiency L2 French and the other group had high proficiency L2 French. The results showed that that the rate of intrusions (borrowings and foreignisings) from L2 French was higher in the high proficiency group. These results are, however, considered in isolation from L1 transfer, and we may still observe the largest amount of transfer to come from the L1. The results from both Williams & Hammarberg (1998) and Tremblay (2006) thus raise the question of whether comparative levels of proficiency only help to determine the choice of source language across L2s, while different processes govern the activation of the L1.

Lindqvist (2010) included values on both L1 and L2 transfer and found that learners only drew on their high proficiency languages L1 Swedish (9 instances) and L2 English (2 instances) for transfer into L3 French, and made
no use of closely related languages like Spanish and Italian, that were at lower proficiency (0 instances). These results seem to indicate that proficiency overrides typology as the most determining factors of the SL of transfer. However, one should be cautious with drawing strong conclusions given the low number of occurrences (11 instances in total).

In addition to findings of high proficiency in a BL leading to more transfer from that language, there have been studies that indicate a mirrored pattern between the proficiency level of the BLs and the TL. Bardel and Lindqvist (2007) found that there is more transfer from a low proficiency BL when the TL is also at low proficiency. They conducted a longitudinal study on lexical transfer in oral production with the second co-author as participant. She was a native speaker of Swedish and spoke L2 English and French at high proficiency, and L2 Spanish at low proficiency. The target language was L3 Italian. Overall, greater transfer was detected from the two typologically related languages French and Spanish. However, there seemed to be a trend of greater L2 Spanish influence during the first recording, with French then taking over in the later recordings. Bardel and Lindqvist explain these patterns by arguing that there is greater transfer from a low proficiency L2 when the L3 is also still at low proficiency.

The hypothesis that low proficiency in the TL elicits more transfer from low proficiency background languages, has been put into question, however, in a second study by Lindqvist and Bardel (2014), where they compare the results of their previous case study (Bardel & Lindqvist, 2007) to those of a new learner. The second participant was a bilingual L1 Swedish/Italian speaker learning L3 Spanish, with L2 French and English. While proficiency also played a role in this learner’s transfer patterns, it did so in a different manner. In learner 2, the same high-proficiency language (L1 Italian) dominated in both word construction attempts (i.e., foreignisings) and code-switches (i.e., borrowings) in L3 Spanish. The first learner, on the other hand, had used low-proficiency L2 Spanish in code-switches and high-proficiency L2 French for word construction attempts.

These two case studies thus seem to indicate that source language proficiency does not have the same effect on the transfer patterns of these two learners. Given the multitude of different results across the studies reviewed here, large uncertainties remain regarding the relevance of the proficiency factor in the case of lexical transfer in oral production. The most important remaining questions relate to (1) whether the L1 should be included in comparative aspects of proficiency in the source languages or whether transfer from the L1 follows
a different process, and (2) whether learners draw on low proficiency SLs when their L3 is also still at low proficiency and then draw on higher proficiency SLs when their L3 proficiency improves.

3.1.1.3 SL proficiency in written production

It is often assumed that the results found for spoken production equally apply to written production, as indicated by the majority of literature reviews that cover studies on different modes under the same heading and often do not specify whether the data originated from spoken or written production (e.g. Bardel & Lindqvist, 2007; Cenoz, 2001; Tremblay, 2006). It is important, however, to remain aware of the differences in processing mechanisms underlying spoken and written production (§ 2.1.5) and it is therefore that the following studies are presented separately from those on spoken production. Generally, there is a lack of studies on transfer in writing and the factors involved in the choice of source language. The two studies presented below, however, provide some indication of whether and how proficiency in the SL might affect written transfer.

Jessner’s (2006) Tyrol study is an exploratory attempt at uncovering the underlying mechanisms of crosslinguistic influence through the use of think-aloud protocols. She investigated strategy use in transfer, as well as proficiency, recency, and psychotypology as influential factors in 17 bilingual German/Italian university students’ English texts. One important difference to other studies on transfer, especially those regarding oral production, is Jessner’s focus on conscious transfer strategies and the individual steps the learners run through in their decision process. This methodology thus represents a contrast to studies that investigate surface evidence of underlying psycholinguistic processes. Jessner provides a qualitative analysis of learners’ think-aloud data and finds that the greatest amount of transfer originates from L1 German (43 instances), rather than from their other L1, Italian (20 instances). She argues that this is due to the more dominant status of German in the participants’ lives, as they lived in a German-speaking environment in Innsbruck. Information about language dominance was gathered via a questionnaire, but no definition is provided as to what aspects of language use were considered
decisive in establishing language dominance. Also, as with many other studies, typology was a confounding factor; the greater reliance on German, rather than Italian, in the production of English may be due to the closer typological relationship between the two languages.

In contrast to Jessner (2006), Odlin and Jarvis (2004) employed a hypothesis-testing methodological design in their study, which allowed for different factors to be teased apart more clearly. They looked at 2100 learners’ written texts and investigated the effect of proficiency and psychotypology on lexical transfer in both L1 Finnish and L1 Swedish learners of L3 English. The L1 Finnish speakers had Swedish as L2 and the L1 Swedish learners had Finnish as L2. They decided to focus on four lexical items (grammatical words, not content words) that were English words with Swedish cognates: instead, for, some, and what.

They found greater transfer from Swedish into English by the high proficiency L1 Swedish participants than by the lower proficiency L2 Swedish participants, and this especially for the items instead and some. While typology was often confounded with proficiency in the studies on spoken production reported above, this was not the case here. If typology alone had an effect we would see the same amount of transfer from Swedish in both groups. These results thus isolate proficiency from typology and support its role as predictor for the source language of transfer. However, what might have been a confounding factor in this study is the L1/L2 status. While most research suggests an L2 status effect, some studies indeed find an L1 status effect in lexical transfer (e.g. Tullock & Fernández-Villanueva, 2013), which we may also be observing here. This will be further discussed in § 3.1.4.

3.1.1.4 Conclusion

Generally, these results underline the importance of clear experimental designs that allow us to disentangle confounding factors. Williams and Hammarberg (1998) argued for a proficiency factor, but needed to invoke the L2 status hypothesis to fully explain their results. Tremblay (2006) (oral production) and Jessner (2006) (written production) both found proficiency effects in their data, but in each case they were confounded by typology. Bardel and

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Language dominance is also used by Angelovska and Hahn (2012), where no clear definition is provided either. It seems that the concept is generally based on proficiency and daily exposure to the language.
Lindqvist (2007) even found that typology might override proficiency. Finally, it may be that there is greater transfer from a low proficiency SL into a low proficiency TL, and from a high proficiency SL into a high proficiency TL (Lindqvist, 2010). Given these conflicting results, it still remains to be established whether proficiency indeed has an effect on the SL of transfer and if so, what the direction of that effect is.

3.1.2 Recency

In addition to proficiency, recency has been argued to affect the choice of source language in transfer. In this section, I will first discuss the different conceptualizations of recency that have been put forward (e.g. the language most recently acquired vs. the language most recently used) (§ 3.1.2.1), before reviewing studies on recency effects on the source language of transfer in both spoken (§ 3.1.2.2) and written (§ 3.1.2.3) production.

3.1.2.1 Conceptualizations of recency

Williams and Hammarberg (1998) and Hammarberg (2001) were the first to directly discuss recency as a potential explanatory factor. Different aspects of recency have been suggested that may or may not belong to the same concept. Hammarberg (2001), on the one hand, suggests that the learner uses the *most recently acquired* language as source for transfer. This conceptualization is used in the case of multiple L2s, in order to establish which of them is the most likely source of transfer. In this sense, the language learned just prior to the target language would be the most likely transfer candidate (Jarvis & Pavlenko, 2008).

On the other hand, it is argued that the language *most recently used* may lead to greater activation, which in turn leads to more transfer from this language (Gabrys-Barker, 2012; Szubko-Sitarek, 2015). There is currently no empirical study that employs such a definition of the concept, but it appears rather plausible when considered in the context of Grosjean’s model of language mode. Bilinguals are suggested to be either in a mono- or bilingual mode, depending on a number of external factors, including the location in which an interaction takes place and the languages the interlocutor knows. If a learner has recently used their home language with a friend who speaks the same language, then this may have put them in a bilingual mode, which continues into the next interaction, leading to transfer from the language recently used, but currently not appropriate.
Finally, the language *used most often* has been found to affect the source language of transfer (Hall & Ecke, 2003; Jessner, 2006; Tremblay, 2006; Tullock & Fernández-Villanueva, 2013). This conceptualization is what some researchers refer to as exposure, daily use, or active use, rather than recency. Exposure to language can encompass a great number of different aspects, such as the language used at home or at school, and can have a longitudinal component, where not only current amount of exposure is considered but also the length of exposure over a number of years. This second aspect is necessarily also connected to proficiency, as proficiency tends to increase the longer one is exposed to a language.

With regards to the amount of exposure to a language at a particular moment in time, Hammarberg (2001) and Cenoz (2001) both argue that active language use may be more important than simple language knowledge. Assuming active language use allows for a lower activation threshold for that language, thus enabling easier access and greater transfer, the question arises as to whether it is enough to be exposed to a language for its activation threshold to be lowered or does one need to actively use the language?

Szubko-Sitarek (2015) finds that a recently used language influences the recognition time of both double and triple cognates. It has been proposed that not only recently used languages are more easily activated in subsequent language processing, but that “recency of thinking about a certain language, its country of origin, culture, or personal experience with that language” (Angelovska & Hahn, 2012, p. 27) can also trigger the activation of a background language. Whichever aspect of recency or exposure one chooses to investigate, it is important to clearly define what exactly it is that is measured, as the language most recently acquired, most recently used, or most often used may not coincide. Finally, it might be interesting to also take aspects of active and passive language use into account in future studies.

The definition of recency used in this study reflects the language used most often, and is therefore referred to as either recency or exposure throughout the ensuing text. The construct, as measured in this study, includes daily use of a language for interaction in the home, the school environment, as well as outside school, with friends, in sports clubs, or during other social activities. It further includes exposure to media, such as TV, music, and the internet (see § 4.3.2.2 for a detailed account of the question pool used in this study).
3.1.2.2 Recency in spoken production

The effects of a language acquired directly prior to the TL can be investigated by discussing the results from a study by Dewaele (1998), who looked at lexical inventions (i.e. foreignisings) in L1 Dutch university students during their acquisition of French. Thirty-nine of the participants had acquired French first followed by English and seven participants had acquired English first followed by French. The target language of investigation was French for both groups. For the group that had acquired the TL French before their additional language English, the greatest source of transfer was L1 Dutch, while for the group that had first acquired their additional language English and then the TL French, the greatest source of transfer was their other additional language English.

Jarvis and Pavlenko (2008) argue that the prevalence of L2 English transfer over L1 Dutch, in the group that had acquired English before the TL French, may be due to the closeness in time between the acquisition of the TL French and L2 English. They argue that it is not the most recently learned language by overall order of acquisition, but whether the language was learned just prior to (as opposed to after) the target language which makes it the most likely candidate for transfer. If it were the most recently acquired language that dominates as source for transfer then the group that had learned English last would have transferred from English the most. This was not the case, however. Furthermore, such an analysis would be indistinguishable from the L2 status hypothesis in cases where there is only one L2. The most recently acquired language would necessarily also be the L2 of the study. Jarvis and Pavlenko’s analysis specifies that the language needs to have been learned prior to the TL, thereby excluding L2s that were learned after the TL and making it distinguishable from the L2 status.

While Jarvis and Pavlenko’s argument seems to be framed around recency as a predictive factor, a different way of analysing Dewaele’s results is in terms of forward versus reverse transfer. For the group that learned English after the TL French, reverse transfer would need to occur for there to be influence from L2 English, while forward transfer would take place for those that have learned English before the TL French. Forward transfer may be easier and we may therefore see greater transfer from French in the L3 English group than in the L2 English group (where French was the L3). This may potentially be due to subordinate links in the mental lexicon at early stages of acquisition. Whether different patterns of source language distribution exist depending on the direction of transfer remains to be investigated in future research.
Finally, Tremblay (2006) (see also § 3.1.1.2) finds clear indications of exposure affecting transfer. In her study, 0.4% of transfer into L3 German originated from L2 French in a group of English native speakers with both high proficiency and high exposure to French, while there was only 0.05% transfer from the same language in two groups with low exposure to French, with varying proficiency levels. These results thus indicate a clear effect of L2 exposure, independent of proficiency.

3.1.2.3 Recency in written production

There are only a couple of studies in written production that discuss exposure as a determining factor. As opposed to other factors, recency is often only mentioned as a side-note or supporting factor in addition to other, supposedly more prevalent factors. It is never considered as the sole determining factor. Tullock and Fernandez-Villanueva (2013) (see also § 3.1.4.3), for example, generally found L1 Spanish to dominate as source language in L3 English acquisition, despite L2 German being typologically closer. They mainly ascribe these results to an L1 status effect, yet add that “[n]ot only daily contact but also daily use seem to have a great influence on the likelihood that a given language will be activated during writing” (p. 438-9). This remains difficult to establish objectively, however, given that the data did not include a measure of language use or exposure. The participants lived in Spain but attended a German immersion school, they were thus presumably extensively exposed to both languages.

Similarly, Jessner (2006) (§ 3.1.1.3) invokes language dominance to explain the greater preference for L1 German over L1 Italian as source of transfer in written English, but does not include a definition or measure of language dominance. Given the explanation provided about the particular linguistic environment the learners lived in, it seems that exposure to the language would, however, form part of such a definition.

3.1.2.4 Conclusion

There is no study to date that focuses exclusively on recency or exposure (Szubko-Sitarek, 2015). Each of the studies presented here are discussed elsewhere in this chapter as the authors provide interpretations of their results using multiple factors. Furthermore, it has become clear that different authors use different definitions of recency and studies are thus not always fully comparable. Future research will have to establish whether different measures have an effect each in their own right, or whether one particular conceptual-
ization of recency (e.g. exposure) has an effect on the source language of transfer, while others do not. The present study has used daily exposure to each background language, rather than another conceptualization, as it appeared to be the most relevant aspect to test in this context (see § 4.3.2.2 for a detailed justification).

3.1.3 Psychotypology

The third factor that has been suggested to determine the preferred SL for transfer is psychotypology. I will first discuss the concept of psychotypology, starting with its initial formulation in Kellerman’s (1977, 1983, 1986) seminal work within second language acquisition (§ 3.1.3.1). I will then review studies that have investigated the effects of psychotypology on the source language of transfer in third language acquisition in both spoken (§ 3.1.3.2) and written production (§ 3.1.3.3).

As in preceding sections, I will focus on studies looking at lexical, rather than syntactic (Bartelt, 1989; Rothman, 2011) or phonological transfer. Equally, while there are studies that have investigated psychotypological beliefs in, for example, reading comprehension (Haghighi, Tabrizi, & Eghbalitabar, 2012), I only review studies on L3 production. It needs to be noted that the majority of studies use the concept of psychotypology (i.e. a learner’s subjective perception of similarity) in their analysis, but few elicit data from individual participants on what their typological beliefs are (Lindqvist, 2015 being one of the exceptions). Rather, their beliefs are considered to equate actual typology (e.g. Cenoz, 2001; Hall & Ecke, 2003). The terminology used in this chapter mirrors the terminology used by the respective authors, but a thorough discussion of the potential differences between psychotypology and typology and their effects on crosslinguistic influence will be presented in § 6.2.3.2.

3.1.3.1 Conceptualizations of psychotypology

While typology has proven relevant in research on crosslinguistic influence, Kellerman (1977, 1979, 1983) argued that it is psychotypology, rather than typology as such, that determines the learner’s willingness to transfer formal and semantic aspects of a language. It is crucial to recognize the distinction between what is objective and what is subjective in relation to language similarity (Jarvis & Pavlenko, 2008). Typology or objective similarity between languages is the actual degree of congruence between them, while psychotypology or subjective similarity is the degree of congruence the learner perceives there to be. A learner’s individual estimation of language distance may be incorrect and not reflect the actual degree of similarity, and therefore “an
objective estimation of language distance can sometimes be misleading about the likelihood of transfer: in some cases, the subjective estimation of distance by learners can override an objective measure” (Odlin, 1989, p. 142, emphasis in the original).

While objective typological distance affects the likelihood that transfer is positive or negative, subjective psychotypology determines the degree to which learners rely on different background languages when learning or producing the target language (Jarvis & Pavlenko, 2008, p. 178). Typology is a constant feature of similarity between two languages and does not change over time; psychotypology, on the other hand, can change over time with increased exposure to and proficiency in the target language (R. Ellis, 1994). Ringbom (2007) also argues that objective similarity is symmetric and goes both ways (from language A to B and vice versa), while subjective or perceived similarity can be asymmetrical: “[s]peakers of language X may find it easier to understand language Y than speakers of language Y to understand language X” (p. 7). Jarvis and Pavlenko (2008) further argue that transfer is based on the perception of similarity and not of difference; that it is interlingual identification that is the basis of transfer (p. xx). Through exposure to the target language, the learner discovers similarities which they assume to exist beyond the particular items they have encountered thus far.

A further distinction provided by Jarvis and Pavlenko (2008) is perceived versus assumed similarity between languages. While perceived similarity refers to a learner’s judgment that “a form, structure, meaning, function or pattern […] in the input of the recipient language is similar to a corresponding feature in the source language”, assumed similarity, by contrast, is a learner’s “hypothesis that a form, structure, meaning, function or pattern that exists in the source language has a counterpart in the recipient language, regardless of whether the L2 user has yet encountered anything like it in the recipient language” (p. 179). Perceived similarity implies the presence of the target language, which one can then base a judgment of similarity on. This process thus occurs during acquisition and comprehension. The continued exposure to the target language and the accumulation of judgments regarding its similarity to other languages in one’s repertoire then leads to the assumption of similarity between other, thus far not encountered, items and structures in the background languages and items and structures in the target language. Through heightened perceived similarity, learners’ assumed similarity increases and individual SL items are therefore more readily transferred. Assumed similarity is thus especially helpful in understanding learners’ transfer strategies in language production.
This account of psychotypology illustrates the close relationship between similarity judgements of individual items and structures and their development into psychotypological beliefs at a language-general level. Through the accumulation of a great number of individual examples of similarity, a learner’s psychotypology regarding the two languages as a whole develops. Yet, it remains crucial to distinguish between individual structures and the language overall in terms of psychotypology. Falk and Bardel (2010) have offered a three-way distinction that addresses differences in item-specific and language-general psychotypology. They propose the term *language relatedness* to indicate a genetic relationship between languages in a general sense, e.g. Romance languages, and *typology* to describe the ‘ad hoc similarity’ of certain linguistic structures or lexical items between languages that are not genetically related (e.g. verb-final syntactic property in both German and Turkish, false friends, etc.). Finally, they use psychotypology to mean a learner’s subjective perception of the relative similarity between languages in their repertoire, as originally proposed by Kellerman (1983).

Given that a great number of studies investigate psychotypology using one particular syntactic feature (Bardel & Falk, 2007; Sánchez, 2011, 2015a), it may be worth extending the distinction between Falk and Bardel’s (2010) language relatedness and typology to psychotypology. The same way a language can be closely related to another language in broad terms (i.e. language relatedness in Falk and Bardel), or only in the case of some of its structures (i.e. typology in Falk and Bardel), psychotypology can also apply to both these levels: language-general similarity, as well as item- or structure-specific similarity. Item-specific psychotypology will be discussed in the context of the degree of transferability and markedness of individual words in § 3.1.5.

In addition to general and item-specific psychotypology, languages may belong to very different language families, yet be perceived to share certain phonological similarities. Both Schmidt and Frota (1986) and Selinker and Baumgarten-Cohen (1995) report transfer based on phonological similarity from distant languages such as Arabic into Portuguese. It seems that “psychotypological similarity of specific lexical items (from two genetically distinct languages) seems to have affected these cases of CLI” (Ecke, 2015). Language-general psychotypology thus appears to be a useful concept to understand general patterns of transfer, but item-specific psychotypology needs to be further explored to fully understand the phenomenon.
Rothman (2011, 2013) takes an alternate view on psychotypology in his Typological Primacy Model (TPM) and defines psychotypology in the context of syntax as

an *unconscious* [emphasis added] perception of comparative structural similarity globally, i.e. not in a domain-by-domain sense […] In this sense, the TPM claims that the selection of underlying morpho-syntactic transfer is an involuntary reflex dependent on parsing and processing mechanisms. […] By assuming that the mind inherently seeks to avoid acquisition redundancy and that it attempts to employ from its previous linguistic knowledge bases the best bet for initial hypothesis transfer, assessing structural proximity itself is a reflex of general cognitive economy.

Rothman, 2013, p. 235

Rothman’s position stands in contrast to many other formulations of psychotypology, which conceptualize it as a *conscious* aspect of language acquisition (e.g. De Angelis, 2005a; Ringbom, 1986, 1987, 2001, 2007; Singleton & Ó Laoire, 2006). There are different processes underlying the acquisition of syntax and lexis, as suggested by Paradis’ model of procedural vs. declarative memory, and one needs to remain aware of potentially highly distinct processes underlying the two linguistic levels, when analysing data and presenting explanatory models. Rothman’s model offers a cognitive economic perspective on additional language acquisition which was formulated within research on syntactic transfer. While I believe similar processes of non-redundant language learning to be at play in lexical acquisition (e.g. in the case of cognates, whether actual or false), it remains to be determined whether syntactic and lexical transfer are equally governed by unconscious psychotypology or whether there might be a greater degree of conscious awareness of similarity in lexis.

In the present study, psychotypology is defined as the conscious and subjective beliefs a learner holds regarding the degree of similarity or congruence between two languages, which may or may not differ across linguistic levels. This is not to say that psychotypology might not also act at an unconscious level, but the aspect tested here is learners’ conscious beliefs and whether these have an effect on their transfer behaviour.

Finally, Bardel and Lindqvist (2007) argue that “the Romance languages resemble each other to a different extent at different linguistic levels” (p. 130) and that “the typological relationship between Spanish and Italian plays a role,
not only in a general sense as language systems, but above all at the phonologi- 
cal level” (p. 139). Given that perceptions seem to differ for different lin- 
guistic levels of the same language pair, psychotypology for orthography and 
phonology were measured individually in this study (see § 4.3.2.3.1 for a de- 
tailed account of the data collection method). This distinction may prove es- 
pecially important given the study’s comparative component of spoken vs. 
written production.

3.1.3.2 Psychotypology in spoken production

There are a number of studies that have found evidence of a psychotypology 
effect, but often other factors need to be invoked to fully explain the results 
(Singleton, 1987) or the L2 status is a confounding variable (e.g. Hall & Ecke, 
2003; Hammarberg, 2001). One of the earliest studies on psychotypology in 
L3 oral production is Singleton (1987). The study looked at an L1 English 
learner of L3 French, with L2 Spanish, Latin, and Irish. The results showed 
that he was mainly relying on L2 Spanish in order to expand his resources in 
French and it is hypothesized that this is due to its typological closeness to the 
target language. Of the three remaining background languages (English, Irish, 
and Latin), however, L1 English was the most important source of transfer, 
Despite Latin’s greater similarity to the TL. It is argued that given the partic- 
ipant’s overwhelmingly broader and deeper knowledge of his L1 English than 
his L2 Latin, the proficiency factor was strong enough in this instance to over- 
ride psychotypology.

Another study in which psychotypology seems to have an effect, but where 
the L2 status is a confounding factor is Hammarberg (2001), in which an ad- 
ditional analysis of the data collected for Williams and Hammarberg (1998) is 
presented. In recordings of spoken L3 Swedish production, L2 German was 
found to be the strongest source language for lexical transfer, in comparison 
to L1 English, L2 French and L2 Italian. It is argued that English and German 
may be considered at comparable distance to Swedish, but that at the lexical 
level German is definitely the closer neighbour and thus more susceptible to 
act as supplier language. Since the learner spoke both languages at a very high 
level and with equal exposure, the only alternative explanation could be the 
L2 status factor. Unfortunately, the given combination of languages does not 
allow us to further disentangle the two factors.

A similar methodological set-up is found in Hall and Ecke (2003), who con- 
ducted a study with 100 native speakers of Spanish, with intermediate to ad-
vanced knowledge of L2 English and learning L3 German. They found cross-linguistic influence from both L1 Spanish and L2 English, but the proportion of transfer originating from English was much higher. The authors speculate that psychotypology may be affecting these results, given that L2 English is more closely related to German than the learners’ L1 Spanish, but admit that while such an explanation may be correct, “it is difficult to see ways of moving it beyond the level of informed speculation” (p. 84). As in Hammarberg (2001), the L2 status may be a confounding factor.

Similarly, Bardel and Lindqvist (2007) (see also § 3.1.1.2) found a typology effect, where L2 status factor also remains a confounding factor. The learner used mainly L2 French and L2 Spanish as source languages in her L3 Italian speech and avoided her typologically more distant L1 Swedish, as well as L2 English. This is in line with other studies that found greater transfer from Romance background languages into another Romance L3 (Bardel, 2006; De Angelis, 2005a, 2005b; Falk, Lindqvist, & Bardel, 2013), and this especially in the early stages of acquisition.

Clearer evidence of psychotypology as a predictive factor comes from studies in which there is an effect, independent of what the L1/L2 status of the SL is. In a later study, Lindqvist and Bardel (2014) tested a new learner, who was a bilingual native speaker of Swedish and Italian, speaking both L2 English and French and currently learning L3 Spanish. The results showed that transfer mainly originated from the learner’s L1 Italian. The authors rely on psychotypology as explanatory factor, which nevertheless does not provide a fully satisfactory explanation since the learner’s L2 French is also typologically related to the TL Spanish:

The other Romance language, French, was not at all used by this learner. Thus, even though French is typologically close to Italian, and could therefore be activated, as predicted by the typology factor, this does not happen.

Lindqvist & Bardel, 2013, p. 263

On the other hand, it could be argued that Italian is generally perceived to be closer to Spanish than French, thus nevertheless supporting a psychotypological analysis of the results. This analysis finds further support in a study by De Angelis and Selinker (2001), who observed greater lexical transfer from the participant’s L2 Spanish than L1 French into L3 Italian. The authors suggest that the learner may have perceived Spanish and Italian as two ‘foreign’ languages and therefore more similar (i.e. L2 status effect), but argue that the
main reason for the greater observed transfer from L2 is her perception of
greater similarity between Spanish and Italian than French and Italian. Com-
bining the results of these two studies, it seems that there is generally more
transfer between Spanish and Italian than between French and either Italian or
Spanish, independent of their status as L1 or L2. These results thus lend fur-
ther support to the prevalence of psychotypology over the L2 status of back-
ground languages in their probability to act as source language for transfer.

In addition, Müller-Lancé (2001) also found a psychotypology effect, without
the L2 status being a confounding factor. In a wide-ranging study on crosslin-
guistic strategies, both think-aloud data and a background questionnaire were
used to test a strategy model of L3 acquisition. The target languages varied
between Spanish, Italian, and Catalan. Most subjects also had competencies
in English, German, and French, again with the L1 varying across participants.
The most relevant finding regarding psychotypology is that learners whose
native language was German avoided using their L1, while native speakers of
Romance languages intensely used their L1 as a resource for transfer, thus
further lending support to the psychotypology factor.

The two studies by De Angelis and Selinker (2001) and Müller-Lancé (2001)
thus offer important evidence of a psychotypology effect that is not con-
founded by other variables. As a next step, Cenoz (2001) specifically tried to
disentangle psychotypology and the L2 status. Two groups of L3 English
learners participated in the study, where one group had L1 Spanish and L2
Basque and the other had L1 Basque and L2 Spanish. The results show more
transfer from Spanish than Basque across both groups, which speaks in favour
of a psychotypology effect. However, Cenoz (2001) points out that those stu-
dents who had L2 Basque transferred less from their L1 Spanish than those
who had L2 Spanish, even if overall L1 influence prevails. This suggests that
the L2 status of a language may have some additive effect (Ecke, 2015), but
that typological distance is a stronger predictor of CLI than the L2 status fac-
tor.

It thus seems that the source language of transfer is often determined by a
multitude of different factors, rather than one alone. In Cenoz (2001), the L2
status played a supportive role, in addition to psychotypology, while in Sin-
gleton (1987) proficiency also had an effect. As with the majority of studies
discussed in this chapter, it is difficult to isolate one all-determining factor.
The results on psychotypology continue to highlight the strong possibility that
all the factors investigated in this study play an important role in the choice of
source language of transfer. Furthermore, the primacy of one factor over another in different studies may be an indication of individual differences that favour one factor in one individual and a different factor in another individual. Such differing results across studies should therefore not be taken to be conflicting, but rather show that the existence of an effect of one factor does not exclude the simultaneous effect of another factor. Furthermore, there may be a range of additional factors that have not yet been explored.

3.1.3.3 Psychotypology in written production

As already noted (§ 3.1.1.3), research on the source language of transfer in the written mode is generally scarce, with only a handful of studies investigating proficiency, the L2 status, or recency. When it comes to psychotypology, however, there is a greater interest to test this factor in written production as well. As I have discussed above (§ 3.1.3.1), Rothman (2011) argues that psychotypology is unconscious and automatic, while others have conceptualized it as a more conscious factor (Cenoz, 2001; Kellerman, 1977, 1979, 1983). Seeing an increased number of studies on psychotypology in written production seems to reflect a general consensus in the field that psychotypology is considered a conscious resource. During writing, learners have more time to think and consciously consider their options, which may make psychotypology more relevant in this mode than in the spoken mode.

Similarly to Cenoz (2001), De Angelis and Selinker (2001), Lindqvist and Bardel (2014), and Müller-Lancé (2001) in the spoken mode, Ringbom (1986, 1987, 2001, 2007) also found an effect of psychotypology in writing, which was independent of the language’s status as L1 or L2. He studied L3 English acquisition in Finland with both L1 Finnish speakers (who had Swedish as L2) and L1 Swedish speakers (who had Finnish as L2) and found very low amounts of transfer from Finnish in comparison to Swedish in both groups. The effect was thus present whether the SL was an L1 or L2. Ringbom argues that it is typological similarity between Swedish and English that facilitates this transfer (see also Odlin & Jarvis, 2004).

In contrast to Ringbom’s studies, De Angelis (2005a) and Singleton and Ó Laoire (2006) found evidence of a psychotypology effect, but in each case there are confounding variables that could potentially have affected the results. In both studies, psychotypology has an effect when the background language is also the L1 and/or at high proficiency.
De Angelis (2005a) looked at two groups of university learners of L3 Italian. The first group consisted of L1 English speakers (with some having low proficiency L2 Spanish and some L2 French) and the second group consisted of L1 Spanish speakers (with all having high proficiency English and some also low proficiency French). They were asked to read a text in their respective native language and produce a written summary of it in their L3 Italian. One needs to keep in mind here that using a particular language to translate from necessarily has an impact on that language’s level of activation, which in turn may lead to greater transfer from it. The results nevertheless showed that for function words, there seems to be a strong typology factor independent of L1 or L2 status and level of proficiency, with Spanish and French consistently dominating over English in both groups. For content words, we see a strong preference for Spanish if it is the native language and thus at high proficiency, but we see balanced proportions between English and Spanish for English native speakers whose Spanish proficiency is low and even a preference for English when low proficiency French is the L2. Proficiency thus seems to play a role too, possibly in combination with psychotypology.

Similarly, Singleton and Ó Laoire (2006) (see also § 3.1.4.3) found that their participants used more L1 English transfer than L2 Irish when writing in French (46 instances from English vs. 3 from Irish). While it is tempting to argue that these results are indicative of a strong typological effect, the issue of proficiency being a confounding variable necessarily dampens the claim. While Irish and English were taught for the same amount of hours over the same amount of years, the fact that English is the L1 and consequently used abundantly more outside school, as well as having been acquired as a native language rather than through instruction at the start of school attendance, would have led to higher proficiency and/or language dominance in the sense of a stronger network. As suggested by Singleton and Ó Laoire themselves, conducting the same study using balanced English/Irish bilinguals would provide an excellent context to solidify their results and any claims about psychotypology as the determining factor.

Finally, one study that actually tested learners’ perceptions of similarity, rather than relying on objective measures of language relatedness in the analysis, is Lindqvist (2015). Sixty-three lower secondary school students (grades 6-9), who were native speakers of Swedish, with L2 English and L3 French, participated in the study. The questionnaire data showed that 75% of the pupils considered English to be closer to French than Swedish, while 70% of all transfer instances came from English in their written production. At the group level, it thus seems that psychotypology has an effect on the source language.
of transfer. However, when tested whether there is a statistically significant relationship between SL of transfer and typological perception using chi-square analyses, no such relationship was found.

These results are an important reminder that group-level means can be misleading regarding actual correlatory relationships between variables, and illustrate the potential discrepancy between what relationship descriptive statistics seem to indicate and what relationship inferential statistics prove to exist (or not to exist). The main issue with group-level scores (i.e. group averages) is that, while there might be a high score for one language on both variables (e.g. psychotypology and amount of transfer), we do not know whether it is the same individuals that score high on both. Lindqvist’s (2015) study is therefore extremely informative from a methodological point of view and highlights the need for more inferential statistical analyses in the field of transfer research.

3.1.3.4 Conclusion

As suggested by the studies reviewed here, psychotypology appears to have a rather strong predictive power regarding the source language of transfer in both spoken and written production, and this especially so, if combined with proficiency or the L2 status. Most researchers seem to judge psychotypology to be the most decisive factor in determining the amount and source of lexical transfer. De Angelis and Selinker (2001) write that “language closeness is probably a privileged factor in interlanguage transfer” (p. 55) and Cenoz (2001) argues that “linguistic distance is a stronger predictor of cross-linguistic influence than L2 status” (p. 18). This is supported by Jarvis and Odlin (2000), who suggest that typological similarity between languages is what determines CLI in its first instance, regardless of the L1/L2 status of the source language.

Finally, it is important to note that, while almost all studies on lexical transfer in TLA nowadays consider the concept of psychotypology to be a conscious process and to be subjective and thus to vary across individuals, it is rarely formally tested (e.g. De Angelis, 2005a; Ringbom, 1986, 1987, 2001, 2007; Singleton & Ó Laoire, 2006). Except for some evidence originating from diary entries as in Schmidt & Frota (1986), which actually uncover counter-intuitive patterns of subjective perception (Arabic is perceived as phonologically similar to Portuguese), none of the largely cited studies assess learners’ subjective perceptions, with the exception of Lindqvist (2015). Instead, in the majority of the above presented studies, psychotypology is assumed to be the same as
objective typology, that is: if there is transfer between two typologically close languages, this is presented as evidence of the learner’s (necessarily correct) psychotypological beliefs.

The reasoning behind a distinction between the two terms (typology and psychotypology), however, is based on the assumption that they may potentially differ. Finding transfer from a less typologically related language does not mean that psychotypology was not at play. It could well be that the learner’s psychotypological beliefs are simply different (and objectively wrong) from actual typological distance. It is therefore essential to actually measure a learner’s perception of similarity between each of their background languages and the target language.

3.1.4 L2 status

The fourth highly cited factor in the literature is the L2 status. Williams and Hammarberg (1998) initially suggested an L2 status factor for lexical transfer, but it has been investigated most prominently in the context of syntactic transfer ever since (Bardel & Falk, 2007; Bohnacker, 2006; Bouvy, 2000; Dentler, 2000; Gabrys-Barker, 2012; Häkansson, Pienemann, & Sayehli, 2002; Hammarberg, 2001; Pfenninger, 2014; Sánchez, 2012). The various hypotheses as to why there appears to be an L2 status effect suggest that the differing underlying processes in syntax and lexis may lead to different L1/L2 transfer patterns at the two linguistic levels. Below, the L2 status factor is defined (§ 3.1.4.1.1) and various hypotheses regarding the underlying mechanisms that could explain such a pattern are presented (§ 3.1.4.1.2). Furthermore, methodological hurdles in testing the L2 status hypothesis are discussed (§ 3.1.4.1.3). Finally, since the focus of this thesis is on lexical transfer, the ensuing review of the literature will not discuss studies on the L2 status effect in syntax, but will limit itself to studies on lexical transfer. Studies on both spoken (§ 3.1.4.2) and written production (§ 3.1.4.3) are included.

3.1.4.1 Conceptualizations of the L2 status factor

In the literature, L2 status factor and L2 status hypothesis are often used interchangeably and different authors use different definitions of what it is they mean by these terms (Bardel & Falk, 2012). The definition adopted here, however, distinguishes between the two. The L2 status factor is taken to mean the surface phenomenon of seeing more transfer from an L2 than from an L1 in L3 production, while L2 status hypotheses are theoretical suggestions as to why we might see such a pattern. Both will be discussed in detail below.
3.1.4.1.1 The L2 status factor

In this thesis, Leung’s (2007) definition of the L2 status factor is used:

The ‘second language (L2) factor’ in L3 acquisition refers to the general tendency to transfer (representations) from L2(s) rather than L1. In online processing/performance terms, ‘L2 status’ is usually used to express the idea of general tendency to activate L2(s) rather than the L1.

Leung, 2007, p. 102

The L2 status factor thus reflects the simple observation that L2 structures and items frequently affect L3 production (Ecke, 2014; Meisel, 1983; Williams & Hammarberg, 1998). In some contexts, the mere existence of L2 transfer is perceived to reflect an L2 status factor (even if L1 transfer is more prominent) (Meisel, 1983), while in others it is the supremacy of L2 transfer over L1 transfer that is considered to indicate an L2 status factor (Hammarberg, 2001). Meisel (1983) further points out that “if one comes to the conclusion that syntactic transfer from previously learned foreign languages does occur, it still remains an open question as to the cause of this kind of transfer. It is not at all obvious that the conditions on the application of transfer strategies from L1 or a foreign language are identical” (p. 18). It remains to be established why we see transfer from other foreign languages at all, as well as why we sometimes see greater transfer from an L2 than from a learner’s L1. The L2 status factor has mainly been shown to exist in syntax (Bardel & Falk, 2007; Bohnacker, 2006; Falk & Bardel, 2011; Leung, 2005; Rothman & Cabrelli Amaro, 2010), but also in lexical transfer (Cenoz, 2001; De Angelis, 2005b, 2007). It remains to be determined whether syntactic and lexical transfer are equally affected by an L2 status effect. Below, the term L2 status hypothesis (as opposed to L2 status factor) is used to refer to the hypothesized explanation as to why we observe an L2 status effect.

3.1.4.1.2 The L2 status hypothesis/es

Suggested hypotheses as to why there is an L2 status factor are generally two-fold: those associated with the mode of acquisition and those associated with types of language processing. The following section will discuss four different explanations as to why we seem to observe an L2 status effect. These are interconnected and not mutually exclusive. The first hypothesis is the foreign language mode hypothesis and relates to how background languages are used to achieve a particular identity in the target language. The second hypothesis has emerged from a discussion around formal vs. naturalistic language learn-
ing and thus relates to how the languages were acquired, and the third hypothesis has developed out of research on procedural vs. declarative memory and relates to how the languages are processed. The final suggested hypothesis takes the perspective of network activation and differences in the strength of connections fostered in the L1 and L2 to explain an L2 status effect.

While it may seem that the mode of acquisition (hypothesis 2) is the cause for how a language is subsequently processed (hypothesis 3) or for how strong its network is (hypothesis 4), this is not always the case. A language formally learned at school may subsequently increase in proficiency and automaticity, and consequently be processed more like a naturalistically acquired language, such as an L1, with high network activation. However, we continue to lack the necessary understanding of how an L1 and an L2 are processed in the mind, in which ways they differ, and whether underlying processing patterns can change over time, to answer these questions. Furthermore, while some of the hypotheses presented here may be equally relevant to syntactic and lexical level’s specific acquisition, production and processing mechanisms.

First, Williams and Hammarberg (1998) formulated the hypothesis of a foreign language mode, based on the observation that the learner consciously avoided using her L1 because she did not want to sound like a native speaker of her L1. There seems to be a “desire to suppress L1 as being ‘non-foreign’ and to rely rather on an orientation towards a prior L2 as a strategy to approach the L3” (Hammarberg, 2001, p. 37). This phenomenon had already been observed by Meisel (1983), as well as Ecke and Hall (2000), who call it the Fremdspracheneffekt.

Second, Bardel and Falk (2012) take a slightly different perspective and base their reasoning on a distinction between formally learned L2s and the naturalistically acquired L1. They argue that “[a] formally learned L2 and a formally learned L3 have many cognitive and situational features in common that they do not share with an L1” (p. 3). Furthermore, the foreign language learner is aware that they are learning an additional language and may make use of strategies that facilitate their acquisition process. In Falk and Bardel (2010, 2011), it is argued that the L2 status factor is the result of a higher degree of similarity between the L2 and L3, “regarding age of onset, outcome, learning situation, degree of metalinguistic knowledge, learning strategies and degree of awareness in the process of language appropriation” (Bardel & Falk, 2012, p. 68). It is further suggested that the L3 learner has already acquired metalinguistic,
as well as crosslinguistic, awareness and learning strategies during their formal L2 learning, which they can now take advantage of. They stress the importance of formal, adult learning of a foreign language for the L2 status factor to occur, as early bilinguals or L2 users with a high level of proficiency may behave more like L1 speakers; however, this remains to be investigated.

While the distinction between formal and naturalistic learning is a useful one, its synchronic nature does not address underlying processing which may be affected by diachronic change. Meisel (1983) already pointed out that “[i]t cannot even a priori be ruled out that there is a difference in the neuropsychological basis for storing and processing first and second languages. If it could be shown that ‘second languages’ are stored differently and/or processed by a different ‘acquisitional device’, then the distinction ‘first language/other than first language’ would turn out to be a crucial one” (p. 18). He further writes that there are believed to be two different kinds of cognitive structures available to the language learner, one specific to language processing and one for general problem solving tasks and states that foreign language learning may be governed by the latter. He then debates whether such a cognitive distribution may be interpreted to predict greater transfer from a foreign language than from a native language.

Similarly, Bardel and Falk (2012), as well as Lindqvist and Falk (2014), use Paradis’ (2004, 2009) distinction of declarative versus procedural memory to further shed light on the potential differences in neurolinguistic processing of an L2 versus an L1. “According to Paradis’ perspective, in L1, procedural memory sustains linguistic structure (phonology, morphology, syntax and the lexicon) while declarative memory sustains vocabulary (words as form-meaning pairs)” (Bardel & Falk, 2012). In the L2, on the other hand, both grammar and vocabulary are sustained by declarative memory. Phonology, morphology, syntax, and the morphosyntactic properties of the lexicon are acquired explicitly in the L2 and thus represent different cognitive processes than in the L1, where these aspects are acquired implicitly.

Ecke (2015) also suggests that “due to assumed differences in L1 vs. L2 learning and representation, it would be expected that the more similar representation and processing routes of two or more L2s affect each other more than the (qualitatively different) representation and access routes of the L1” (p. 147). Importantly, Paradis’ model would suggest that we see increased syntactic transfer from L2, but not necessarily any difference in lexical transfer between the L2 and the L1. Taking these considerations into account, the importance
of distinguishing between different linguistic levels when reviewing previous research and analysing results becomes ever more apparent.

Finally, De Bot (2004) suggests that levels of activation may give insight into why one BL is chosen over another as source for transfer and argues that the "whole issue of how we have access to languages that differ in level of activation is linked to theoretical discussions on access of competing information more generally" (p. 27). He writes that in a simple model of trilingualism one would expect the greatest influence to come from the L1, rather than the L2, as languages that are used often have a higher default level of activation and are therefore more difficult to suppress or inhibit. On the other hand, he also states that once a strong network such as the L1 is deactivated it also becomes more difficult to reactivate. The fact that some studies indicate L2 transfer despite its relatively low inherent level of activation, might be because the L1 is a stronger network and therefore more easily deactivated as a whole than the more loosely organised second and third languages.

Within this framework, one important issue that still needs to be resolved is understanding whether the strength of a network increases or decreases the odds of a language being used as source for transfer. This is especially important in the context of attrition in the L1 and near-native L2 proficiency, as we might see inverted patterns of network strength for the L1 and L2 and consequently unexpected patterns of activation and inhibition. Finally, in contrast to the procedural/declarative hypothesis, there is no mention of whether there could be differences in transfer patterns by linguistic level. For example, would the activation or inhibition of a language network affect all levels (phonological, syntactic, and lexical) simultaneously? Or could we potentially observe transfer at the lexical level from the L1, but no syntactic transfer, or vice versa?

The present study aims to investigate whether there is an L2 status factor in lexical transfer, as well as hypotheses around differences in L1 and L2 transfer patterns due to their age and mode of acquisition. It will be tested whether age of acquisition or mode of acquisition are better predictors for the L2 status factor (see § 4.3.2.4 for a detailed account of the methodology and § 5.2 for the results of this investigation).

3.1.4.1.3 Methodological implementation

A great number of methodological hurdles need to be overcome in order to test L2 status hypotheses without including any confounding factors. In lexical transfer, many studies found L1 transfer from a typologically more similar L1
the prevailing combination of a relatively distant L1 and more closely related L2 and L3 pairs in these studies did not make it possible to separate the two factors and determine the potential PRIMACY of one or the other factor’s effect on CLI. The frequently observed influence of a typologically more related L2 on L3 use leaves open the question of whether the effect was primarily a result of typological similarity, L2 status, or a combination of both (or even more) factors.

Ecke, 2015, p. 147

Szubko-Sitarek (2015) suggests that the two factors may have their greatest impact when co-occurring: “[O]utcomes of numerous experiments indicate that there could be closer links between users’ foreign languages than between these languages and the mother tongue, which seems to be most probable in the case of typologically related languages learned after L1” (p. 23). However, before discussing potential combined effects, we first need to establish the simple existence of an L2 status factor, independent of other factors. The strongest argument for an L2 status factor in lexis comes from studies that used typologically more distant L2s from relatively similar L1/L3 pairs (e.g. Schmidt & Frota, 1986). De Bot (2004) acknowledges evidence from Hammarberg (2001) and Dewaele (1998), but argues that there are no controlled experiments available in the literature that use typologically sufficiently different languages to substantiate any claims regarding the L2 status factor and that “further speculation on this is [therefore] pointless” (p. 27). In the present study, all the background languages are at a similar typological distance from the target language (§ 4.1.4) and any potential effects can thus more reliably be assigned to the L2 status factor.

3.1.4.2 L2 status in spoken production

The bulk of research on the L2 status factor comes from studies on spoken production (e.g. Cenoz, 2001; De Angelis & Selinker, 2001; Lindqvist, 2009, 2010; Schmidt & Frota, 1986; Williams & Hammarberg, 1998), rather than written production (e.g. Sánchez, 2015; Singleton & Ó Laoire, 2006; Tullock & Fernández-villanueva, 2013). Evidence for or against an L2 status falls under one of the following three types:
• More L2 transfer, despite the L2 being typologically more distant from the TL than the L1
• More L2 transfer, but L2 also typologically closer to the TL than the L1
• More L1 transfer, despite the L1 being typologically more distant from the TL than the L2

The strongest evidence of an L2 status factor comes from studies that have an L2 that is typologically different from the L3, while the L1 is typologically close. This would exclude typology as confounding factor, thus substantiating any claims in favour of an L2 status factor. Schmidt and Frota (1986) present such evidence, however provide no descriptive statistics that could show how pervasive the effect indeed is. The study relies on anecdotal evidence and diary reports from a case study of the first co-author’s L3 acquisition of Portuguese. He was a native speaker of English, with knowledge of several L2s (Arabic – high proficiency, French – low proficiency, Japanese – rudimentary, German – rudimentary). He showed crosslinguistic influence from a distant L2 (Arabic) into L3 Portuguese, despite having access to typologically more closely related languages (both L1 and L2). However, the participant wrote in his journal that he felt his lexical transfer from Arabic was based on its phonological similarity to Portuguese.

Today in class I talked about hanging out at Caneco 70, and L corrected my pronunciation to setenta ["70"]). I realized that I have been saying [sittenta]. That's from Arabic, a clang association. Portuguese setenta sounds closer to me to Arabic sitta ["six"] than it does to Portuguese [Rio] sete ["seven"], which is pronounced [seci].

Schmidt & Frota, 1986, p. 255

This morning in class I said yimkin [Arabic, "perhaps"] without realizing it wasn't Portuguese until L looked at me and signalled noncomprehension. Now I know the word: talvez. It even sounds Arabic, rhymes with ma'leesh [Arabic, "never mind"].

Schmidt & Frota, 1986, p. 255

While one may want to argue that there is an L2 status effect here, it might also be based on the learner’s perceived similarity between the two languages’ phonological systems. I myself have experienced similar transfer from L2 Turkish during L3 Swedish acquisition. Despite Turkish being typologically distant and definitely the most distant of all my background languages (L1
Luxembourgish, L2 German, L2 French, L2 English), as well as the language with the lowest level of proficiency and recency, I repeatedly used Turkish words in Swedish sentences, thinking that they sounded perfectly Swedish and unaware they were actually Turkish.

Words such as “tavla” (Turkish for backgammon, but Swedish for painting) or “tabak” (Turkish for plate, similar to Swedish “tobak” = English tobacco) would often find their way into Swedish sentences, presumably because of their similarity to Swedish words. Other words that lent support to this perceived similarity were Turkish “köprü” (Eng: bridge) vs. Swedish “köp” (Eng: buy), Turkish “anda” (Eng: currently) vs. Swedish “anda” (Eng: spirit) or Swedish “andas” (Eng: breathe), and Turkish “bara” (Eng: to the bar) vs. Swedish “bara” (Eng: only). Also, both languages use French loanwords whose spelling they adapt to directly reflect its pronunciation in the recipient language. For example, Swedish uses “kö” (Eng: queue) from French “queue”, Turkish uses “kuaför” (Eng: hairdresser) from French “coiffeur”, and both use French “toilette” (Eng: toilet), as “toalett” (Swedish) and “to-valet” (Turkish).

This transfer may thus have been due to the two languages’ high degree of form-to-pronunciation matching, as well as similarity in their vowel-to-consonant ratio. Alternatively, we might be observing an effect of item-specific activation. If transfer was only based on the status of Turkish or Arabic as L2s, we should see similar influence from the other L2s, which was not the case. Consequently, while overall typology may not have an effect, perceived phonological similarity between individual items may indeed play a role. Such considerations thus put into question the validity of an L2 status effect as explanatory factor for the particular case study in Schmidt and Frota (1986).

In all other studies on the L2 status factor in lexis, typology is a confounding factor and any claims made thus need to be considered with some caution. For example, Williams and Hammarberg (1998) (see also § 3.1.1.2) found the L2 status to have an effect, as SW transferred more from L2 German than L1 English. While proficiency is controlled for, there might still be a preference of German due to its typological closeness to L3 Swedish. Ecke and Hall (2000, 2011) also found greater lexical transfer from L2 English than L1 Spanish into L3 German, but the potential effects of psychotypology cannot be ignored here either. Drawing clear conclusions from these studies about the primacy of the L2 status factor remains difficult and future studies will have to employ methodological designs that disentangle the L2 status and typology more clearly.
Finally, there are also studies that find counter-evidence to an L2 status effect (e.g. Lindqvist, 2009; Tremblay, 2006). In Tremblay (2006) (see also § 3.1.1.2 and § 3.1.2.2), however, typology is a confounding variable yet again. Thirteen participants speaking L1 English, L2 French, and L3 German were grouped by level of proficiency in the L2 and exposure to the L2. While transfer from the foreign language was the focus of the study, for all groups L1 influence was by far the strongest, independent of exposure and proficiency in the L2. As with other studies, however, L1 English is also typologically closer to L3 German than L2 French and so typological distance may have played a role in encouraging the greater use of English as source language.

In Lindqvist (2009), on the other hand, typology would push for the L2 to dominate as source of transfer, yet most transfer originated from the L1. There were 30 L1 Swedish learners of L3 French, who also had knowledge of L2 English, who were divided by proficiency levels. The results clearly indicate a strong preference for transfer from the L1 across all proficiency groups. On average, the three groups transferred 76.6% from L1 Swedish and only 18.9% from their L2 English. This is an interesting finding as from a typological point of view one would expect greater transfer from English into French. However, it can be assumed that proficiency in the learners’ native language Swedish was higher than in their L2 English, as well as their level of exposure/recency, which may have led to stronger influence from their L1. Generally, however, it is important to note that, unlike in many other studies, typology was not the most influential factor.

3.1.4.3 L2 status in written production

In written production, there is also no study that provides evidence of an L2 status factor without typology being a confounding factor. In Sánchez (2015b) the results clearly indicate that it is L2 German that is activated and drawn on for transfer into L3 English, rather than L1 Spanish/Catalan. Given the typological proximity between L2 German and L3 English, however, Sánchez highlights that “the question of why the L2 is the only background language activated cannot be answered here. […] Whether L2 activation is boosted by the effect of L2 status, of (perceived) language relatedness or by a combined effect of both factors is a pressing issue that should be addressed in future research” (p. 164).

As with Tremblay (2006) in spoken production, Singleton and Ó Laoire (2006) find the L1 to dominate, but the L1 was also typologically closer to the target language. Learners relied more on their L1 English than L2 Irish in their
production of L3 French. The given language pairing would make a strong claim about the L2 status factor if transfer was indeed more substantial from L2 Irish than L1 English. Since this was not the case, however, these results counter claims of an L2 status factor. As with many other studies on crosslinguistic influence in speech production, it is unclear whether there could instead be an L1 status factor at play or whether it is simply due to typological similarity that English is favoured over Irish.

Finally, Tullock and Fernandez-Villanueva’s (2013) study indeed provides strong evidence of an L1 status effect that is independent of typology. The focus of their study was not directly on factors influencing the choice of source language, but on conscious strategies used by the participants. They used think-aloud protocols with ten participants learning L3 English. The learners were 16-17 years old L1 Spanish students in a German (their L2) immersion school and they were tested on a written L3 English production task. Spanish clearly dominated over German as the source of lexical searches (62 out of 81 instances), which Tullock and Fernandez-Villanueva argue is due to its status as L1 for the majority of the students. However, it remains possible that proficiency has skewed these results, but no measure of learners’ level in L1 Spanish and L2 German is provided.

3.1.4.4 Conclusion

Given the difficulty in disentangling psychotypology and the L2 status, a rivalry between those that support a psychotypological perspective and those that support an L2 status factor perspective continues to pervade the literature. Singleton and Ó Laoire (2006) write that the debate is “on the question of whether the critical factor in the resorting to language y when using language z is (a) that the language user perceives language y as typologically closer to language z than any other available language or (b) that language y is, in common with language z, a non-native language” (p. 192).

Given the problematic methodological set-up of the studies reviewed here, it remains difficult to determine which factor outweighs the other. In her review of the literature on psychotypology in syntactic transfer, Sánchez (2012) writes that “[i]n sum, the evidence discussed here points to inconclusive results (sometimes even contradictory). From this it follows that further research is needed without delay, with the hope that it will be of assistance in clarifying the roles of the two factors under examination here” (p. 89). The same is true for research on lexical transfer.
In the same vein, de Bot (2004) criticizes that most studies have not been able to isolate the status of a language from typological considerations and states that any further discussion remains but speculation. This critique continues to apply to more recent studies, as the same methodological impasses are encountered. In order to gain further insight into the primacy of different factors, it is important to design studies in such a fashion as to clearly disentangle them.

This review of previous research thus illustrates the need to move beyond more exploratory studies, which often do not allow to control for different factors, to more experimental studies which specifically employ a methodological design that permits the L2 status factor to be tested in isolation from other potential factors. Controlling for psychotypology, proficiency, and recency therefore becomes a crucial prerequisite if we want to test whether there is an L1 or L2 status effect (or neither). The statistical model used in the present study allows just that (see § 4.6 for a detailed account of the statistical analysis).

3.1.5 Item-specific transferability

The four factors discussed thus far relate to languages as a whole. For example, proficiency is an overall measure regarding one particular background language, which predicts the probability with which that language will be chosen as source for transfer. In addition to these language-general factors, however, there are predictive factors that relate to aspects that are specific to individual items. For example, a word’s frequency, saliency, markedness, and prototypicality have been suggested to affect its transferability. These item-specific factors have long been investigated in SLA, but remain neglected in research on transfer in third language acquisition.

Ringbom (2002) distinguishes between three levels of transfer: an overall level, an item level, and a system level. Such a distinction is “particularly useful to begin to account for the difference between multilinguals’ general reliance on one source language, and the occurrence of specific instances of transfer that involve form, meaning, or both, sometimes from distant languages” (De Angelis, 2007a, p. 25). While Ringbom believes that learners’ perception of overall similarity affects their learning, he also stresses the importance of the similarity between individual items, which “illustrates a principle well known in applied linguistics: that the whole is more than the sum of the individual parts: i.e. a large number of individual item similarities put together produce a more general facilitating effect on learning” (Ringbom, 2002, p. 2).
Ringbom’s analysis is predominantly aimed at comprehension and the effects of transfer on learning, and less so at production. However, the degree of similarity at the item-specific level is equally relevant for transfer in production.

The present study therefore aims to explore the relevance of markedness (§ 3.1.5.2) and item-specific psychotypology (§ 3.1.5.1) in the degree of transferability of individual items, as well as their impact on the source language of transfer. Given the limited amount of previous studies on the predictive power of these factors on the source language of transfer, a more exploratory approach to this fifth factor is taken. Due to the scarcity of studies in both spoken and written production, the ensuing review of the literature is not organised by mode of production (as was done for the other factors), but rather in a more thematic fashion.

### 3.1.5.1 Item-specific psychotypology

What emerges from previous studies on psychotypology and learners’ transfer patterns is a general assumption that language-general psychotypology influences item-specific transferability (see § 3.1.3.1). In other words, if a background language is generally perceived to be more closely related to the target language, then specific items and structures from this language are more readily transferred than those from a less closely related background language. However, this does not explain why in some cases learners do transfer from a typologically less closely related background language (Schmidt & Frota, 1986). While language-general psychotypology is a useful concept to understand general patterns of transfer, item-specific psychotypology and/or transferability needs to be further explored to gain a more complete understanding of transfer in multilingual learners.

A change of perspective and re-analysis of previous data may be necessary to see what factors certain transfer behaviours can be ascribed to. Williams and Hammarberg (1998) argue for an effect of psychotypology based on retrospective comments such as the following:

> I was going to say something in 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 backup, because something like *throw-throwa*-that wouldn’t be *throware*, or whatever the Swedish people would say
So I was looking around for possibilities of using foreign words that I know on a Swedish setting, and perhaps making them Swedish.

Hammarberg & Williams, 1993, p. 66

The first sentence clearly indicates an initial preference for German as the language that is being scanned for potential transfer options, probably based on language-general psychotypological beliefs about German being the most closely related language to Swedish. However, she then rejects the German item based on *item-specific* elements, such as never having heard this particular word or something similar in Swedish. She then moves on to the next available source word, French *jeter*, which she perceives as transferable enough to attempt a Swedish version of it (similar words in Swedish like *jätte*, meaning *giant* or *very*, may have enforced this belief). Again, she discards English *throw*, as non-transferable, since *throware* just does not fit Swedish phonological constraints. This extract shows how she has activated all available options and considered each item in turn, independent of language-general typological similarity (as, in that case, German would have been the closest of all background language). Her analysis of which item is the most transferable is specific to each word’s individual orthography and phonology and its acceptability in the target language. While this illustrates the relevance of transferability, it is not clear yet what this judgment of transferability is based on. In the next section, markedness is discussed as the underlying measure of what is transferable.

3.1.5.2 Markedness

The degree of markedness and prototypicality of a particular item or structure has been shown to impact the probability of it being transferred (Kellerman, 1983). Both these factors relate to the degree to which a form, feature, or structure is marked (i.e. special, atypical, or language-specific) versus unmarked (i.e. basic, prototypical, or universal). Eckman’s (1977) Markedness Differential Hypothesis states that two L1 structures that are both equally different from the L2 may nevertheless experience different transfer patterns based on their degree of markedness within the L1. His analysis was mainly aimed at the acquisition of syntactic structures, however. Kellerman’s (1977) seminal work on markedness also did not directly focus on lexis, but on idioms. In a later paper (Kellerman, 1979), he nevertheless writes that in personal communications with P. Jordens he had been convinced that “markedness could well affect transfer in syntax as well as lexis” (p. 45).
This study consequently aims to explore the relevance of markedness in lexical transfer. When transposing theoretical accounts from one linguistic level to another, we need to understand the limitations of doing so. Jarvis (2016b) lists eight landmark findings concerning transfer, one of which is transferability. The corresponding explanation states that “[n]ot all features of a language are equally likely to show cross-linguistic effects. Learners’ intuitions about which features are universal versus language-specific have an important impact on the cross-linguistic associations they make” (p. 23). While terminology such as “universal features” may be useful in the context of syntax, it cannot be applied to lexical transfer to the same extent. While there are some universals in phonology (e.g. all languages have stops and all languages have at least two degrees of vowel height), the fact that there are different alphabets alone, defies any notion of universal patterns in orthography. It seems that, in contrast to syntax and phonology, orthography cannot be discussed in terms of markedness and its specificity to a particular source language without taking the target language into consideration. For example, the letters “ä” and “ö” may be perceived as marked and specific to German when the target language is English or French, but may be perceived as perfectly transferable when the target language is Swedish, which contains the same umlauts.

Some studies indeed consider markedness in relation to the target language. Bouvy (2000), for example, argues that two L2 structures that are equally marked within the L2, but differ in their degree of markedness in relation to the TL may experience different transfer patterns. She found that her French native speaker participants, who had L2 Dutch and were acquiring L3 English, were more reluctant to transfer Dutch “bezuinigen” than Dutch “sparen” (both mean to save money). That is, she observed a preference for items that are less marked in relation to the TL. The spelling of “bezuinigen” looks highly Dutch, while “sparen” could equally well belong to the English language. She thus argues that transfer only involves words that the learner perceives as transferable according to their knowledge of similarity between the L2 and L3. This transfer pattern necessarily depends on the TL in question and the same pair of synonyms (e.g. “bezuinigen” and “sparen”) may experience different transfer patterns if the target language was not English. It seems that each word’s

7 Some authors, however, discuss universals in orthography in relation to another language. Luelsdorff (1991), for example, writes that “whereas both German and English observe [no long vowels represented distinctly unless some short vowels are] […], only English exhibits distinct representation of long vowels, and is thus marked for this feature in relation to German [emphasis added]” (p. 199).
transferability is assessed against evidence of the target language and the probability of certain forms conforming to target language norms.

In the context of multiple background languages, a potential candidate for transfer may further be assessed for its degree of transferability in relation to transfer candidates from other background languages. Item-specific factors of transferability have been considered in both SLA and TLA but always from a within-language perspective, i.e. comparing different items within one language. As discussed above, Bouvy (2000) compares the transferability of two L2 Dutch words, but does not compare the transferability of L2 Dutch (e.g. sparen) vs. L1 French (e.g. épargner). Such cross-language comparisons of item-specific markedness may, however, lead to words from typologically distant languages being transferred, even when a more closely related language is available. For example, Schmidt and Frota (1986) (§ 3.1.4.2.) found transfer from Arabic into Portuguese, when the more closely related languages English, French, and German were also available. These particular Arabic words, however, were very similar to TL sounds and forms and were thus deemed transferable. Both within-language markedness (e.g. Dutch “bezuinigen” vs. “sparen”) and cross-language markedness (e.g. an Arabic word vs. a French word) can thus be affected by the particular target language (Figure 3-1).

![Diagram](attachment:image)

**Figure 3-1.** Target language effects on perception of markedness.

It thus seems that transferability not only affects the preference of a word over its synonym from the same language, but also affects the source language of transfer. Whether such patterns can be discerned in the current data will be investigated in § 5.6.

### 3.2 Justification for the present study

The preceding review of the literature has shown that proficiency, recency, psychotypology, and the L2 status factor have been investigated in a considerable number of qualitative studies. Given the nature of the methodological approach in previous research, it has been difficult to disentangle different
factors and to clearly assign effects to one factor in isolation. In order to avoid issues of confoundedness, a quantitative approach, using a statistical model that can keep all other factor constant while testing one factor’s predictability, is required. The present study will therefore rely on multinominal logistic regression to test the predictive power of these four factors.

In addition, it has been shown that item-specific factors, such as the level of markedness, have predominantly been investigated at the within-language level, but not yet comparatively across background languages in the context of third language acquisition. Given the lack of prior studies, as well as methods of quantification, a more exploratory approach will be employed to investigate the relevance of item-specific factors for the source language of transfer.

Finally, it has also emerged that no study has yet tested the relevance of these predictive factors comparatively across modes of production. As studies from both oral and written production, however, seem to find similar factors to be relevant, a direct comparison of the two modes presents an important next step. Such an analysis will offer important insights into the differences and, more importantly, potential similarities in processing mechanisms underlying oral and written language production.

The aims of the present study are thus to:

(1) conduct a quantitative analysis to solve the issue of confounding factors that previous studies have encountered\(^8\) (§ 3.2.1.1)

(2) conduct an exploratory analysis into the relevance of item-specific factors for the source language of transfer in TLA (§ 3.2.1.2)

(3) conduct a comparative analysis into the generalizability of predictive factors across modes of production (§ 3.2.2)

Given the nature of the five factors in focus for this study and the different methods necessary to investigate them further, a mixed methods analysis

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\(^8\) Since few studies have employed inferential statistics to test the predictive power of these factors, the possibility of a quantitative approach to the problem of factor prevalence in itself presents a question that needs to be answered.
emerges as the most appropriate methodological approach. A detailed justification for each component of the study, as well as the emerging research questions are presented below.

3.2.1 A Mixed Methods analysis

A mixed methods approach is especially well-suited when a study aims to both confirm previous results and explore new aspects (Teddlie & Tashakkori, 2009). Since the first four factors under investigation (proficiency, recency, psychotypology, the L2 status) are already well-established in the literature, a confirmatory statistical approach offers generalizability of previous findings, thereby contributing to the advancement of knowledge in the field. The fifth factor under investigation (item-specific transferability), however, remains largely unexamined and so a more qualitative and exploratory approach is required in order to gain better understanding of its effects on the source language of transfer. The statistical model is not expected to explain all variability in the data and adding a qualitative investigation into other potential factors offers a degree of comprehensiveness, which one method alone cannot achieve. This is especially true in the context of variables for which no method of quantification has yet been established, as is the case for item-specific transferability.

Definitions of what constitutes mixed methods can vary. Creswell et al. (2003) propose the following:

A mixed methods study involves the collection or analysis of both quantitative and/or qualitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of the data at one or more stages in the process of research.

Creswell et al., 2003, p. 212

Different rationales can justify the use of mixed methods. For this study, the addition of a qualitative component to a largely quantitative methodology seeks to both complement and expand the results found through the first method. Item-specific factors complement and expand on language-general factors and it is only in considering both at once that we may see the phenomenon in a more comprehensive way. Mixing methods can occur at different stages of the research process, e.g. at the problem/question specification, during data collection, or at the data analysis stage. In this case, both qualitative (written and spoken texts) and quantitative data (questionnaire) were collected
concurrently, where the qualitative data was quantitized for the statistical analysis, while being explored qualitatively in a parallel analysis. An overview of the mixed methods research design is presented in Figure 3-2 (qualitative aspects are represented in ellipses, quantitative aspects in rectangles).

![Figure 3-2. Mixed methods research design of this study.](image)

The quantitative data represents the main focus of the study and the overall design is thus [QUAN]+[qual] in nature (Newman, Ridenour, Newman, & DeMarco, 2003)

3.2.1.1 A quantitative analysis

As can be seen in the studies on proficiency, recency, psychotypology, and the L2 status reviewed in the previous sections, the general methodology in the field of lexical transfer in third language acquisition is qualitative in nature. Qualitative research is generally exploratory and is used when we do not know what to expect, to define a problem, or to develop an approach to the problem (Tashakkori & Teddlie, 2003a). It is also used to gain deeper insight into certain issues and explore relevant nuances to a particular problem. Considering the complexity of language processing and production, employing
such methods is a necessary step in uncovering general tendencies and relevant factors that can account for the observed behaviour. Since Williams and Hammarberg’s (1998) seminal study, the field has grown and a large number of studies have investigated the phenomenon, both through small-scale, qualitative approaches and more quantitative approaches, using descriptive statistical analyses (e.g. Cenoz et al., 2001; Odlin & Jarvis, 2004; Tremblay, 2006).

A number of issues, however, remain and cannot be resolved by the methodologies currently used in the field. First, factor confoundedness is prevalent in almost all previous studies. As shown in the review of previous research (§ 3.1) and noted by Ecke (2015), “most research involved L3 learners with language constellations [...] that did not allow the primacy of one or the other factor to be filtered out” (p. 155). The issue of confounding factors is not only prevalent in studies investigating the competing forces of psychotypology and the L2 status, but more generally in studies investigating all four factors. The variability in methodology and linguistic background of the participants across individual studies has made it difficult to compare results and determine the effect of any one factor in isolation. While these factors may work in an interconnected way (Serrander, 2011) and have a cumulative effect, it is necessary to first establish their relevance in isolation from each other.

Secondly, most seminal work conducted on transfer involved one of the authors as learner under investigation (Bardel & Lindqvist, 2007; Schmidt & Frota, 1986; Williams & Hammarberg, 1998). Most multilinguals are not linguists, however. If we want to understand multilingual processes in general, we need to choose participants that constitute a representative sample of the population under investigation. Bardel and Lindqvist (2007) argue that “[Lindqvist] was participating in the recordings predominantly as a learner, she had to try to disconnect herself from her role as a researcher” and that she “felt that she was able to do so, since the task of speaking Italian took so much effort” (p. 128). Being the researcher as well as the researched can, however, potentially affect the results, especially in the case of psychotypology. Since psychotypology is part of a learner’s metalinguistic awareness, it seems that choosing a trained linguist as the participant for a case study leads to a bias towards objective typology, as opposed to psychotypology, due to the linguist’s increased knowledge of typological distances between languages. Furthermore, due to the researcher-participant’s knowledge of factors recognized in the literature, descriptions of background knowledge and language experiences will likely also follow a certain bias toward mentioning things that have
already been established as relevant in the literature, thus limiting the opportunity of finding new significant aspects (one of the great benefits of exploratory qualitative research).

Third, case studies tend to select participants “based on a unique (often rarely observed) quality” (Guest, Namey, & Mitchell, 2013, p. 9), thus justifying their particular methodological framework. Focusing on individual participants gives invaluable insight into new and unexplored areas of research, in which clear predictive factors have yet to be established and, over the past few decades, such methods have revealed important aspects to be considered in multilingual learners’ transfer behaviour. However, considering the all-pervasive presence of multilingualism in the world today, the field should not limit itself to small-scale studies. We have the opportunity to collect greater amounts of data in contexts that are multilingual by nature, thus allowing us to test well-established factors for their statistical significance. Maximizing the generalizability of linguistic findings is crucial if we want them to bear meaningful theoretical and practical implications. Gass (2006) stresses that “we must have the capacity to generalize, for, if not, research remains at the ‘that’s interesting’ stage rather than moving the field along in any theoretically serious way” (p. 213).

A quantitative approach, using a representative sample of multilingual learners and controlling for the four factors, thus becomes an important next step in the field of transfer research in third language acquisition. Quantitative methods do not come without drawbacks, however. Presenting descriptive statistics such as aggregated group scores, for example, leads to data reduction and a great deal of information is consequently lost. Using inferential statistics therefore offers an important advantage over descriptive statistics, as it is based on individual tokens of transfer, rather than percentages and/or group averages. This means that the SL of every transferred item is taken as a data point for the dependent variable, and not, for example, an average of how many items are transferred from a particular SL within the whole group.

A second potential issue of a quantitative approach is highlighted by Bardel and Lindqvist (2007), who argue that large scale studies are less well suited for the investigation of the role of psychotypology than case studies. They suggest that case studies allow for detailed introspection and thus better insight into a learner’s perception of similarity between two languages. There are studies, however, that have attempted to investigate psychotypology in large samples, such as Sánchez (2012) (154 participants) and Lindqvist (2015)
(63 participants). Sánchez (2012), on the one hand, did not measure psychotypology, but discusses her results in terms of “typological closeness” (p. 97), but not from each learner’s individual and subjective perception of similarity. Lindqvist (2015), on the other hand, elicited learners’ perceptions through the use of a questionnaire, but did not find statistically significant correlations between psychotypology and the source language of transfer.

Bardel and Lindqvist’s (2007) initial concerns may thus be well-founded, considering the concept’s multifaceted and complex nature and the difficulty of eliciting participants’ psychotypological beliefs. This study therefore aims to further explore whether psychotypology can be measured in a quantitative manner and thus contribute to a predictive model of transfer behaviour. A well-designed questionnaire that has undergone the necessary psychometric tests of reliability should indeed be able to provide a trustworthy indication of psychotypological beliefs.

Overall, the advantages of a quantitative approach were considered to outweigh the potential limitations of such a method and the study conducted for this thesis, therefore, uses multinomial logistic regression to test the predictive power of the four most established factors on the source language of transfer. While similar approaches have been used in research on syntactic transfer (e.g. Rothman & Cabrelli Amaro, 2010; Sánchez, 2015a), this is the first comprehensive study incorporating all four factors to employ such an approach in the context of lexical transfer.

A multivariate analysis, such as multinomial logistic regression, allows these factors to be investigated in one integrated model, provided that we have a highly variable sample, including the same language pairs but with varying combinations regarding levels of proficiency, recency, psychotypology, and the L2 status. The multilingual, multi-cultural context of Luxembourg, where the current study was conducted, provides an excellent environment to find

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9 There are additional studies on lexical transfer that have used inferential statistics (e.g. Navés, Miralpeix, & Luz Celaya, 2005), but for purposes other than the investigation of the source language of transfer. Lindqvist (2015) is the only other study on lexical transfer that uses inferential statistics aimed to test the predictive power of psychotypology on the SL of transfer, but other factors were not included and thus not controlled for.
large sample of learners speaking the same language pairs, while the high percentage of immigrants in the country (nearly 50%) ensures the necessary variability in the four factors under investigation.

Multinomial logistic regression determines each individual factor’s effect while holding all other factors constant (i.e. controlling for them), thereby offering greater generalizability of previous findings. The intention of the present study is not to replace qualitative methods or to deny their value and ability to uncover important patterns in lexical transfer; instead, the goal is to establish whether quantitative methods also have the potential to answer important questions in the field and contribute to what qualitative methods have to offer. Both methodological stances play a defining and necessary role in the furthering of knowledge:

Qualitative and quantitative forms of research both have roles to play in theorising. The issue is not whether to use one form or another but rather how these might work together to foster development of theory. […] The qualitative should direct the quantitative and the quantitative [feed back] into the qualitative in a circular, but at the same time evolving, process with each method contributing to the theory in ways that only each can.

Strauss & Corbin, 1998, p. 34

Within the field of lexical transfer, little such exchange and mutual influence across methodological approaches has taken place thus far. Qualitative methods offer initial insights to a new phenomenon, as well as important in-depth analyses, which a quantitative approach cannot achieve. What the addition of quantitative methods to the field of lexical transfer has to offer is greater generalizability of findings and thus more far-reaching implications for learning and teaching practices. They present a natural continuation of the exploratory, qualitative research conducted thus far. The phenomenon of lexical transfer is highly complex and multi-faceted, however, and this study will have to determine whether its quantification and subsequent statistical analysis can indeed achieve useful results or whether the nature of the phenomenon is such that it does not lend itself to a quantitative approach.

3.2.1.2 An exploratory analysis

The quantitative analysis of this thesis is confirmatory in nature, allowing us to test established factors and determine their statistical significance. However, given the complexity of transfer phenomena, we need to assume that in
addition to the four well-established factors (whether they prove to be significant predictors or not), there are a range of other important factors that impact the choice of source language in lexical transfer. An additional, more qualitative investigation at the item-specific level is consequently conducted in order to uncover other potential predictors (§ 5.6). This additional analysis acts as an expanding element to the quantitative analysis of the other four factors. Findings from this analysis are treated as indicators, meant to generate new ideas and hypotheses, so as to further develop the established theories on factors influencing the source language in lexical transfer (Morse, 2003).

Small-scale studies often do not produce enough data points to investigate patterns of item-specific transferability. The size of this data set, however, provides us with the opportunity to conduct an exploratory analysis of how markedness, for example, affects transfer patterns. In addition, while quantitative methods have the advantage of generalizability, their main liability is “their potential lack of attention to the unique characteristics of the participants and the environments” and in order to minimize this potential liability, quantitative analyses should be supplemented with qualitative analyses (Jarvis & Pavlenko, 2008, p. 31). The investigations at the item-specific level of this study are thus intended to zoom in onto aspects that a quantitative approach to the data cannot bring forth, thereby increasing the study’s scope and comprehensiveness.

3.2.2 A comparative analysis

As was shown in the review of the literature (§ 3.1), the majority of previous research has focused on transfer in oral production (Cenoz, 2003b; Dewaele, 1998; Lindqvist, 2009, 2010; Williams & Hammarberg, 1998). While these results may prove to be equally applicable to written production, this has often been assumed rather than empirically tested (Jessner, 2006; Tullock & Fernández-Villanueva, 2013). Furthermore, thus far, all studies have focused on either the written or the spoken mode and there is no study to date that tests the effect of proficiency, recency, psychotypology, and the L2 status on the source language of transfer in speaking and writing in direct comparison.

Given the great differences in processing associated with each mode of production, such a split focus is necessarily justified to some extent. While both studies focusing on spoken data and studies focusing on written data seem to find the same factors to be determining, one needs to be careful with drawing comparative conclusions based on separate studies as the differences in methodology, sample population, and task type are considerable.
This study therefore presents a direct comparison between written and oral production, using the same population and task, and testing which (if not all) factors are significant predictors of transfer in each of the two modes respectively. Writing is a more conscious process allowing greater time to employ compensatory strategies in comparison to speaking and one might thus assume that the relevance of each factor differs across modes. Psychotypology, in particular, may prove to have a greater impact on written production, for example (Singleton, 2002).

One major difference between the two modes is the processing demands posed by the task. In writing, “[g]iven more time to think what language item to produce, speakers may consciously resort to other languages they know and use them as props in L3 production” (Szubko-Sitarek, 2015, p. 166), while in speech, conscious transfer strategies may be limited by task demands. Nevertheless, the distinction should not be considered to be clear-cut, where the process of writing is fully conscious and the process of speaking fully unconscious. As discussed in § 2.1.5, there seems to be a continuum where learners also employ conscious strategies in speaking and stop to think to find an appropriate item, while more unconscious slips equally occur in writing, but to a lesser degree. Overall, however, the way the empirical task was conducted in this study (see § 4.4) should ensure that the elicited data is as stereotypical as possible of the particular mode of production.

In addition, a language’s typical mode of use is rarely discussed in the literature with regards to this language’s probability of being chosen as source for transfer when the target language is produced in that same mode. A particular mode of production may lead to greater transfer from a language that is more commonly used in that mode, whether spoken or written. Sociolinguistic specificities, such as the context in which data is collected (e.g., school vs. home setting), as well as the particular task (formal/academic vs. informal) may similarly influence the choice of source language due to domain-specific language use in learners’ everyday lives. The comparative approach this study takes therefore not only offers insight into the predictive power of the four factors across the two modes, but also offers a new perspective on the impact the typical mode and/or context of use of a language has on the probability of this language to be used as source for transfer.
3.3 Research Questions

To conclude, previous research has identified a number of highly relevant factors, most importantly proficiency, psychotypology, the L2 status, and recency, in the choice of source language of lexical transfer in TLA, and as a result it is now possible to test these factors using a comparative and quantitative approach, thereby offering greater generalizability of previous findings. In addition, item-specific transferability, a new and so far unexplored predictor for the SL of transfer, will be investigated in a qualitative manner. The following research questions have thus been formulated:

Research Question 1:

A. To what extent do the four factors (proficiency, psychotypology, recency, L2 status) combined predict the source language of transfer in multilingual learners?

B. Are there any differences in how well the four factors combined predict the source language of transfer in spoken versus written production?

Research Question 2:

A. To what degree does each factor individually predict the source language in transfer?

B. Are there any differences in how well each individual factor predicts the source language of transfer in spoken versus written production?

Research Question 3:

A. What is the direction of the effect of each factor in predicting the source language of transfer? In other words, is the direction of the effect positive or negative (e.g. does higher proficiency in a background language increase or decrease the odds of choosing that language as source of transfer)?

B. Are there any differences in the direction of the effect of each factor in spoken versus written production?
Research Question 4:

A. To what extent can item-specific transferability contribute to our understanding of the source language of transfer in multilingual learners?

B. Are there differences in how item-specific transferability affects the source language of transfer in spoken versus written production?
4 Method

In this chapter, different aspects of the methodology employed in this study are presented. First, the particular geographical and linguistic setting in which this study was conducted (§ 4.1) and the participant pool (§ 4.2) are presented. Second, the choice and development of the data collection instruments are discussed (§ 4.3), followed by the procedure of the data collection (§ 4.4) and the coding criteria (§ 4.5). Finally, the statistical model that was chosen for the quantitative data analysis (§ 4.6) and the limitations of the methodological approach are discussed (§ 4.7).

4.1 Setting

In order to run inferential statistics, a large group of learners had to be identified that all share the same background languages. As will be discussed in § 4.6, multinomial logistic regression was chosen as the best statistical model to test the predictive power of the four factors under investigation in the quantitative part of this study. However, the number of potential outcomes for the source language had to be kept to a minimum in order to guarantee reliable results. If we have a sample of 100 learners that all speak three different background languages, there would be 300 different possible outcomes for the dependent variable (i.e. the source language). If, however, we have a group of learners that each speak the same three background languages, then any transferred item from any learner can only come from those three languages, thereby reducing the possible outcomes for the dependent variable to three. In addition, choosing a homogeneous group with fewer potential transfer sources ensures that there are enough instances of transfer per source language to make reliable statistical predictions. If we only had two instances of transfer from Arabic, three instances of transfer from French, one instance from Swahili, etc., we would not have sufficient data points to run a statistical analysis.

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10 In addition, there may be instances of transfer originating from multiple sources at once.
One excellent environment in which the large majority of inhabitants knows the same three languages before acquiring English is Luxembourg. It is a small land-locked country in central Europe, bordered by Germany, Belgium, and France. Roughly 563,000 people live in Luxembourg, of whom 45.9% are foreigners (STATEC, 2015). The country has three official languages: Luxembourgish, German, and French. Luxembourgish is the mother tongue of nearly all Luxembourgers and is spoken by all children of immigrant background that attend public school. German and French are introduced as foreign languages in grade 1 and 3 respectively.

It needs to be noted that the participants in this study often spoke more than the three languages under investigation (see § 4.2), but because these languages were not shared by all members of the sample, the analysis had to be limited to the three languages that all participants had knowledge of. In addition, a number of transfer instances could not be ascribed to just one of the three SLs under investigation, due to the item’s cognate nature across background languages. For example, a number of items could either be of German or Luxembourgish origin and were consequently coded in a separate category. In § 5.1.2, the overall distribution of transfer across SLs is presented. Four SL categories are shown: Luxembourgish, German, French, and “Other”, where the latter category includes transfer from background languages other than the three shared by all participants, as well as transfer that could not decisively be assigned to just one SL (e.g. Luxembourgish/German transfer) (Figure 5-1). The coding procedure for all transfer instances is discussed in detail in § 4.5.

4.1.1 Luxembourgish

Since Luxembourgish is considered a separate language from both German and French in this study, it is necessary to discuss its status as language rather than dialect. Furthermore, the reader may not be familiar with the origins and usages of Luxembourgish, which may prove relevant given the study’s focus on psychotypology, as well as mode of production. I will therefore briefly discuss the development of Luxembourgish as a language, away from its origins as a West Moselle Franconian dialect.

Luxembourgish (or Lëtzebuergesch) is used as the main language of oral communication at all social levels. That Luxembourgish is considered to be an independent language from an ideological standpoint, however, does not dispel the remaining ambiguity regarding its status of language versus dialect from a linguistic point of view. Newton (1996) argues that scholars in Lux-
embourg could not deny its genetic origins as a West Moselle Franconian dialect, but they refuse to see it as “an ancient relic” (p. 54), that has not developed. Luxembourgish has been moving away from the German standard language since 1839 (Treaty of London establishing the formal independence of Luxembourg), and particularly so since 1941 (WWII),

with a rapidity which in the twentieth century has made the German regional varieties spoken east of the Moselle, Sûre, and Our [rivers delineating the border between Luxembourg and Germany] sound more alien to Luxembourg ears than any even of the most conservative inner dialects of Lëtzebueresch (Hess, 1946, p. 10), while standard German itself is unintelligible to most Luxembourg children before they attend school (Hess, 1960, p. 335), and ‘in domains of application stands over and against Lëtzebueresch in effect as a foreign language’ (Maroldt, 1979, p. 168).

Newton, 1996, pp. 54–55

Ehrhart and Fehlen (2011) write that Luxembourgish is “a typical Ausbau language, a language by extension, or construction in the sense of Kloss (1967): a Germanic dialect becomes a language because it has, over time, assumed the functions of a language in a small community” (p. 286). This Ausbau was favoured by Luxembourgish’ geographical position as border dialect to standard French and other neighbouring Romance dialects, which profoundly influenced it.

Finally, both due to its consistent Ausbau over time and its ideological construction as the language of the Luxembourgers, Luxembourgish was declared the national language by the House of Deputies (CR 1983-4 33/82-3) in 1984 as the language “which was used over the entire sovereign area by all citizens, every day and on all occasions, in their normal communication with each other” (p. 5187).

A comparable example of the distance between Luxembourgish and German is the typological distance between Swiss German and Standard German. While Pfenninger and Singleton (2016) regard Swiss German as a dialectal variety of German, they only do so “in light of the close linguistic relatedness of Swiss German and High German with regard to the constructions under investigation in this paper [emphasis added]” (p. 149). While they consider Swiss German and High German as one, they do so in the specific context of inflectional morpheme transfer. In another publication, Singleton (2016a) stresses that “Swiss German […] is, of course, very different from Standard
German” (p. 506). Similarly, Luxembourgish and German were considered two different languages for the purposes of this study. Given the linguistic development of Luxembourgish away from standard German over time, children’s lack of understanding of German at the beginning of their school education, and the specific focus on lexical transfer in this study, transfer from Luxembourgish and German was coded separately for each language.

4.1.2 *Triglossia*

Triglossia governs the language landscape of Luxembourg, with each of the three official languages having domain-specific usages. This presents us with an excellent environment to collect large amounts of data with high levels of variability within the sample, which is necessary to conduct correlatory analyses. Furthermore, the prevalent domain- and mode-specific usages of these languages can offer important insights into the effects of context and mode on the SL of transfer (see § 6.3.2 for a discussion).

Luxembourgish (or Lëtzebuergesch) is characterized by a strong spoken/written distinction in usage (Belling, 2013). There are no domains in which Luxembourgish is not used for spoken interaction when Luxembourgers meet among themselves, whether this is “the Council of state, a meeting of an administrative board, or a conversation in a public bar” (Newton, 1996, p. 136). In writing, however, many domains still remain to be occupied by Luxembourgish. There is no translation of the Bible in Luxembourgish, nor of masterpieces of world literature, or any other type of scholarly and scientific works (Newton, 1996). A standard form of written Luxembourgish now exists, but the education system focuses on teaching German, French, and English, with very little focus on written Luxembourgish (Ehrhart & Fehlen, 2011). Consequently, knowledge of standard written Luxembourgish is not widespread among the population. This does not deter Luxembourgers, however, from using it in informal written contexts, such as postcards, letters, text messages or social media (Ehrhart & Fehlen, 2011).

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11 Triglossia is generally defined as the systematic use by a community of three different varieties or dialects of a language in different situations. Triglossia is, however, also used to describe the linguistic landscape of Luxembourg (Hoffmann, 1981), where the three languages in use are not varieties of the same language, but belong to different typological families.
In contrast, both speaking and writing in German and French are taught at school. These languages fulfil almost all formal written functions in Luxembourg. German is the main language of the printed media and television, as well as the language in which most children are alphabetized. It is rarely used in spoken communication, except with native speakers of German who do not speak Luxembourgish. French is generally used for official business, legal matters, and written communication. It is only used orally in restaurants and shops when addressing Belgian or French staff that do not speak Luxembourgish.

Although all Luxembourgers are bilingual or multilingual, most of the local population are not primary bilinguals (having acquired two languages simultaneously from birth), but are secondary bilinguals (learning an additional language in a school setting) (Newton, 1996). In addition, almost half of the population is foreign and consequently a whole range of different additional home languages are introduced into the linguistic landscape of the country. Most importantly, however, the degree of competence achieved in German and French, as well as Luxembourgish in the case of non-natives, varies across individuals (Newton, 1996).

Luxembourg thus constitutes an excellent environment for a quantitative study as it provides large samples of learners sharing the same language pairing, yet at varying degrees of proficiency, levels of exposure, and L1/L2 status for each of their background languages. Such variation in a sample is necessary to disentangle different factors and avoid multicollinearity between them in a statistical analysis.

4.1.3 Education system

Luxembourg’s education system is trilingual, in that German, French, and English are compulsory subjects for all students: German language classes start in the first year of primary school, followed by French one or two years later. Content classes are generally held in German until the age of fifteen, from which age on all subjects are instructed in French. English is introduced at the age of 12 or 13 (depending on the school), with all students participating in mainstream classes having knowledge of Luxembourgish, German and French at this point.

From age 12, students attend high school, which is divided into two main tracks, called “classique” and “technique”. While the “technique” track offers mainly vocational programmes, the “classique” track remains more theoretical, with a strong focus on languages and science, thus preparing students for
university studies (Ehrhart & Fehlen, 2011). There remains a strong bias for more native Luxembourgish students to enter the “classique” track (37.9%) than non-native Luxembourgish students (16.5%) (Weber, 2010). In order to have the most representative sample possible, it was therefore decided to include participants from both tracks in the study.

4.1.4 Typology

As previously stressed, typology and psychotypology do not represent the same concept (§ 3.1.3.1). In order to disentangle the two and understand whether psychotypology indeed has an effect in the absence of an actual typological difference, it is important to ensure that objectively there is as little difference in typological distance between each of the background languages and the target language as possible. Of course this is only true if we assume that typology also has an effect.

If we believe that only psychotypology has an effect, there is no need to disentangle the two. In this case, Arabic, for example, may well objectively be more distant from Italian than Portuguese, but if the learner believes that Arabic is closer to Italian than Portuguese then we should observe greater transfer from Arabic. On the other hand, if we believe that typology also has an effect (through statistical learning at an unconscious level for example), then we may well see greater transfer from Portuguese than Arabic, despite the learner’s contrary psychotypological beliefs. Taking typology and psychotypology to be two distinct concepts necessarily implies that they may lead to different transfer outcomes. Consequently, we need to control one, in order to determine the effect of the other. The possibility that the two concepts differ should not be underestimated, especially in the case of younger, more inexperienced learners.

Without wishing to take a stance on the issue, the current study was set up so as to avoid any potential confounding typological effect (if there is one) by choosing a language combination in which each BL is similarly close to the TL. Lindqvist (2010) argues that equal typological distance between the BLs and TL allows us to truly measure the impact of other factors on the choice of source language. Having similar degrees of objective similarity between each background language and the target language offers a clearer picture of the effect learners’ subjective perception of similarity has on transfer.

While it is impossible to measure the exact typological distance between two languages, the number of cognates, for example, can provide some indication of their degree of relatedness. In the present study, the target language under
investigation is English. The three potential source languages under investigation are Luxembourgish, German, and French. Luxembourgish is part of the West Central German group of High German languages, but there are considerably more French loanwords in Luxembourgish than in Standard German (it is said to feature over 5,000 words of French origin). While it is a Germanic language, the great influx of French words cannot be ignored when considering typological distance to the TL English. German belongs to the same Germanic language family as English, but the Germanic lexical core in English is below 5,000 words (Katzner, 2002). In addition, cognates across the two languages often look quite different due to phonological changes. French, a Romance language, is also very closely related to English, despite the latter being a Germanic language. English has undergone a major influx of French words due to the Norman Conquest in 1066. Claiborne (1990) argues that about 7,500 French words are currently still in use in the English language, with some even arguing that English is a semi-Romance language (Barfield, 1962). Since German is a Germanic language, French a Romance language, and Luxembourgish a Germanic language with many French loanwords, they can be argued to be as similar as possible regarding their typological distance to the TL at the lexical level, given the special status of the target language (English) as a Germanic language with a high number of Romance words. Such a language combination thus provides an excellent methodological working ground to investigate psychotypology.

4.2 Participants

The participants in this study were 79 high-school students in their second year of English instruction. They each had knowledge of Luxembourgish, German, and French. There were 43 female and 36 male participants. Students were between 13-14 years old and all of the participants had followed the regular Luxembourgish school curriculum. The participants were drafted from four classes; two from the higher (“classique”) level within the Luxembourgish secondary school system and two from the lower (“technique”) level, to ensure that the whole range of the student population existing within the Luxembourgish educational system is represented. One “classique” and one “technique” class was assigned to the spoken and the written production groups respectively.

As this particular school runs a strict enrolment programme based on proportional representation of the country’s overall student population, both the overall student body and different classes at the school are matched in age, overall school results, sex, socio-economic status, and immigrant background
through the admission process and class assignment. However, sampling issues invariably force pragmatic choice, and it was thus not possible to control for classroom effects. However, in Luxembourg each class has a different teacher for each subject every year, thus dissipating the teacher effect to some extent. Due to these practical limitations that govern sample selection, external validity may also be affected to some extent. Nevertheless, given this school’s admission process by proportional representation, the sample should closely approximate the national proportions of different immigrant background, socio-economic status, sex, and school achievement (i.e. “classique” vs. “technique”).

It may nevertheless be argued that the results found here cannot be generalized beyond the context of this particular linguistic environment since the school in which the data was collected was not randomly selected. Dörnyei (2007), however, argues that cluster sampling is an acceptable way of making random sampling more practical, by “randomly select[ing] some larger groupings or units of population (for example, schools)” (p. 98). Ideally, one would cooperate with the ministry of education to obtain a list of every class in that age group in the country and then randomly select participants from that list. However, even in that case, teachers are still allowed to refuse to participate and the question remains whether it is a particular type of teacher and school that would accept or decline to participate. Given these difficult circumstances in the collection of student data, we might need to accept these limitations, yet work towards approaching generalizability as much as possible given the particular circumstances. The ‘Task Force on Statistical Inference’ of the American Psychological Association (Wilkinson & TFSI, 1999) encourage researchers “to extend [their] interpretations to a general class or population if you have reasons to assume that your results apply” (p. 602). Given these considerations and the school’s rigorous selection process which aims to balance its student population, I believe there is reason enough to assume that these results also apply to the greater population of multilinguals in Luxembourg.

Table 4-1. Proportion of sequential versus simultaneous bilingual participants.

<table>
<thead>
<tr>
<th></th>
<th>TOTAL</th>
<th>L1: Lux</th>
<th>L1: Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monolingual from birth</td>
<td>51%</td>
<td>45%</td>
<td>6%</td>
</tr>
<tr>
<td>Bilingual from birth</td>
<td>49%</td>
<td>34%</td>
<td>15%</td>
</tr>
</tbody>
</table>
The sample was balanced across sequential and simultaneous bilinguals (51% vs. 49% respectively) (see Table 4-1 above). Forty-five percent of the participants were monolingual Luxembourgish L1 speakers from birth, while 34% spoke Luxembourgish, as well as a second L1 from birth. 6% were monolingual from birth but with an L1 that was not Luxembourgish, and 15% were bilingual from birth with two languages other than Luxembourgish. Consequently, 50% of the participants spoke either an additional L1 or an L1 different from Luxembourgish. This offers sufficient variation in the L1/L2 status of the three background languages to test the L2 status factor in a statistical model.

There were 23 additional languages known within the sample at varying proficiency levels. These included highly diverse languages, such as:

- Bosnian
- Cape Verdean Creole
- Chinese
- Danish
- Dutch
- Finnish
- Flemish
- Hebrew
- Icelandic
- Italian
- Japanese
- Latvian
- Latin
- Moroccan
- Norwegian
- Romanian
- Russian
- Serbian
- Spanish
- Swahili
- Swedish
- Thai
- Turkish

While these additional background languages may also be used as source for transfer, the analysis of the present study focused exclusively on the languages shared by all participants in the sample. Some examples of transfer from these languages are presented in § 4.5.3.2.5, however. Those learners that do not speak any additional languages (other than the three under investigation) could have been separated from those that do as they could be argued to belong to different populations. This was found unnecessary for a number of reasons, however.

First, knowing an additional language in itself does not affect the proportion of transfer across the three SLs under investigation. Instead, the fact that one knows an additional language may affect the amount of exposure one has to other languages or the level of proficiency in each of their languages. It is these consequences of knowing an additional language, rather than the fact of knowing an additional language itself, that can affect the source language of transfer. All of the possible consequences, however, are captured through the independent variables in the study. Someone speaking additional languages,
may have lower proficiency in the SLs investigated, may have lower exposure to them, and their psychotypological beliefs may differ and they may consequently transfer less from them, but all of these factors are measured and thus taken into account in the statistical model.

The only remaining potential limitation is the fact that they might interpret the scale of the psychotypology questionnaire items differently from those learners that do not have additional background languages. If someone speaks an additional language, such as Russian, which is typologically very different from the target language English, they might judge the SLs under investigation (German, French, and Luxembourgish) to be more closely related to the TL than a learner without knowledge of Russian. This may be an issue if they nevertheless portray the same transfer patterns as learners that have no other background languages, and their behaviour thus does not correlate with their psychotypological judgments. However, the Russian speaker that ranks the BLs tested in this study as very closely related to the TL may consequently also transfer more from them in comparison to learners with no additional languages, making the argument null again.

Secondly, in addition to knowing more than the three languages shared by all participants, there might be other factors that have an effect, such as gender, crosslinguistic awareness (see § 2.1.5 for a definition), or working memory. However, testing these factors was not the focus of this study. The statistical analysis is primarily concerned with conducting a confirmatory analysis of the four already established factors. Not knowing what other factors affect the choice of source language does not diminish the reliability of the predictive power of those factors tested in the model. We may simply see some unexplained remaining variability.

4.3 Instrumentation

In this section, the different instruments used for data collection are presented. Following the overview below, the choice and development of the empirical task (§ 4.3.1) and the questionnaire (§ 4.3.2) employed in this study are discussed in detail.

In order to test the four factors as predictors of the source language of transfer, both transfer data and information on the four factors had to be collected, and this in a limited amount of time. Two instruments were chosen to collect the required data. An empirical task was chosen to provide transfer data and a
A questionnaire was developed to collect data on the four factors under investigation (proficiency, recency, psychotypology, L2 status). In a pilot study, three language production tasks (free production, picture story description, picture naming) were selected from the relevant literature and piloted in order to identify the most effective instrument for the purposes of this study. The production tasks were only piloted in the written mode. As the aim of the pilot study was to establish which empirical task could provide the most useful data for the research questions at hand, it was deemed sufficient to test these in one mode only (see § 4.3.1 for a more detailed justification).

Second, a questionnaire was designed and piloted, which established participants’ background and target language proficiency levels, their exposure to and L2 status of the background languages, as well as their psychotypological beliefs regarding the relationship between each of the three background languages and the target language. The design of the questionnaire allowed for these factors to be quantified for statistical analysis.

Table 4-2. Overview of the study.

<table>
<thead>
<tr>
<th>Pilot study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written production</td>
</tr>
<tr>
<td>1.</td>
</tr>
<tr>
<td>a. Free production</td>
</tr>
<tr>
<td>b. Picture story description</td>
</tr>
<tr>
<td>c. Picture naming (in the classroom)</td>
</tr>
<tr>
<td>2.</td>
</tr>
<tr>
<td>Questionnaire (in the classroom)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Main study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spoken production</td>
</tr>
<tr>
<td>1. Picture story description (individual recordings)</td>
</tr>
<tr>
<td>2. Questionnaire (in the classroom)</td>
</tr>
</tbody>
</table>

Table 4-2 above offers an overview of the pilot and main study. The research design was concurrent in nature, where the empirical task was elicited at the same time as the background questionnaire in both the pilot and the main study. For the main study, a number of changes were made to the questionnaire in order to improve its internal consistency (§ 4.3.2). Furthermore, the picture story description task was chosen out of the three empirical tasks that were piloted, as it demonstrated the greatest potential to elicit the necessary
amount of transfer data for a statistical analysis to be conducted (§ 4.3.1). Both instruments are discussed in detail in the following two sub-sections.

### 4.3.1 Empirical task

The empirical task was piloted with 60 participants. The participants had knowledge of the same languages (i.e. Luxembourgish, German, French, now acquiring English) as those in the main study, but they did not participate in the main study. Two different methodological aspects had to be piloted in order to produce the best possible data to answer the research questions at hand. First, the most suited level of proficiency in the target language had to be identified, and second, a task had to be found that could elicit as much transfer as possible. Given the quantitative nature of the research design for this study, it was imperative to elicit high amounts of transfer. Since the research questions for this study did not pertain to the overall amount of transfer in naturalistic production, but rather to the factors influencing the choice of source language, creating a fully natural language production environment was not necessary. Rather, it was important to stimulate, even if artificially, the use of transfer.

First, the best L3 proficiency level for the elicitation of large quantities of transfer had to be identified and students in both their second and their third year of English instruction participated in the pilot study. Lindqvist (2015) found that the picture story description task used in her study was too difficult for students in grade 6, at age 12-13 (but not in grades 7-9, at age 13-16), leading to many incomplete sentences and short texts, and consequently to low numbers of transfer tokens. It is important to find the right balance between the task being easy enough for the participants to complete, and it being difficult enough for them to be confronted with gaps in their L3 knowledge, thus eliciting transfer. The pilot study showed that third year students’ proficiency in the target language was already too high for the empirical tasks used, offering very few opportunities to rely on transfer. The L3 proficiency of the second year students, on the other hand, allowed them to complete the task, producing sufficiently long texts for data analysis, yet leaving them faced with a significant enough number of unknown items to produce instances of transfer.

In addition to different proficiency levels in the TL, different empirical tasks were also tested. The following three data collection methods were piloted: a free production task, a picture story description, and a picture naming task. The three tasks differed in their degree of guidance and since “transfer errors are more numerous in guided exercises […] than in less constraining tasks” (Bouvy, 2000, p. 155), the three tasks elicited different amounts of transfer.
The picture naming task elicited the greatest amount of transfer, with 28.2% of all the words produced being transferred from another language. Students were encouraged to name the picture as best as they could, even if they did not know the word or were unsure. While the task provided great amounts of transfer, with the proportion of transfer from each background language similar to that of the other tasks, it was nevertheless judged too limited, as the simple naming of individual objects reduced transfer opportunities to nouns only.

For the free production task, participants were asked to write a letter to an English-speaking friend, who was planning a trip to Luxembourg. They were allowed to write about any topic of their choice, but were offered examples, such as describing the sights of the country, their school, or their family and friends. They produced an average of 91.2 words, of which 1.75% were transferred. The task offered much greater freedom to the students to employ avoidance strategies, thus producing the lowest amount of transfer items of all three tasks.

The picture story *Frog Where Are You* (Mayer, 1969) was tested as the third production task. The story has been used successfully in different contexts with both children and adults (Berman & Slobin, 1994; Cenoz, 2001; Kellerman, 2001). Furthermore, Cenoz (2003b) tested both a story that had been part of the regular curriculum, as well as a story that had not been included in classroom activities and concluded that “there is more cross-linguistic influence when learners produce a story that has not been included in their classroom activities” (p. 110). Consequently, this particular story was also chosen for its novelty to the students. Furthermore, since it has been suggested that recency of thinking about a language or its country of origin can lead to higher activation of this language (Angelovska & Hahn, 2012), the story was also chosen for being culturally neutral. It did not include a picture of the Eiffel Tower, for example, but its setting is predominantly outside in nature.

The participants produced an average of 123.5 words, but participants were unable to finish describing the whole story, as it proved too long for the time limitations given in the classroom. Of all the words that were produced, 3.1% were transferred items. Due to its more controlled nature, students were forced to name particular aspects of the story and thus relied on transfer more often than in the free production task. The picture story description task was therefore chosen as the most appropriate elicitation task for the research questions at hand.
As mentioned above (§ 4.3), the pilot study was conducted eliciting written text only. While some tasks may be particularly well suited for written or oral production, the three tasks tested in the pilot study were deemed sufficiently dissimilar to assume that the difference in amount of transfer elicited by each task would be the same in the spoken mode. In other words, it was considered unlikely that the free production task would have provided larger amounts of transfer than the picture story in the spoken mode, when it did not do so in the written mode. Furthermore, many of the same restrictions apply to both modes (e.g. the picture naming can only elicit nouns, the free production offers too much space for avoidance). Consequently, it was deemed sufficient to only pilot the data elicitation tasks in the written mode.

For the main study, the same picture story was used in both writing and speaking, in order to keep the data from both modes as comparable as possible. Since participants struggled to finish describing the story in the given time during the pilot study, it was shortened to 18 pictures for the main study.

4.3.2 Questionnaire

To elicit data on the four predictors tested in this study, it was decided to use a questionnaire (Appendix B & Appendix C). Dörnyei (2003) writes that questionnaires are one of the most common methods of data collection in SLA research. Their popularity can mainly be explained by their versatility and capability of gathering large amounts of data in a short amount of time in a format that is easily processed for statistical analysis. However, he further argues that, unfortunately, questionnaires are generally perceived to be easy to construct and are consequently often badly designed or inadequately processed. The questionnaire for this study was therefore piloted and has undergone psychometric testing to ensure its validity and reliability.

Construct (or content) validity is the ability of an instrument to measure what it is intended to measure. There is no statistical test for validity, and validating a questionnaire simply means that the researcher has deemed it to measure what it is supposed to measure. Validity is an opinion (Walonick, 2013). There are some measures, however, that can be taken to increase the objectivity of the assessment. Following Walonick’s (2013) advice, the questionnaire was first given to another researcher for evaluation and any items they did not believe to measure what they were supposed to measure were altered or removed. Second, a “pretend respondent” was chosen, who was not involved in the development process, to complete the questionnaire. Any questions the respondent raised indicated that the item in question was defective and needed

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rephrasing. After the necessary changes were made, it was administered to a second “pretend respondent”. The latter did not ask any questions and the questionnaire was consequently deemed valid.

The *reliability* of an instrument is its ability to create reproducible results, i.e. getting the same/similar answers repeatedly. There are different methods to test reliability and internal consistency was chosen as the most time-efficient option given the particularities of the study. Cronbach’s alpha was calculated, thereby providing an estimate of the instrument’s reliability (see § 4.3.2.1 - § 4.3.2.4 for Cronbach’s alpha values of each of the constructs).

Furthermore, in designing any questionnaire, one has to achieve a trade-off between obtaining a comprehensive measure of a complex and often multi-dimensional construct and the practical constraints that come with research in a school setting. While one may be tempted to administer a long and elaborate questionnaire, the amount of time granted by the teacher is limited (Dörnyei & Csizer, 2002). Following Dörnyei and Csizer (2002), it was decided to not include too many items per variable rather than limiting the scope of the survey and removing whole constructs from the questionnaire.

The questionnaire elicited data on learners’ background languages and the four main predicting factors for the choice of source language in transfer. Information on other individual differences, such as gender, school class level, learning disabilities, and mode of learning, was also obtained. Most items were newly created for this particular study, as there are very few example questionnaires available on, for example, psychotypology.

The questionnaire was written in German. In many cases, the target language of the study is used for all interaction, to avoid artificially activating one of the background languages and thus skewing the data, but since the questionnaire was administered after the empirical task this was not an issue. Generally in research employing questionnaires, they are given in the participants’ native language. Given that Luxembourgish is neither the native language of all participants, nor a language they generally encounter in written, academic contexts, German was chosen as the most suitable language. It is the most commonly used written language in the Luxembourgish school system and was therefore considered the least marked choice for the questionnaire. Students perform all of their regular written academic tasks in German, as all subjects, other than language classes, use German textbooks and all class work and tests are produced in German at this stage of secondary school.
Generally, 5-point Likert scales were employed for concepts pertaining to proficiency and exposure, while 4-point Likert scales were employed when students needed to express their opinion (e.g., psychotypology) in order to avoid neutral answers (i.e., “neither agree nor disagree”). Providing an accurate answer requires greater cognitive work than a neutral answer, which may lead less motivated participants to not actually make a choice (Dörnyei, 2003). Furthermore, the number of possible responses was limited to four or five to mitigate the cognitive load on these young learners and avoid fatigue effects, as has been done by Cohen & Oxford (2001) and suggested by Dörnyei (2003). All items were closed questions to facilitate coding for statistical analysis, as well as enhance the uniformity of measurement and offer greater reliability. Each option was presented in colours ranging from green to red, indicating agreement or disagreement respectively (see Figure 4-1 below). All questions or statements were balanced in their formulation, to avoid bias towards either positively or negatively phrased items. After each section, participants were given space to add optional comments.

![Likert scale](image)

**Figure 4-1. Likert scale used to assess general proficiency.**

The ensuing sub-sections discuss the design of the questionnaire for each construct (factor) in turn. Each sub-section discusses the choice of items, the results of the internal consistency tests that were conducted during the pilot study, and the changes that were made accordingly for the main study. The questionnaire was piloted with 102 participants. As for the piloting of the empirical task, the participants were of the same linguistic background as those in the main study, but did not participate in the latter.

### 4.3.2.1 Proficiency

Ideally, proficiency is objectively tested for each of the background languages and the target language, but due to important time limitations, this was not feasible. Proficiency measures were thus collected via self-assessment, as has regularly been done in research on linguistic ability in the past (e.g., Bahrick et al., 1994; Delgado et al., 1999; Jia et al., 2002). Self-assessment has indeed been shown to be a reliable measure of language proficiency. Ross (1998) has conducted a meta-analysis of 60 studies that have empirically examined the
relationship between self-assessment and the four skill areas in language learning (reading, speaking, listening, and writing). In his summary, he concludes that there are robust correlations between self-assessment and criterion skill measures. Self-assessment was thus deemed an appropriate and reliable alternative to objective proficiency testing, given the practical limitations of the data collection procedure.

4.3.2.1.1 Pilot & main study

In the pilot study, participants were asked to self-assess their overall proficiency (example 1 below), ease of use of each language (example 2), as well as rank their languages by overall level of proficiency (example 3) and by level of proficiency in the four skills (speaking, writing, listening, and reading) (example 4). Marian et al. (2007) argues that “bilinguals’ language profiles are best captured by assessing language experience and proficiency across multiple linguistic domains” (p. 942); more specific questions were therefore included, in addition to overall proficiency.

(1) How well do you know your second language?
   very well / well / average / badly / very badly

(2) It is easy for me to use French outside school (e.g. in shops, restaurants, on holiday, etc.).
   very true / true / false / very false

(3) Rank all the language you know according to how well you know them. Start with the language you know best.

(4) In which language do you do the following best:
   A. write:
   B. speak:
   C. read:
   D. listen:

Those questions that did not include a Likert scale were converted so that each language received a score based on its ranking. Cronbach’s alpha internal consistency was then calculated and was above 0.7 for each of the languages. However, the combination of Likert scales and rankings felt too unreliable, due to the necessary assigning of a value to the ranking questions, and so it was decided to remove all the ranking questions and replace them with can-do questions that use Likert scales in the final version of the questionnaire.
This greatly improved the comparability of items and made it easier to integrate all items into one construct.

In the main study, each student rated at what level they could perform certain productive tasks (5 questions on both speaking and writing) in each of the background languages and in the target language. The can-do questions were representative of the levels used by the Common European Framework of Reference (CEFR, 2001). The questions pertained to different levels of proficiency. One item would, for example, ask whether students can introduce and describe themselves in simple terms (Figure 4-2 below), while another would ask whether the students can present their opinion in a clear and concise manner when participating in a discussion on a topic they care about (Appendix C, item 7.3). While most students can do the former in all their languages, few students can do the latter equally well in each language.

<table>
<thead>
<tr>
<th>I can introduce myself and answer simple questions about myself.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>very true</strong></td>
</tr>
<tr>
<td>Luxemburgish</td>
</tr>
<tr>
<td>German</td>
</tr>
<tr>
<td>French</td>
</tr>
<tr>
<td>English</td>
</tr>
</tbody>
</table>

Figure 4-2. Example can-do item measuring proficiency.

One concern that arises is that of insufficient variability in learners’ L1 proficiency. If all learners judge their L1 proficiency to be very high, then there is not enough variability in the sample to run a correlatory analysis. In order to see whether transfer from a language decreases when proficiency in that language is low and increases when proficiency is high, we need data points across the whole scale (i.e. both high and low scores). Furthermore, if there is a lack of variability in the L1 proficiency variable, there may be issues of multicollinearity between the proficiency and the L1/L2 status variable. If all learners judge their L1 proficiency to be very high and their L2 proficiency to be very low, then it will correlate with the L1/L2 status variable, making it impossible to determine which of the two variable is having an effect. This was not the case, however. Learners’ self-assessments of proficiency in their L1(s) varied considerably, due to the particular make-up of local and immigrant participants in the study.

Well (1986) discusses the main dimensions that produce variability in L1 development. While social background and personal attributes feed into it, the setting, type of activity, number, and status of speakers also affect native language proficiency. These latter factors are particularly relevant in the context
of speakers whose native language is not the main language of the social environment they live in, as is the case for many of the participants in this study. In a more recent paper, Hulstijn (2015) discusses his theory of basic language cognition (BLC) versus higher language cognition (HLC) in one’s native language, where all speakers achieve the former (BLC), but the level of the latter (HLC) varies considerably. He argues that the explanation for such differences “should probably be found in (1) cognitive abilities […], in combination with (2) environmental factors, such as exposure to oral and written language at home, in school, and elsewhere” (p. 28). It is thus not as unusual as one may think to find differences in L1 proficiency in the type of context that this study investigates.

4.3.2.1.2 Data processing

Given that some important changes were made to the questionnaire after the pilot study, new psychometric tests were run on the data gained from the main study to ensure its reliability. First, individual questions were weighted to take varying proficiency levels covered by each item into consideration. Since the different questions are not at objective equidistance from each other, an arbitrary weight would have had to be assigned. In order to avoid this, the score on each question for each participant was standardised (i.e. normalised). The point of normalization is to make variables comparable to each other. Creating standardised scores, or z-scores, allows us to see whether a particular score is equal to the mean, below the mean or above the mean of all the scores in the sample. They can also tell us how far away from the mean a particular score is. If the z-score on Question 1 for student A is 0, it is equal to the mean of all the students’ scores on Question 1. If it is positive, it is higher than the average score and if it is negative, it is lower than the average score. Each full unit above or below 0, represents one standard deviation above or below the mean. Standardised scores thus help us see how a student performs in comparison to the rest of the group. They also take into account the different degrees of difficulty of each of the questions. Finally, the standardized scores for each participant on all questions were averaged to produce a proficiency score for that participant.

Second, in order to find out whether the five questions on spoken proficiency and the five questions on written proficiency should be coded as two separate constructs or whether they could be combined into one, exploratory factor analysis (EFA) was conducted. It was determined to extract 8 components (2 modes x 4 languages) to see whether the different items would map accordingly.
The rotated component matrix (Appendix F) showed that for both French and English, the questions pertaining to speaking and writing all loaded to a single component, thus indicating that they should be merged. Given the clear loadings onto the same component for French and English, EFA was run again, but this time only four components (4 languages) were extracted (Table 4-3).


<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof_LS1</td>
<td>.821</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>.732</td>
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<td>Prof_LW4</td>
<td>.528</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prof_LW5</td>
<td>.680</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prof_GS1</td>
<td>.657</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prof_GS2</td>
<td>.675</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prof_GS3</td>
<td>.642</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prof_GS4</td>
<td>.569</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prof_GS5</td>
<td>.777</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prof_GW1</td>
<td>.835</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prof_GW2</td>
<td>.752</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prof_GW3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prof_GW4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prof_GW5</td>
<td>.566</td>
<td>.573</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As with 8 components, French (Prof_F) and English (Prof_E) spoken (Prof_xS) and written (Prof_xW) proficiency questions load onto the same component. Component 3 groups all questions on German oral proficiency, as

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12 See Appendix D for the variable coding sheet.
well as three questions on German written proficiency. It also, however, includes one of the questions on oral proficiency in Luxembourgish, which concurrently does not load onto component 4 (the component that comprises all other Luxembourgish measures). Although the loadings for German and Luxembourgish are not perfect, spoken and written proficiencies were judged to load collectively well enough to only use one average proficiency measure per language, rather than one for each mode of production.

Measures on internal consistency for the overall proficiency measures are presented in the Table 4-4 below. Note that each mean approximates 0 due to the standardization of the scores. The means are not exactly 0 because of slight rounding error. Nunnally (1978) has indicated 0.7 to be an acceptable reliability coefficient (Cronbach’s alpha). Since each source language proficiency measure achieved Cronbach’s alpha values above at least 0.87, all questions were retained in the average score.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Cronbach α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lux.</td>
<td>-.0016</td>
<td>.69325</td>
<td>.87</td>
</tr>
<tr>
<td>German</td>
<td>.0012</td>
<td>.73195</td>
<td>.90</td>
</tr>
<tr>
<td>French</td>
<td>-.0001</td>
<td>.80671</td>
<td>.94</td>
</tr>
<tr>
<td>English</td>
<td>-.0008</td>
<td>.77532</td>
<td>.93</td>
</tr>
</tbody>
</table>

4.3.2.2 Recency/exposure

As discussed in § 3.1.2.1, recency has been conceptualized as a number of different things: the language most recently acquired, the language most recently used, and the language most often used. They each carry a different value for the particular context of this study.

For the participants of this study, the acquisition ages of the background languages German and French are generally very close (within a year or two of each other), unless they are the learner’s L1. The participants are also still attending language classes in German and French and so these languages are still in the process of being acquired. This makes the order of acquisition or the conceptualization of “the most recently acquired” L2 less relevant. Furthermore, since participants use each language on a daily basis, the aspect of “most recently used” was also judged to be less relevant in this context. For
this particular study, recency was therefore conceptualized as exposure and measured as the language “most often used and/or exposed to”.

4.3.2.2.1 Pilot & main study

In the pilot study, exposure was measured using four questionnaire items, covering the participant’s language use at home, with friends at school, and outside school, as well as the language(s) they watch TV in. Internal consistency was below 0.7 for all languages and it was thus decided to separate interactional exposure and media exposure in the final version of the questionnaire.

Since it was decided to separate interactional exposure from media exposure, two questions (exposure through the internet and through music) were added to the latter construct in order to balance the two constructs. Students thus answered three questions on interactional daily use and media exposure respectively on a 5-point Likert scale and this for the three background languages and the target language (Figure 4-3 below). The three questions on interactional language exposure covered family, school, and spare time. Similarly, media exposure was measured via exposure to music, TV, and the internet.

At home with my family I speak:

<table>
<thead>
<tr>
<th>Language</th>
<th>always</th>
<th>most of the time</th>
<th>half the time</th>
<th>sometimes</th>
<th>never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxemburgish</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>German</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>French</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 4-3. Example item measuring interactional exposure.

4.3.2.2.2 Data processing

Since changes had been made to the constructs after the pilot study, both exposure constructs (interactional and media) underwent Cronbach’s alpha testing for internal consistency again. As with the proficiency factor, the values (or scales) used in the ensuing statistical analysis were constructed by averaging all questions relating to one language. As shown in Table 4-5 and Table 4-6 below, most Cronbach’s alpha values fall slightly short of the generally accepted 0.7 mark for good reliability, which indicates that the three questions used do not correlate strongly enough to produce high reliability scores.
Table 4-5. *Internal consistency of interactional exposure measures. (max=5)*

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Mean</th>
<th>SD</th>
<th>Cronbach α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxembourgish</td>
<td>4.22</td>
<td>1.3678</td>
<td>.05</td>
</tr>
<tr>
<td>German</td>
<td>1.69</td>
<td>.70034</td>
<td>.66</td>
</tr>
<tr>
<td>French</td>
<td>1.82</td>
<td>.78931</td>
<td>.51</td>
</tr>
</tbody>
</table>

Table 4-6. *Internal consistency of media exposure measures. (max=5)*

<table>
<thead>
<tr>
<th>Media</th>
<th>Mean</th>
<th>SD</th>
<th>Cronbach α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxembourgish</td>
<td>1.75</td>
<td>.71829</td>
<td>.61</td>
</tr>
<tr>
<td>German</td>
<td>3.92</td>
<td>.91596</td>
<td>.66</td>
</tr>
<tr>
<td>French</td>
<td>2.36</td>
<td>1.00130</td>
<td>.68</td>
</tr>
</tbody>
</table>

It is rather difficult to achieve high Cronbach’s alpha values with small scales (only three items in this case). Dörnyei and Csizer (2002), therefore, accept values above 0.5 in such cases, and consequently all values above 0.5 were deemed acceptable for these particular constructs. However, the extremely low reliability score on interactional use of Luxembourgish (0.05) required adjustments. Looking at all three questions individually, it became clear that Q2 and Q3 (see Appendix C) lacked sufficient variation in their answer patterns. Of five available answers across the Likert scale, all students responded with either “most of the time” (4/5) or “always” (5/5). Both items were consequently removed from the construct and only Q1 (exposure to Luxembourgish in the home) was retained.

4.3.2.3 Psychotypology

As Dörnyei and Ushioda (2011) argue, every questionnaire requires the development of its own instrument specific to that environment. New items need to be designed to fit the particular research objectives of a study, while other items may be borrowed from previously tested instruments in the literature (Dörnyei, 2003, 2007). The present study had to create new questions to elicit learners’ psychotypological beliefs, since no complete questionnaire was available in the literature.

The majority of the more well-established literature on psychotypology did not test the students’ subjective perception of similarity. Lindqvist (2015)
points out that “the existence and the nature of learners’ perceptions about the relative proximity between languages have only been assumed in many previous studies” (p. 232-3) and “have rarely been examined explicitly” (p. 243). Sánchez (2015) therefore stresses the need for psychotypology to be formally tested: “[research] should incorporate a test specifically designed to measure learners’ perceptions about language relatedness, over and beyond objective typological (dis)similarity” (p. 264). Such a test has thus become a necessary step in understanding the effects of psychotypology beyond the potential effects of typology itself.

There are only a couple of studies to date that have aimed to measure psychotypology. Hall et al. (2009) used a questionnaire to elicit participants’ subjective perception of similarity between languages. All of their items were comparative in nature, i.e. they asked which of two background languages was more similar to the target language. Lindqvist (2015) bases her questionnaire of psychotypology on Hall et al. (2009) and also poses comparative questions, such as whether their L2 or their L3 was easier to learn for a native speaker of their L1. The questionnaire also included one item on which language pair was most similar at the lexical level and which at the syntactic level.

In both studies, the questions are dichotomous in nature (i.e. the participant is asked to choose one language pair over another as the most closely related). Such an approach, however, denies varying degrees of similarity to be taken into account and only provides a ranking of the background languages with no measure of actual distance (e.g. German may be ranked closer to Swedish when compared to English, but also when compared to Chinese; leaving no room for a distinction based on how much closer it is).

Haghverdi et al. (2012) and Sayehli (2013), on the other hand, used items that asked about the degree of similarity between one of the background languages and the target language. The same approach was employed in the present study as it allows the coding of three separate variables (one measure for each background language in relation to the target language). As there are no other published questionnaires on psychotypology but the 5-item excerpt found in Haghverdi et al. (2012) and the 7-item questionnaire in Sayehli (2013), the items for this study had to be newly created. Items were, however, modelled on the examples provided by Haghverdi et al. (2012) and Sayehli (2013).
The way we define psychotypology necessarily affects how we measure it. For the present study, a definition of conscious, subjective perception of similarity between languages was used, which may or may not differ across linguistic levels. In addition, what was tested is language-general psychotypology, rather than item-specific psychotypology. Due to the more free nature of the task, too many different items are produced by each student to test the perceived transferability of individual items.

4.3.2.3.1 Pilot & main study

The questionnaire items measuring psychotypology that were included in the initial pilot study related to the overall degree of similarity between languages (see example 5 below) and the learners’ judgment of whether knowing a particular SL makes acquiring the TL easier (Lindqvist, 2015) (see example 6 below).

(5) Luxembourgish and English words are similar.
   Very true / true / false / very false

(6) It will be easy for me to learn English because I already know German.
   Very true / true / false / very false

The Cronbach’s alpha values of internal consistency for these fell short of the 0.7 mark, which is indicative of the two types of questions not measuring the same construct. For the main study, it was thus decided to remove those items that related to the facilitative effect of certain SLs in TL acquisition, and to develop the construct of language similarity, which was judged to reflect the definition of psychotypology better than facilitative effects.

Since it has been shown that perceptions of similarity at individual linguistic levels can have an effect (e.g. phonological similarity in Schmidt & Frota, 1986a, see § 4.3.2.2.2), for the main study, learners’ perceptions were elicited through items relating to each SL’s general degree of similarity to the target language, as well as items pertaining to phonological and orthographic similarity in particular (Figure 4-4 below).
4.3.2.3.2 Data processing

As with proficiency and recency, the scale for psychotypology was re-tested for internal consistency after the main study (Table 4-7). Interestingly, items pertaining to phonology and orthography correlated well with each other, despite previous research suggesting potential difference across linguistic levels (§ 3.1.3.1). All items thus contributed to a strong overall Cronbach’s alpha and were included in the average psychotypology measure of that language pair. The final values (or scales) used in the subsequent statistical model were achieved by averaging the individual questions for each participant. The means and standard deviations in Table 4-7 below relate to these averages.

Table 4-7. Internal consistency of psychotypology measures. (max=4)

<table>
<thead>
<tr>
<th>Language Pair</th>
<th>Mean</th>
<th>SD</th>
<th>Cronbach α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lux. vs. English</td>
<td>1.79</td>
<td>.53763</td>
<td>.74</td>
</tr>
<tr>
<td>German vs. English</td>
<td>2.26</td>
<td>.54683</td>
<td>.79</td>
</tr>
<tr>
<td>French vs. English</td>
<td>2.02</td>
<td>.57130</td>
<td>.82</td>
</tr>
</tbody>
</table>

4.3.2.4 L2 status

As discussed in § 3.1.4.1.2, different hypotheses have been proposed as to why we seem to be observing an L2 status effect in transfer. They generally relate to how a language was acquired (naturalistic versus formal acquisition) and how a language is processed (procedural versus declarative memory). Both approaches argue that because the L2 is more similar to the L3 (regarding mode of acquisition and/or underlying processing mechanisms), there is more transfer from an L2 than from an L1 in third language acquisition. It is argued that in the L1, procedural memory sustains syntax, and declarative memory
sustains vocabulary (Bardel & Falk, 2012), while in the L2 and L3, declarative memory sustains both syntax and lexis. This model would thus suggest more syntactic transfer from the L2, but no difference in transfer from the L1 and L2 in the case of lexis. In order to test the L2 status hypothesis, learners’ were asked to answer questions regarding how they acquired each of their background languages.

4.3.2.4.1 Pilot & main study

In the pilot study, information on the L2 status of each of the languages in a student’s repertoire was gathered through two separate questions. First, students were asked to indicate the approximate age at which they started learning each additional language, and second, whether they learned it through family, friends, at school, or on their own. They were allowed to tick more than one box (Figure 4-5). Given the more fact-establishing and categorical nature of these questions, no issues were encountered, and the section was retained as was for the main study.

<table>
<thead>
<tr>
<th>2.2</th>
<th>How old were you when you started learning this language?</th>
<th>years old</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3</td>
<td>How did you learn this language?</td>
<td>family</td>
</tr>
<tr>
<td></td>
<td></td>
<td>friends</td>
</tr>
<tr>
<td></td>
<td></td>
<td>school</td>
</tr>
<tr>
<td></td>
<td></td>
<td>on my own</td>
</tr>
</tbody>
</table>

Figure 4-5. Example items measuring the L1/L2 status.

4.3.2.4.2 Data processing

In this study, the threshold used for an L1 based on the age of acquisition was age three, which is generally accepted as the cut-off line in the literature. For example, Lakshmanan (2009) writes that in “[c]hild second language acquisition […] the initial exposure to the target language typically occurs beyond the age of three years” (p. 377) and Saville-Troike (2006) echoes this view by stating that L1s “are assumed to be languages which are acquired during early childhood – normally beginning before the age of about three years” (p. 4). For the L2 status measure based on mode of acquisition, having learned a language through friends, family, or on your own was taken to be naturalistic acquisition, while having learned a language at school was taken to mean formal acquisition.

Generally, naturalistic learning tends to coincide with those languages learned from birth, while formal learning tends to coincide with subsequently learned languages. In the present data set, however, participants had conflicting combinations, with the age of acquisition indicating an L2 status, but the mode of
acquisition indicating an L1 status. Some students of immigrant background had learned Luxembourgish through friends and interaction at the age of four and so while the time of onset is indicative of an L2, the mode of acquisition is suggestive of an L1 status. The two types of information regarding the status of each language were consequently kept as two separate variables: “L2 status based on age” and “L2 status based on mode” and they were each tested for their predictive power on the source language of transfer, as a preliminary research question (see § 5.2 for the results of this investigation).

4.3.2.5 Limitations

Questionnaire design is a highly complex and difficult task, which requires constant weighing of what aspect needs prioritising in a given context (Dörnyei, 2003). Due to the fact that data on four languages (three SLs and one TL) were elicited in this study, the size of the questionnaire was quadrupled as every scale had to be repeated for each language. One of the constraints regarding length is the amount of time the teacher grants the researcher to work in their classroom, stealing precious teaching hours from them. A more important time constraint is the one imposed by the participants’ motivation and attention span. This second limitation becomes even more prominent in studies with young participants. Students may struggle to remain focused until the very end of the questionnaire and to maintain a certain degree of motivation, and this especially in the lower level classes. The questionnaire was, therefore, kept at a maximum of four pages. Furthermore, colourful answer grids and small cartoons were used to make it visually more appealing and answer blocks including the four languages for a single question (e.g. Figure 4-2 and Figure 4-3) were designed to make the process as efficient as possible.

One of the limitations of the data that was collected is that some of the scales were skewed, due to a high number of students giving the same or similar answers (e.g. all participants judged their proficiency in Luxembourgish to be high or very high). Skewness may lead to inflated correlations in the Cronbach’s alpha measures and consequently to exaggerated reliability measures. Finding a large sample of participants that contains sufficient variation on all aspects tested is, however, a nearly impossible task, considering that they also need to have knowledge of the same combination of languages. This thus remains a limitation we need to accept for this study (for the variable of proficiency in Luxembourgish), but it is also a limitation that governs the field of research more generally, as participants always tend to have good knowledge of the majority language in the country.
Finally, it also needs to be stated that there may have been a slight bias in some students’ answers with regards to the L1/L2 status of Luxembourgish, as some stated that they learned Luxembourgish at school at a young age. What they most likely meant, however, is through general exposure at school and not in a formal language instruction class, as these do not exist for young learners in Luxembourg. Luxembourg employs a policy of direct integration into regular school classes for age groups 3-5 and 6-12, and either an intensive German or intensive French track for those aged 12-17, who have no knowledge of French or German respectively (CASNA: Cellule d’accueil scolaire pour élèves nouveaux arrivant, 2017). The national language Luxembourgish is thus not a language of education (Pettinger & Heggen, n.d.). In future research, the wording of the questions in the questionnaire needs to include greater detail to avoid any potential misunderstanding of this sort.

4.4 Data collection procedure

As a first step, consent was obtained from both the participants themselves and their legal guardians. It was decided that passive consent was sufficient, given the non-invasive nature of the study. The study was of minimal risk to the participants, and the degree of discomfort anticipated to be encountered in the research was not greater than that ordinarily encountered in daily life or in their regular school environment. One parent denied their child’s participation in the study, and the student in question was given an alternative task by the teacher for the length of time that the study took place in the classroom. The empirical task was administered first and the questionnaire second (see Table 4-8 below). This order was chosen in order to avoid the content of the questionnaire potentially indicating the purpose of the study, thereby influencing learners’ behaviour on the empirical task.

Table 4-8. *Order of task administration in main study.*

<table>
<thead>
<tr>
<th>Spoken production</th>
<th>Written production</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Picture story description (individual recordings)</td>
<td>Picture story description (in the classroom)</td>
</tr>
<tr>
<td>2. Questionnaire (in the classroom)</td>
<td></td>
</tr>
</tbody>
</table>

One higher level class (“classique”) and one lower level class (“technique”), 41 students in total, completed the picture story description in writing together in the classroom (e.g., Pfenninger, 2014; Sánchez, 2012), followed by the questionnaire. Thirty-eight students, again from two different levels, described the picture story orally during individual recording sessions, and then
completed the questionnaire together in the classroom. Each student was given a 10min time-slot for the spoken recording during which they met with the researcher. This was done outside regular school hours. All oral productions were audiotaped and transcribed. Both the spoken and the written data were entered into NVivo and transferred items were coded by source language (see § 4.5 for details of the coding principles applied).

During the oral production task, participants were not given time to look at all the pictures first, but were asked to just start describing the story as well as they could. This was done in order to keep the production spontaneous and thus more representative of spoken data. Allowing too much processing time would create an environment more similar to writing and thus make any contrast between the two void. The elicited data from both speaking and writing should consequently be rather stereotypical for the mode they were produced in.

Students were told that they should not worry about making mistakes. Rather, they should imagine being in England, where they needed to explain an urgent matter to a monolingual English speaker by whatever means available to them. It was also made clear that it was not a test which they could fail, that it was anonymous (each student received a code which they used for both the questionnaire and experimental task) and that their teacher would not be given access to the data.

Generally, the language of instruction for a given experiment can skew transfer data toward that particular background language, by leading to greater activation levels of that language. Ideally then, only the target language of the study is used for interaction, in order to avoid a bias for one of the background languages. However, due to the low proficiency levels in English, this was not possible. All oral instructions were given in Luxembourgish. Luxembourgish was chosen for spoken interaction as it is the most commonly used oral language at all levels of school proceedings. The researcher/interlocutor was a speaker of Luxembourgish, German, French, and English and students were aware of this. While the language knowledge of the interlocutor has been shown to potentially influence the choice of source language (Dewaele, 2001), in this case such bias would only be relevant for other, additional background languages which a participant may know, but which the researcher does not know. As the focus of this investigation was the three background languages shared between the interlocutor and the students, the impact of the issue was
considered negligible given the particular research questions under investigation.

It needs to be stated, however, that participants may have relied more heavily on their additional background languages, if the interlocutor had shared their knowledge of these languages. Increased transfer from an additional language, such as Arabic (had the interlocutor been familiar with Arabic), might have decreased the overall amount of transfer from the three background languages under investigation in this study, but it seems unlikely that the proportions across the three languages would have been influenced, and it is these proportions that the current study aims to investigate. Finally, Bardel and Lindqvist (2007) have suggested that all background languages appear to be active in L3 production, independent of whether the interlocutor shares the same language knowledge.

4.5 Coding procedure

“CLI has often been treated as a you-know-it-when-you-see-it phenomenon” (Jarvis & Pavlenko, 2008, p. 27). It is most often based on the researcher’s intuition and generally perceived as self-evident. Felix (1977) expressed his concerns over the lack of “any well-established criteria by which it can be decided in a unique and principled way which ungrammatical utterances are demonstrably instances of language transfer” (p. 238; cited in Meisel, 1983, p. 129). A great deal of questions arise regarding what happens when transfer is so subtle that it cannot be detected by simply looking at the data or when something looks like transfer but actually is not.

Meisel (1983) adds to these concerns by arguing that identifying as transfer any instance where an interlanguage structure bears resemblance to a corresponding L1 structure but not a target language structure is poor practice, as one cannot prove that no other cause underlies the effect. More recently, Jarvis and Pavlenko (2008) have argued that “the all-too-common practice of assuming the liberty to label as transfer any or only the language use data that the researcher subjectively deems as such, is inadequate” (p. 27), and suggest three types of evidence that can be used to approach transfer identification in a more principled manner. According to Jarvis (1998, 2000) and Jarvis and Pavlenko (2008), the following three types of evidence should be employed in any identification of CLI:
• **Intragroup homogeneity:** Evidence that the behavior in question is not an isolated incident, but is instead a common tendency of individuals who know the same combination of languages.

• **Intergroup heterogeneity:** Evidence that the behavior in question is not something that all language users do regardless of the combinations of L1s and L2s that they know.

• **Crosslinguistic performance congruity:** Evidence that a language user’s behavior in one language really is motivated by her use (i.e., the way she demonstrates her knowledge) of another language.

Jarvis & Pavlenko, 2008, p. 35

However, they argue that all three types do not necessarily need to be verified through rigorous tests but can also be established through more informal evaluation, as well as drawn from external sources, such as previous studies, existing corpora, or common knowledge. However, in their more detailed explanation of the different types of evidence, they exclusively focus on the occurrence of *syntactic* deviances in the target language. For example, in the case of intragroup homogeneity, they argue that “if a verifiable trend in the use of the English definite article with proper nouns (e.g., *the David Gilmore*) is observed in the language production of Spanish-speaking learners of English at a given level of L2 proficiency, then the relative homogeneity of this pattern (i.e., the strength of this trend) in the English (recipient language) of these Spanish (source language) speakers would serve as one piece of evidence that the observed pattern may be the result of CLI” (Jarvis & Pavlenko, 2008, pp. 41-42). The question that arises is how these types of evidence apply to *lexical* transfer.

Vocabulary acquisition is highly dynamic and variable across individuals, as are the exact items that are being transferred. In addition, the expectation that if CLI causes one speaker of a source language to demonstrate a certain behaviour then the same should be true for other speakers of that language becomes increasingly difficult to apply to multilingual learners, as they may make use of their source languages to different extents.

It thus seems that, at least in the case of lexical transfer, no clear criteria have yet been established that would allow us to reliably identify a TL error as transfer and to assign it to one (or more) of the source languages. In their final comments on the topic, Jarvis and Pavlenko (2008) write the following:
Methodological rigor is important, but the ultimate goal should be interpretational validity—or the credibility of one’s findings and interpretations—and this ultimate goal may demand differing levels of methodological rigor in different studies depending on the degree to which external sources of evidence are already available, and depending on the degree to which the presence of CLI effects is likely to be questioned or challenged in the first place [emphasis added].

Jarvis & Pavlenko, 2008, p. 50

It may be that the presence of transfer at the lexical level is generally less questioned or challenged, as the origin of direct borrowings and foreignisings are often very obvious. This is not to say that we do not need to establish strong criteria that can reliably identify transfer, thus making results also more comparable across studies, but we may have to find a way to confirm our analyses of lexical transfer that is not item-bound. One first step could be to rely on inter-rater reliability, i.e. the use of a second coder and the subsequent comparison of the two raters’ analyses. This was done in this study (§ 4.5.4) in order to increase the credibility of the transfer analysis and reduce the subjectivity of the coding as much as possible.

Before introducing the coding criteria (§ 4.5.3), the transcription conventions used when giving an example are presented (§ 4.5.1), as well as all those instances of language switching that were not considered transfer and therefore not included in the analysis (§ 4.5.2).

4.5.1 Transcription conventions

The following transcription principles are used throughout this text. The transferred item that is the focus of the example is marked in bold (examples 7-11). In the case of form-based transfer in the oral data, all words other than the transferred item are presented orthographically for ease of reading, while the target item is presented phonetically (example 10). In the case of meaning-based transfer (example 11), the phonetic transcription was deemed unnecessary since the transferred words indeed exist in the target language and their form (i.e. pronunciation) was correctly produced; the transfer error only relates to its meaning.

Each transfer example is followed by the source language it is judged to originate from, the original SL word in quotation marks, and the intended English target in brackets and italics. In the oral data, the original SL pronunciation of
the word is also provided (example 10). When an example sentence contains two transferred items (example 9), the one in focus is marked in bold, while the other is preceded by an asterisk. The SL and translation for those additional errors is not provided for ease of reading. Other errors (i.e. non-transfer errors) are not marked.

**Written transfer:**

(7) The kid and the dog search the *Frosh*.  
From German “Frosch” (*frog*)

(8) But the frog has *spring* out of the window.  
From German “springen” (*jump*)

(9) He is sitting in the forest and looking in to the *true* and a *maulwurf* coming up.  
From French “trou” (*hole*)

**Spoken transfer:**

(10) / [...] but he can't /fɪnt/ him /  
From German “finden” /fɪndən/ (*find*)

(11) / the boy run *for* search the dog /  
From Luxembourgish “fir” (can mean either *in order to* or *for*)

### 4.5.2 Excluded from coding

Since the focus of this study is on lexis, only lexical errors were considered. In the spoken data, however, it was sometimes difficult to decide whether transfer should be classified as phonological or lexical. The same issue arose with orthographic transfer in the written data. While slight mispronunciations were not taken into account, if a cognate item was clearly pronounced in one of the source languages (e.g. example 10 above), which was often accompanied by a difference in tone or giggling associated with the student’s awareness of using a non-target language item, this word was coded as lexical transfer.

In the spoken data, all instances of language switching that did not relate to the content of the story, but occurred as an interactional strategy (i.e. instru-
mental language use) (examples 12-15) or as a self-addressed comment (examples 16-18) were ignored. Only the content that directly contributed to the description of the story was considered for the coding of transfer. Instrumental language use is strongly dependent on the context and interlocutor and thus less representative of the psycholinguistic factors under investigation in this study. Furthermore, including interactional language from oral production would impede any comparison with written production and strongly skew the data (Falk, 2015) in favour of Luxembourgish as all task-related interaction was done in this language.

Any repetitions in the spoken data were ignored for the same reasons (examples 19-20). Transferred items that preceded correct self-repairs in the target language were, however, counted (examples 21-22), as these reflect the more unconscious, spontaneous nature of speech and the item activated first.

**Instrumental (interactional) language use**

(12) / [L] wéi seet ee scho méi den nächsten Daag /
    English: How do you say ‘the next day’ again?

(13) / the boy found a / [L] wat as dat /
    English: What is that?

(14) / they follow bees and came to their / to / [L] wi seet een dat / to their nest /
    English: How do you say that?

(15) / Pitti looked in / [L] duerf ech iwwersprangen /
    English: Am I allowed to skip?

**Self-addressed comments**

(16) / and a uhu (E: owl) saw / [L] jo / the uhu (E: owl) attacked Pitti /
    English: yes

(17)  / the kid  scream / [L] ah nee nee / in the garden the kid looked in the in the hole of a of a *maulwurf /
English: ah no no
*From German “Maulwurf” (mole)

(18)  / the insect are / [L] keng Ahung /
English: no clue

Repetitions

(19)  / then after the boy klamm... klamms on a tree /
From Luxembourgish “klammen” (climb)

(20)  / he dog is will will die Bienen /
From German “will” (want)

Transfer before/after a correct self-repair

(21)  / the dog play on / with a house from the beens bees bees bee /
From German “Bienen” (bees)

(22)  / Pitti and her dog looked the frosh *oder frog /
From German “Frosch” (frog)

4.5.3 Coding criteria

The coding criteria for what counts as transfer (§ 4.5.3.1) had to be as rigorous as possible as they have a direct impact on the quantification of the transfer data for statistical analysis. Since the main focus of this study was not on the amount of transfer, however, but on the source language of transfer, the most important classification was that of deciding which background language a particular error in the target language originated from (if any) (§ 4.5.3.2). The data was also coded for the type of transfer each item represents (e.g. borrowing, lexeme matching) (§ 4.5.3.2).

4.5.3.1 Coding of transfer

Using Singleton’s (1987) guideline on coding those expressions as transfer that “grossly deviat[e] from [the target language] norms in terms of morphophonological form, their syntax, and/or their meaning, and whose deviancy
could plausibly be related to [the participant’s] knowledge of other languages” (p. 330), the following coding criteria were used for this study:

1. a lexical item had to be identified as an error in the target language
2. the error needed to be of form, or meaning, or both
3. the erroneous item needed to be similar in form or meaning to its intended translation equivalent in one of the background languages

In some instances, the first and second criterion were fulfilled, but the error was not similar in either form or meaning to its equivalent in any of the languages the learner knows. For example, one participant wrote: “[H]e is going tho his brother in Hanover.” While “tho” is an error in form, it cannot be linked to any available language in the learner’s repertoire. It rather seems to be an over-generalization of the frequent occurrence of “th” in the English language.

Whenever possible, tokens were classified “according to the languages that were deemed to offer plausible sources for the deviancies in question” (Singleton, 1987, p. 331). One useful question to ask in borderline cases such as spelling influence is whether a learner who did not have knowledge of the SL in question would have produced the same error. For example, if a speaker of German writes “bet” to mean English bed (the German word being “Bett”), is this simply a spelling error or is this orthographic influence from German? The question we should ask ourselves is what the odds are that a speaker of French (with no knowledge of German) would produce the same error (the French word for bed being “lit”). If we believe the odds to be much lower, then we should code it as transfer from German.

Other issues that arise from these criteria are whether an item is truly incorrect in the target language or whether the learner’s intended meaning simply does not match our expectation. A learner might, for example, describe the picture of a lake as “sea”, which could be interpreted as a semantic extension or lexeme matching from German “See” (Eng. lake). However, the learner may indeed interpret the picture to be depicting the ocean rather than a lake and is thus correctly using the term “sea”.

It also remains to be determined how similar an erroneous item needs to be to a SL word to be reliably assigned to that language. Is one letter such as in the example of “bet” sufficient to code it as German transfer? In this study, such instances were considered transfer, as a rather generous acceptance policy was
applied throughout. Other researchers may, however, exclude these instances, and so we need to accept that such ambiguities and consequent limitations regarding the comparability of results remain. However, since this study’s focus is not the amount of transfer in language production but the predominance of one source language over another and since the generous acceptance of an item as transfer equally applies to all source languages, these limitations should have little impact on the research questions at hand.

Transfer in this data was only considered to mean “the use of one or more terms (but not whole sentences)” in one of the background languages as part of an utterance produced in the target language (Cenoz, 2001, p. 13). This includes form-based transfer (§ 4.5.3.1.1), such as borrowings, foreignisings, and spelling transfer, as well as meaning-based transfer (§ 4.5.3.1.2), such as lexeme matchings, semantic extensions, direct translations, and combined transfer (see § 2.1.6 for full definitions of the different types of transfer).

Below, the coding of different types of transfer is described. The examples are taken from all possible source languages (including examples that could not be assigned to one SL alone and were consequently excluded from the statistical analysis).

4.5.3.1.1 Form-based transfer

(1.a) Borrowings

Borrowings are usually the least controversial type of transfer (examples 23-28). Items that underwent capitalization changes could be considered borrowings but were considered to be foreignisings in this study, given that removing the capital first letter of German and Luxembourgish nouns is a reflection of students’ awareness of TL orthographic rules.

Written transfer:

(23) In the next moment fällt a big *bienenstock.

From German “fällt” (falls)

(24) The kid and the dog search the Frosch.

From German “Frosch” (frog)

(25) He is on the tête of the *hirsch.

From French “tête” (head)
Spoken transfer:

(26) / and then he goes go at the *also /bəʃ/ /
From Luxembourgish “Bësch” /bəʃ/ (forest)

(27) / the dog was running /dafɔn/ /
From German “davon” /dafɔn/ (away)

(28) / she going in the /fɔʁɛ/ /
From French “forêt” /fɔʁɛ/ (forest)

In example (23), the verb was borrowed with its SL morpho-syntax thus illustrating a complete borrowing. Generally, however, borrowings are more common with nouns than verbs (e.g. examples 24, 25, 26, and 28). Assigning a source language to a borrowing is usually rather uncontroversial as the orthographic or phonological form make the word’s origin obvious.

(1. b) Foreignisings

As discussed at the beginning of this section (§ 4.5.3.1), the third criterion for identifying transfer is that the erroneous item needs to be similar in form or meaning to its intended translation equivalent in one of the source languages. However, there is no guidance in the literature on how similar an erroneous item needs to be to the SL word. As explained above (§ 4.5.3.1), for this study even minor similarities were considered evidence of transfer.

The interpretation of examples (29), (30), and (31) is rather straightforward, as no word in English could be identified that might have been meant by “bleesed”, “bines”, or “prain”. The orthographic adaptation of “prend” to “prain” (example 31) seems to show the learner’s perception that this spelling may be more acceptable than its SL spelling (potentially based on the learner’s exposure to words such as train, grain, rain, brain; all words of a >1500 frequency in the BNC, while there is only one word ending in -rend with a frequency above 1500: trend).

Written transfer:

(29) [...] he is bleesed on the head.
From French “blessé” (injured)
(30) The **bines** are angry and follow the dog.  
From German “Bienen” (*bees*)

(31) [...] the boy **prain** his pullover.  
From French “prend” (*take*)

(32) The next day the frog is **disparent**.  
From French “disparu” (*disappeared*)

(33) The boy and the dog **seach** the *frosh* in the shoes.  
From Luxembourgish “sichen” (*search*)

The word “disparent” in example (32) may be indicative of partial acquisition of the target word (see § 2.1.5). Such partial gaps may lead the learner to rely on their background languages to fill this gap. In this case in particular, the spelling influence is undeniable. Transfer of the word “seach” in example (33) is less obvious and it may be argued that it does not actually constitute transfer but rather incomplete target item acquisition. It was decided to include borderline cases, when any kind of SL influence could be detected.

**Spoken transfer:**

(34) /he /ɡʁɛ̃pt/ up the tree and on the other side from the tree he see the frog /  
From French “grimpe” /ɡʁɛ̃p/ (*climb*)

(35) / the frog have /kɪtɪŋ/ the room /  
From French “quitter” /kɪte/ (*leave*)

(36) / the boy /klæmz/ on a tree /  
From Luxembourgish “klammen” /klamən/ (*climb*)

(37) / suddenly the frog was /wæk/ /  
From German “weg” /vɛk/ (*gone*)

Foreignising also occurred in the spoken data. In example (34) and (35), the learner adapted the original item by using TL morpho-syntax to mark past tense (although they erroneously used the present participle ending -ing in example 35). Similarly in example (36), the transferred verb was marked with third person singular -s. Finally, example (37) shows the learner’s awareness
of how the same grapheme letters would be pronounced in the TL, thus producing “w” as /w/ instead of /v/. The grapheme “e” is pronounced /æ/ instead of /ɛ/, presumably a hyper-anglicism, i.e. an over-generalization of a frequent TL vowel sound to an inappropriate context.

(1.c) Spelling

Spelling transfer is probably the most controversial type of transfer and the most difficult to argue for. It is also with regards to spelling transfer that a large proportion of the disagreement between the two raters in this study originated from (see § 4.5.4 for a discussion). A number of examples are presented here, illustrating the underlying reasoning for why they were coded as transfer. In example (38), a student used the correct English word “river”, but spelled it “riwwer”, which is the spelling of the Luxembourgish word meaning “over”. I would argue that the spelling is not random and that learners with a different background language would not have used the same spelling. Example (39) shows that the learner knows the word shoes, but the spelling (“schuss”) is influenced by the German cognate (“Schuhе”). In many cases, however, identifying transfer remains highly speculative.

Written data:

(38) […] neer the little riwwer.
From Luxembourgish “riwwer” (over)

(39) the boy *prain his pullover, short, and his schuss […].
From German “Schuhe” (shoes)

(40) They swimm to a tree.
From German “schwimmen” or Luxembourgish “schwammen” (swim)

(41) Tony klim to an *Fels.
From Luxembourgish “klammen” (climb) and potentially German “klettern”

(42) The dog see a groupe bees.
From French “groupe” (group) and potentially German “Gruppe”
In example (40), we see a doubling of the final consonant (“swim”), which seems to be influenced by the presence of a double consonant in the German and Luxembourgish cognate forms (“schwimmen” and “schwammen” respectively). The production of the letter k in “klim” (example 41) in initial position appears to be influenced by the Luxembourgish spelling of its translation equivalent “klammen”, and is potentially further supported by the presence of the same initial letter in the German word (“klettern”). The word “groupe” (example 42) could be interpreted as a pure borrowing from French (“groupe”), but it seems unlikely that the learner has no knowledge at all of the TL word (“group”) given its high frequency. It was therefore interpreted as spelling interference from French (potentially also from German “Gruppe”).

4.5.3.1.2 Meaning-based transfer

(2.a) Lexeme matching

Lexeme matchings occurred rather frequently in the data (examples 43-50). It is false friends or false cognates (i.e. highly similar looking or sounding words across languages which have different meanings) which lead to these lexeme matchings. These instances of transfer can either be the result of transfer during the acquisition stage or evidence of the learners’ awareness of crosslinguistic similarity, and consequent trust in the possibility of positive transfer. Lexeme matchings by definition can always be a borrowing or a foreignising that turned out to look like a real TL word. However, it was decided to always code existing TL words as lexeme matchings, avoiding any guesswork about whether the learner was aware of the TL word or not. There is simply no way of establishing whether it was a foreignising or borrowing, where the result happens to be a homonym of an English word, or whether the learner already had knowledge of the TL word form in question.

Written transfer:

(43) [...] he cries the name of the frog.
    From French “crier” (call/scream)

(44) [...] he doesn’t become an answer.
    From German “bekommen” (get)

(45) The little boy and the dog are now in the little sea.
    From German “See” or Luxembourgish “Séi” (pond/lake)
(46) They *clim on a **hole** *three.
From German “**hohl**” (*hollow*)

(47) [...] the frog is not there, he **shine** invisible.
From German “scheinen” (*seem*)

**Spoken transfer:**

(48) / a */ʁeː/ has **packed** Pitti /
From German “packen” or Luxembourgish “paken” *(grab/scoop up)*

(49) / he **remarked** not that he was standing near from a buck /
From French “remarquer” */ʁəmaʁke/ *(realize/notice)*

(50) / the animal run to one **clip** /
From German or Luxembourgish “**Klippe**” */klɪpə/ *(cliff)*

In each of the examples presented here (e.g. “he cries”, “a hole”), the word indeed exists in the TL, but has a different meaning from what the learner intended and thus represents semantic transfer.

(2.b) Semantic extensions

Semantic extensions usually occur when the SL word has a broader meaning than the TL word or has multiple meanings, which are covered by different terms in the TL. In the written data, such transfer mainly occurred when the word functioned in the same way across all source languages, thus providing strong evidence that it must work the same way in English. In the oral data, such transfer mainly originated from Luxembourgish.

Example (51) in writing shows a semantic extension that stems, or could stem, from all three background languages. Each SL has only one word for what is distinguished in English by *let and leave*. The learner seems to have learned that French “laisser”, German “lassen”, and Luxembourgish “loossen” mean *to let* in English and assumes it also carries the two meanings of *to leave* and *to let* that it does in the BLs. In example (52) in writing and examples (53) and (54) in speaking, we see the same pattern where English pairs [*make and put*],
[next and other], [of and from] are covered by the same word in the source language.

**Written transfer:**

(51) Then they see that the *frosh has a *famili and they let him in the *natur.

From French “laisser” and German “lassen” and Luxembourgish “loossen” (can mean either *leave or *let)

(52) Tim make his new animal in a *glas.

From French “mettre” and Luxembourgish “maachen” (can mean either *put or make)

**Spoken transfer:**

(53) / the other day the frog wasn’t there /

From Luxembourgish “aner” (can mean either next or other)

(54) / he is called the name from the frog /

From Luxembourgish “vum” or French “de” (can mean either of or from)

As a side-note, we see “family” produced in example (51), which was interpreted as spelling transfer from German. However, Bouvy (2000) discusses how the TL may act as source for transfer because of the learners’ imperfect knowledge of it. For example, she raises the question of whether the plural form families encourages the use of the Dutch form “familie” in the singular. The same applies here. We may observe an interaction of crosslinguistic and intra-linguistic influence. Bouvy further argues that “the ultimate purpose of learners is not so much to incorporate particular [TL] elements, but rather to establish bonds between rules which are too similar not to be associated in their memories for economy’s sake” (Bouvy, 2000, p. 154). Efficiency thus seems to be just as relevant in second and additional language acquisition as it has been found to be in first language acquisition. In a similar vein, statistical learning should not just be considered in first language acquisition, but should equally be discussed as a relevant learning process in second and third language acquisition (see § 5.6 for a more detailed discussion of these considerations).
(2.c) Direct translation of compounds and other multi-word units

Direct translation presents the case of compounds and other multi-word units from one SL that are translated word by word into the target language (examples 55-58). In example (55) we see the translation of each component of the German compound word “Schlafzimmer” (bedroom) to produce “sleeproom”. Example (56) illustrates a direct translation of a phrasal verb (or alternatively a mix of direct translation and lexeme matching). The main verb is directly translated from German “hängen” to English hang, while the adverb particle was phonetically matched from German “ab” /ap/ to English up /ʌp/.

**Written transfer:**

(55) Michael was in his sleeproom with her dog Pipoc.
From German “Schlafzimmer” (bedroom) – “Schlaf” (sleep) & “Zimmer” (room)

(56) But he could be hanging up that *kukuk.
From German “abhängen” (shake off) – “ab” (lexeme matching to up) & “hängen” (hang)

**Spoken transfer:**

(57) / Peter *sucht very long /
From Luxembourgish “ganz laang” and German “sehr lange” (for a very long time)

(58) / the frog was not to find /
From German “nicht zu finden” or Luxembourgish “nët ze fannen” (not to be found)

The examples from oral production (examples 57-58) are not compounds or phrasal verbs and yet were transferred as multi-word units from the SL and consequently added to this section. In both examples, a set of words was translated one by one. One might judge example (58) to be syntactic transfer, rather than lexical transfer, something I would not argue against. It is the only example of this kind in the whole data set and whether or not it is included has little effect on the statistical analysis. It remains to be determined whether one can indeed tease apart what constitutes the direct translation of multi-word units.
and what constitutes syntactic transfer or whether the boundary is inherently unclear.

4.5.3.2 Coding of the source language of transfer

Individual words were coded for their language of origin, as described under criterion 3 in § 4.5.3.1. The present section only describes how more unusual cases were dealt with (e.g. intra-sentential mixing, multi-word units, etc.)

4.5.3.2.1 Intra-sentential mixing

It is common for learners to transfer from multiple SLs within the same sentence (examples 59-60). For the coding, it did not matter whether two instances of transfer from different SLs occurred intra-sententially or across sentences. Each item was coded in its own right. In example (59) from the written data, “spring” was consequently coded as a foreignising from German, while “chearch” was coded as a foreignising from French.

Written data:

(59) He spring on a three and chearch the frog.
    From German “springen” (jump)
    From French “cherche” (search)

Spoken data:

(60) / the guy have a dog and a Fresch / le / *oh mann / Fresch est /
    *nee ‘t as Franséich /
    From Luxembourgish “Fresch” (frog)
    From French “le” (the)
    Interjection in Luxembourgish “oh mann” (oh man)
    From Luxembourgish “Fresch” (frog)
    From French “est” (is)
    Self-addressed comment in Luxembourgish “nee ‘t as Franséich” (no that’s French)

In example (60) from the spoken data, the speaker stops themselves at their usage of the French determiner “le” and comments on their usage of the French verb “est” by saying “no that’s French”, but seemingly not realising that the preceding noun (“Fresch”) was also not produced in English, but was a Luxembourgish borrowing.
4.5.3.2.2 Multi-word units

In some cases, the learner produced multiple, consecutive words from the same SL (whole chunks or phrases)\(^\text{14}\) (examples 61-62). These were, however, coded for each word separately. It seemed necessary to consider each word in its own right as we would otherwise not be able to consider word class and type of transfer appropriately. A chunk usually includes multiple word classes and while they are often made up of borrowings only, this is not always the case.

**Written data:**

\(61\) A *gaier search **nach Beute**

*From German “nach” *(for/after)*

*From German “Beute” *(prey)*

**Spoken data:**

\(62\) / on the earth where they angekommen sind /

*From German “angekommen sind” *(have arrived)*

4.5.3.2.3 Double- and triple-supported transfer

Double- or triple-supported transfer (examples 63-69) may occur in the case of cognates across background languages (Näf & Pfander, 2001). What De Angelis (2007a) termed “many-to-one” transfer is the process of two or more languages simultaneously acting as source for transfer. The items’ cognate status seems to lend greater assuredness to the learner when attempting transfer. It has also been shown that double and triple cognates across languages lead to a facilitation effect in reaction time tasks (A. Dijkstra, 2005; Szubko-Sitarek, 2011), thus suggesting parallel language activation. Vildom (1963) already noted that two or more languages “may ‘co-operate’ in interfering with other tongues” (p. 212). Möhle (1989), for example, reports examples of combined influence in German learners of Spanish with prior knowledge of

\[^{14}\text{It may be argued that these examples represent code-switching rather than transfer. While a full discussion of the differences between the two is beyond the scope of this text, it was decided that any transferred items in sentences produced with the intent of speaking English and to describe the content of the picture story are to be considered transfer, while sentences for which there was no intent to use the TL were excluded from the analysis (see § 4.5.2).}\]
French and Latin. Here, the word “emplear” was used instead of the Spanish target “llenar” (*to fill*), arguably the result of combined influence from French “remplir” and Latin “plenus”, which were erroneously matched with the Spanish word “emplear”, meaning *to employ*.

In the case of typologically closely related languages and the high number of cognates across them, it is sometimes difficult to isolate which SL the word was transferred from (Lindqvist, 2015) or whether it may have been transferred from multiple languages simultaneously (Christen & Näf, 2001). As was done in Lindqvist (2015), such examples were coded separately, but were not included in the statistical analysis. Even with a powerful tool such as multinomial logistic regression, the model loses in power with an increased number of possible outcomes (i.e. number of possible SLs), especially considering the resulting low number of tokens for each category. Ensuing limitations are discussed in § 6.1. The following double and triple cognate combinations were found (but not included in the statistical analysis):

**German/ Luxembourgish**

**Written transfer:**

(63) The dog **will** climb on the bee house.
    From German “will” and/or Luxembourgish “wëll” (*want*)

(64) The deer bring the boy **by** the water.
    From German and/or Luxembourgish “bei” (*to*)

**Spoken transfer:**

(65) / the /hɪʁʃ/ take him far away and let him fall into a sea /
    From German and/or Luxembourgish “Hirsch” (*deer*)

**French/ Luxembourgish**

**Written transfer:**

(66) The dog are looking **sérieuxs**.
    From French and/or Luxembourgish “sérieux” (*serious*)

(67) The *bies *will **picking** [the dog].
    From French “piquer” and/or Luxembourgish “picken” (*sting*)
Spoken transfer:

No such instances found.

French/German/Luxembourgish

Written transfer:

(68) Boby profite and *trink a little.
   From French “profiter”, German “profitieren”, and/or Luxembourgish “profitéieren” (take advantage of)

Spoken transfer:

(69) / David has afraid and he take his clothes and go out /
   From French “avoir peur”, German “Angst haben”, and/or Luxembourgish “Angscht hun” (to have fear)

Table 4-9 presents the proportion of potential double- and triple-supported transfer across modes of production. We see slightly fewer such items in the spoken data (17% vs. 22% in writing), because the pronunciation of the given cognate sometimes offered clearer indication of which background language it originated from than the spelling of a word could.

<table>
<thead>
<tr>
<th></th>
<th>Ger./Lux.</th>
<th>Fre./Lux.</th>
<th>Fre./Ger./Lux.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaking</td>
<td>130 (17%)</td>
<td>0 (0%)</td>
<td>1 (0%)</td>
</tr>
<tr>
<td>Writing</td>
<td>146 (22%)</td>
<td>4 (1%)</td>
<td>8 (1%)</td>
</tr>
</tbody>
</table>

4.5.3.2.4 Combined transfer of compounds

Combined transfer occurs in the case of compounds, where one part of the compound is transferred from one BL and the second part from another BL. A component of a word might be replaced by a translation equivalent from another background language if that word feels more transferable to the learner.

Example (70) from the written data (“abaille-stock” for beehive) shows a compound word from German (“Bienenstock”), which was transferred by using the translation equivalent from French for the first part of the compound word
(“Bienen” was exchanged for the French translation equivalent “abaille”) and the second part was kept from the German borrowing (“-stock”).

So far, very little research has focused on combined CLI (probably because there are so few instances) and there is thus little understanding of the processes underlying the phenomenon. It is also not uncommon to see only one component translated into the target language, while the other word is left as is (example 71).

**Written transfer:**

(70) The abailestock is *tombe.

From German “Bienenstock” (*beehive*), with French “abaille” (*bee*) as the first part of the compound noun.

(71) On a moment the beenest fall [...].

From German “Bienennest” and/or Luxembourgish “Béienascht” (*beehive*) – “Bienen”/“Béien” (*bees*) & “Nest” (semantic extension of *nest*)

(72) Henry is looking in the maulwolfs house.

From German “Maulwurf” (*mole*)

Furthermore, each part of a compound may be transferred in a different way (e.g. one as a borrowing and one as a foreignising or lexeme matching). In example (72) from the written data set, we see the transfer of a compound noun from German, partially through borrowing and partially through lexeme matching. While “Maul” was fully retained, “wurf” was matched onto English *wolf*.

**Spoken transfer:**

(73) / and the */hʊnt/ find a /biːnənʃtax/ /

From German “Bienenstock” /biːnənʃtɔk/ (*beehive*), with Luxembourgish “Stach” /ʃtax/ (*sting*)

Finally, example (73) from the spoken data set shows how one part of the compound may be replaced by something that is not a translation equivalent. In this case, the learner kept the first part of the compound and transferred it as a borrowing (“Bienen” /biːnən/), while exchanging the second part for a
Luxembourgish word (“Stach” /ʃtax/). This word, however, is not the translation equivalent of the second component of the German compound (“-stock”). The correct translation of German “Stock” in Luxembourgish would be “Stack” /ʃtak/.

What seems to have happened is that the speaker co-activated the whole semantic field surrounding beehive (including the word “Stach” in Luxembourgish, meaning sting) and due to this word’s high orthographic and phonological similarity to the Luxembourgish word “Stack”, it interfered with the intended word selection. Overall, combined transfer from multiple SLs occurred on only a handful of occasions. The low number of occurrences is necessarily related to the limited number of compound words in the SLs given the particular objects and events depicted in the story.

4.5.3.2.5 Transfer from other background languages

In a sample of such diverse linguistic backgrounds, one must expect transfer from languages other than the three background languages under investigation and shared by all participants. A participant who in addition to Luxembourgish, German, and French also speaks Italian might also demonstrate transfer from that language.

Written transfer:

(74) And the boys is in a albero.
   From Italian “albero” (tree)

(75) [...] a *floresthorse is aperessed and have asusted Michael.
   From Portuguese “aparecer” (appear)
   From Portuguese “assuste” (scare)

Spoken transfer:

(76) / and [they] watch the /hoːməls/ /
   From Dutch “hommels” /hoːməls/ (bumblebees)

(77) / and the frog is in the /boːm/ /
   From Dutch “boom” /boːm/ (tree)

However, transfer from languages other than the three background languages in focus seems to have been rare (examples 74-77), with only about a dozen items identified in the whole data set. It needs to be stated, however, that no
true claim can be made as to the actual amount of transfer from additional background languages, given the researcher’s knowledge of only those background languages under investigation. It was, nevertheless, attempted to establish whether non-target-like items, which did not seem to originate from one of the three BLs under investigation, may be the result of transfer from an additional language this participant knew. In such cases, the researcher would look up the translation equivalent in the learner’s other BLs or consort with speakers of these languages to determine whether such transfer has occurred. Reasons underlying the lack of greater transfer from other BLs will be further addressed in the discussion chapter (§ 6.3.2).

4.5.4 Inter-rater reliability

In order to increase the reliability of the coding, a second rater was asked to analyse the data. Since the rater needed to speak English, French, German, and Luxembourgish at a rather proficient level and be willing to invest a certain amount of time, finding an appropriate person was not an easy task. In order to lighten the burden on the second rater, it was judged sufficient for them to analyse 10% of the written data. If the overlap of the two coders was sufficiently high on these 10%, it was assumed that the remaining data would have been analysed in a similar way. The second rater was trained with regards to the different types of transfer and was asked to use the same criteria the first rater applied (see § 4.5.3.1) in identifying instances of transfer:

1. a lexical item had to be identified as an error in the target language
2. the error needed to be of form, or meaning, or both
3. the erroneous item needed to be similar in form or meaning to its intended translation equivalent in one of the background languages

Five participants (roughly 12%) from the pool of 41 learners that completed the written task were randomly chosen. In total, 100 items were identified as transfer in this selection of texts (out of 458 instances in total in the written corpus). After the initial independent analysis, the agreement rate between the first and second coder was 69%. After jointly discussing the items, an agreement rate of 99% was achieved. Most of the cases of disagreement involved instances where the second rater accepted instances when a student chose one term over another as transfer, when the latter would have been the more commonly used item in the given context. The chosen word, however, was not ungrammatical. In example (78), the learner used the verb “to search”, when the more frequent option would have been “to look for”. Since the coding rules
state that the item needs to be an error in the TL for it to be considered transfer, it was agreed not to include these cases.

(78) He **search** the frog in the room

Some disagreement arose in the case of prepositions, where the second rater was more generous in their acceptance of instances that could only potentially be due to SL influence, but could equally well be an intra-lingual error. In example (79), the learner writes that the dog tries to climb “on” the tree, rather than that the dog tries to climb the tree (no preposition). The latter is more common and in both German and Luxembourghish the preposition is required and so it could be argued to be transfer. However, “to climb on the tree” is not an error in English per se, it is just not the correct way to describe this particular context. Given the lack of clarity in these cases, it was decided to exclude them.

(79) The dog jump again and he *(probiert) to climb **on** the tree.

Another source of disagreement was spelling transfer, where the first rater more consistently accepted spelling influence. For example, the second rater did not code “Famili” (example 80) as transfer from German, but the first rater did. The capitalization of the first letter and the use of “i” instead of “y” were judged not to be random, but due to the learner’s knowledge of the German cognate “Familie”. It was agreed that any spelling errors where the same letter combination occurs in the SL equivalent (whether this is a cognate or not) would be coded as transfer.

(80) […] he was with the **Famili**.

From German “Familie” (family)

Finally, a number of instances of initial disagreement were mere oversights on the part of one of the raters and were immediately accepted as transfer when pointed out. Given that the second rater agreed with the first rater in almost all instances of disagreement after discussing each example and re-evaluating it (except for 1 item), the first rater’s analysis of the remaining data was judged sufficiently reliable.

While most cases were clear, the process of using a second rater revealed the degree of subtlety required in judging some cases and consequently the need for highly detailed coding criteria. For example, it needs to be determined
whether “unusual” (but grammatically correct) formulations should be considered transfer. In this study, they were not included as the first criterion was that it had to be an actual error, but future studies may want to consider investigating how transfer affects the use of low-frequency items. Similarly, the criteria for spelling interference had to be specified; in this case it was decided to limit it to influence from the translation equivalent. This is not to say, however, that there is no general effect of orthographic and phonological influence. The fact that /k/ is generally represented by the grapheme “k” in German may influence the spelling of this phoneme in English, independent of whether the translation equivalent contains this phoneme or not.

4.5.5 Quantitizing of qualitative data

For the inferential statistical analysis (§ 5.2 - § 5.5), each individual transferred item was taken as a token of the dependent variable and so no averaging had to be done. However, in the presentation of descriptive statistics (§ 5.1.), group averages had to be achieved, yet different researchers use different methods to quantify transfer. For example, in Cenoz (2001), \{tokens transferred\} is used, independent of the total amount of words produced. More advanced learners may, however, produce significantly longer texts, thus reducing the proportion of transferred items, even when the number of tokens is the same. In a later study, Cenoz (2003b) uses a different method of quantification, where the descriptive statistics presented “compare the mean percentages of utterances containing units from other languages” (Cenoz, 2003b, p. 6) over the total amount of sentences:

\[
\frac{\text{sentences with transfer}}{\text{total sentences}}
\]

Transfer percentages are, however, directly related to the number of words produced per sentence and counting a complete utterance as transfer independent of the number of words contained in it is both inflating and skewing the amount of transfer produced. In Angelovska and Hahn (2012), on the other hand, “[t]he percentages of the L2 negative transferred properties were found for each learner by dividing the sum of the L2 interferences with the total sum of written words from each learner” (p. 30):

\[
\frac{\text{tokens transferred}}{\text{total tokens}}
\]
They find between 0% and 5.17% of transferred items per total amount of words produced. This way of quantifying transfer data allows for easier comparison across studies and was therefore also employed for the descriptive statistics on the total amount of transfer in this study (§ 5.1, Table 5-1).

For the proportion of transfer per source language (rather than the overall amount of transfer), Williams and Hammarberg (1998) use the percentages of items transferred from one source language out of the total amount of transferred items (not the total amount of words produced) to discuss their results:

\[
\frac{\text{tokens transferred from language } A}{\text{total tokens transferred from all languages}}
\]

The same method of quantification regarding the distribution of transfer across the different source languages was used in this study (§ 5.1, Table 5-2).

4.6 Statistical data analysis

The statistical data analysis (multinomial logistic regression) conducted in this thesis represents a novel approach to transfer research in third language acquisition and will therefore be briefly explained in this section. For a more thorough discussion of the use of multinomial logistic regression in research on transfer, the reader is directed to Neuser and Pfenninger (forthcoming).

4.6.1 Multinomial logistic regression

Multinomial Logistic Regression is a statistical analysis conducted when the dependent variable (DV) is nominal (i.e. categorical) with more than two possible outcomes. It is an extension of logistic regression, which analyses a dichotomous/binary (i.e., with two possible outcomes) dependent variable. Multinomial logistic regression is used to predict categorical placement in or the probability of category membership of a dependent variable based on multiple independent variables (IVs). The independent variables can be either categorical or continuous. It is thus used to analyse the relationship between one categorical DV and multiple IVs (Menard, 2010).

One example of when multinomial logistic regression can be used would be to determine which pronunciation of “thought” a person produces (DV) (possible outcomes: /fɔt/, /tɔt/, and /θɔt/), given particular characteristics (IVs) (e.g. location, L1, education, gender). Another example would be which can-
didate a person will vote for (DV), given particular demographic characteristics (IVs) (e.g. race, sex, age, income, etc.). Similarly, the data collected for this study act as training data to determine the IVs’ (proficiency, exposure, psychotypology, L2 status) predictive power for each of the possible outcomes (Luxembourgish, German, French). Given the nature of the dependent variable in this study (categorical with three possible outcomes), multinomial logistic regression represents the most appropriate statistical model.

The goal of a multinomial logistic regression analysis is to construct a model that explains the relationship between a set of explanatory variables and an outcome variable, so that the outcome can be correctly predicted in a new experiment, for which only explanatory variables are available, but not the outcome. It offers a particular solution to the classification problem by determining the best values of the parameters for a given problem from some training data.

4.6.2 Assumptions of the statistical model

One important advantage of multinomial logistic regression over other statistical models is that it does not make any assumptions of normality and homogeneity of variance for residuals, or linearity of variance for the independent variables. This makes it an extremely useful method in research that uses complex human data, which often do not fulfil the required assumptions of other statistical analysis tools (Menard, 2010).

One important consideration for multinomial logistic regression, however, is the maximum number of independent variables allowed, considering the available amount of data. Hosmer and Lemeshow (2000) argue that “a minimum of 10 events per parameter are needed to avoid problems of over-estimated and under-estimated variances” (p. 346). A minimum ratio of 10 observations to 1 parameter is generally accepted as rule of thumb in regression modelling. While parameter is often used interchangeable with independent variable to discuss the necessary number of tokens in the case of ordinary linear regression or binary logistic regression, these are not equal in number in multinomial logistic regression. In binary logistic regression, there are only two possible outcomes and thus one comparison (outcome A vs. B), which represents one parameter. In multinomial logistic regression, however, we have three possible outcomes and thus two comparisons (A vs. C and B vs. C), representing two parameters. If we return to the example of the pronunciation of “thought” above, we would have two parameters since we have two
comparisons: /ʃɔt/ vs. /θɔt/ and /tɔt/ vs. /θɔt/. In the context of this study, we also have two parameters, since we have two comparisons: Luxembourgish vs. French and German vs. French.

Furthermore, ‘events’ in Hosmer and Lemeshow’s argument does not refer to the total amount of valid cases, but to the frequency of the least frequent outcome. In the data presented here, the least frequent outcome in speaking was French (61 tokens), while the least frequent outcome in writing was Luxembourgish (54 tokens). Accordingly, the given rule of thumb would allow six parameters to be estimated in speaking and five in writing. Hosmer and Lemeshow (2000) further maintain that “[a]s is the case with any overly simply solution to a complex problem, the rule of 10 should only be used as a guideline and a final determination must consider the context of the total problem” (p. 347).

Due to the complex nature of the model at hand, as well as the increased size of the model due to the tripling effect of having three measures of each factor (one for each background language), as well as a doubling effect of having two parameters for each variable (i.e. two comparisons), this rule of thumb was violated. The implications of this are reduced power, making the detection of small effects difficult, while those effects that prove to be significant will have wide margins of error. Since we are mainly interested in whether or not there are effects, and their direction, and less concerned with the magnitude of these effects, the model was nevertheless deemed useful and thus retained.

4.6.3 Internal and external validity

Internal validity is “the condition that observed differences on the dependent variable are a direct result of the independent variable, not some other variable” (Airasian, 2000, p. 345). Internal validity is thus threatened when plausible rival explanations cannot be eliminated (Onwuegbuzie & Teddlie, 2003). Assigning the terms dependent and independent to different variables is necessarily accompanied by connotations of causal relationship. Previous research suggests that it is proficiency, psychotypology, recency, and L2 status that affect the source language of transfer (and not vice versa). As with any other study, the question of whether this relationship is uniformly directed needs to be addressed, however.
In the case of proficiency, it seems intuitive that it is not the amount of transfer from source language A that increases the proficiency in language A. Similarly, it would be odd if greater transfer from a language increases the exposure to that language. Third, the status of a language is fixed and while its underlying mechanisms might change over time (e.g. from declarative to procedural memory with improved proficiency), such a change would not be introduced by an increased amount of transfer from that language. Psychotypology, on the other, could be marginally argued to be influenced by the choice of source language over time. If a learner consistently transfers from language B because of its level of proficiency, recency, and L2 status, this learner may perceive language B to be closer to the TL by repeatedly seeing words from this language in their target language production. It is nevertheless doubtful that there is such an effect. Even if there were, this would not eliminate the stronger effect in the other direction, i.e. psychotypology affecting the choice of SL.

External validity, on the other hand, is “the extent to which the results of a study can be generalized to and across populations, settings, and times” (Johnson & Christensen, 2000, p. 200). Even if a finding has high internal validity, this does not mean that it can be generalized outside of the study’s context. Inferential statistics try to reach conclusions that go beyond the immediate sample alone; more specifically, they aim to predict a particular outcome given a number of independent variables. Prediction is closely related to the concept of generalizability. Patterns revealed in a large enough data set from a particular context can be generalized to (i.e. predicted to occur in) other, similar contexts. This prediction is probabilistic, meaning that the researcher cannot be certain that the same pattern of behaviour will be found in other contexts, but can only reasonably expect to observe the same outcome. In other words, given that generalizability has its foundation in probability, it can never be conclusive or exhaustive, but illustrates the odds with which a particular outcome will occur. Producing precise probabilities, with its ensuing generalizability, is the primary goal of inferential statistics.

Results from multinomial logistical regression analysis are assumed to be generalizable because the model is based on inter-individual variability occurring in a sample said to represent the larger population of this type (i.e. multilingual learners in Luxembourg in this case). In order to ensure external validity as much as possible, the sample for this study was taken from a school that employs a strict enrolment policy based on proportional representation of
the country’s overall student population (see § 4.2). The student body and individual classes are matched in overall school results, sex, socio-economic status, and immigrant background, thus offering strong external validity for the population of multilinguals in Luxembourg. Multilinguals with other language backgrounds and from different countries might, however, not be represented by this sample.

4.7 Limitations of the method

Any newly tested method may solve some of the previously encountered issues but raise a number of new ones. In addition, some limitations just seem inherent in the type of phenomenon under investigation.

One limitation of this study is the fact that it is not the same group of learners that completed the spoken and the written part. It was decided to use two different groups as the same picture story could not have been used otherwise. A second limitation that is unavoidable with low TL proficiency learners, is the use of one of the background languages for instructional purposes (Luxembourgish in this case). This may have an activating effect and skew the data toward that SL.

Furthermore, the field of transfer research in general suffers from certain limitations, which also affect the present study. Issues regarding the objectivity of the coding remain, despite the use of a second rater. While quite detailed coding criteria were established in this study, there are no generalized criteria that all researchers adhere to, thus complicating cross-study comparisons of results. Establishing clear, unambiguous criteria that all researchers in the field can agree upon may, however, be an unachievable feat given the particularly complex nature of transfer data. It seems that the researcher’s intuition will remain an essential element of the coding process of lexical transfer at least for the foreseeable future.

Also, using a picture story in which certain objects appear on multiple occasions, while others only appear once, becomes an issue if we assume that there is an effect of item-specific transferability. If we consider the target item frog which is referred to on multiple occasions by most students, the three options for transfer are the following: [L] “Fresch”, [G] “Frosch”, and [F] “grenouille”. Given the French item’s orthographically more marked and language-specific nature, the odds of choosing the German or Luxembourgish word are higher. The data confirms this and a general trend across students to
produce “frosh” can be observed (see § 5.6.1). If we now consider the target word *room*, which only occurs in the first picture of the story, here most learners chose the French word out of the following options: [L] “Zëmmer”, [G] “Zimmer”, and [F] “chambre”. The problem that arises is that, had the majority of the pictures required students to refer to a room, rather than a frog, we would see different proportions of source language usage.

Using a type-count, instead of a token-count, may therefore appear to be the better solution, but this presumes that each item is not a separate case of transfer, but simply the retrieval from short-term memory of a previously transferred item. However, in some cases, we see intra-learner variability for the same target lexeme; it may thus be that each produced word represents a new selection process. Either way, the number of times *frog*, for example, was transferred is small when compared to the overall amount of transfer observed and a general pattern of SL preference can still convincingly be established for each student. Item-specific aspects do, however, play a role and one should remain aware of such effects and the limitations they impose on studies that focus exclusively on language-general factors (as the quantitative analysis of this study does).

Finally, a more conceptual aspect that imposes certain limitations on the conclusions that can be drawn from this study is the continuum of spontaneous versus prepared production which governs speaking and writing. It is not a clear-cut distinction, but rather a graded continuum in which, on the one hand, speech is not always fully spontaneous but learners can stop to think and conduct a lexical search, and, on the other hand, students may write hastily and not consciously reflect on each item they use. Making a dichotomous distinction between the two as this study does and investigating the extreme ends of the spectrum, is necessary, however, if we want to understand the scale in the first place. In future studies, it may prove interesting to look at transfer in a range of tasks along a continuum of spontaneous versus prepared language production, in both speaking and writing.
5 Results and Analysis

In this chapter, results and analyses concerning the four research questions of this project are presented (§ 5.3 - § 5.6). In order to provide an overview for the reader, descriptive statistics are presented first (§ 5.1), including the overall amount of transfer that was produced in both the spoken and the written mode (§ 5.1.1), as well as the distribution of transfer across source languages in both modes of production (§ 5.1.2). In addition, a preliminary research question is addressed (§ 5.2), investigating which is the best measure for the L2 status variable (mode or age of acquisition). Both measures were tested for their predictive power on the source language of transfer, with the strongest predictor then being used as the L2 status variable in all subsequent statistical analyses. Finally, the four main research questions are addressed in turn. Research Question 1 (§ 5.3) relates to the overall statistical model, including proficiency, exposure, psychotypology, and the L2 status, and its ability to predict the source language of transfer in both speaking and writing. Research Question 2 (§ 5.4) looks at each factor in turn and their predictive power when all other factors are held constant. Research Question 3 (§ 5.5) investigates the direction of the effect for each factor (i.e. whether there is a positive or negative correlation between the DV and the IV). Finally, Research Question 4 (§ 5.6) is addressed using a qualitative approach, by exploring the relevance of item-specific features in determining an item’s transferability and how this affects the source language of transfer in multilingual learners.

5.1 Descriptive statistics

Before delving into the descriptive statistics that offer us insight into what the data set looks like, I would like to remind the reader that the sample of participants does not represent a homogenous group regarding the four main factors: proficiency, recency, psychotypology, and the L2 status (precisely so in order to guarantee the necessary variability in the sample to run inferential statistical tests). Since the values presented here are group averages and not based on individual tokens, the descriptive statistics should be considered as merely indicative of a general trend within the sample.
In addition, one needs to remain aware that the proportion of learner profiles may differ regarding the four factors between the oral and the written group. While the four factors are tested as predictors in the inferential statistical analysis, thereby allowing a comparison between the two modes, the same degree of comparability does not apply to the descriptive statistics. A suggestive comparative analysis is nevertheless provided, but the reader is advised to remain aware of the limitations of such a comparison.

First the overall amount of transfer is presented (§ 5.1.1), followed by the distribution of transfer across SLs (§ 5.1.2). It was decided not to discuss the distribution of transfer across word classes and types of transfer here, as they do not directly contribute to the main focus of this study, but the relevant numbers can be found in Appendix A.

### 5.1.1 Overall amount of transfer

Table 5-1 below shows the overall number of words produced in each mode of production, as well the number of transferred tokens, the percentage of transfer by total number of words, and the standard deviation. It needs to be noted that two different samples of participants completed the spoken and the written part, which were not equal in size. Comparing the amount of words produced overall or the total number of transferred token has thus little meaning. More interesting is the proportion of transferred items by mode of production. We see 10.3% transfer in speaking and 7.7% in writing.

<table>
<thead>
<tr>
<th></th>
<th>SPEAKING</th>
<th>WRITING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total No. of words produced</td>
<td>7,269</td>
<td>8,646</td>
</tr>
<tr>
<td>Total No. of transferred items</td>
<td>749</td>
<td>663</td>
</tr>
<tr>
<td>Percentage of transferred item</td>
<td>10.30%</td>
<td>7.67%</td>
</tr>
<tr>
<td>Standard Deviation (SD)</td>
<td>13.89%</td>
<td>5.72%</td>
</tr>
</tbody>
</table>

As a point of comparison one may look at Angelovska and Hahn (2012) for written production and Lindqvist (2006) for spoken production. The former found 2.3% of transfer at beginners level (A2) during a free production task, which continuously decreases with improved TL proficiency to 1.5% (B1), 1.2% (B2), and 0.8% (C1). In speech, Lindqvist (2006) found 5.3% of transfer in beginner learners of L3 French, which decreases to 2% and 0.3% in high-school students and university students respectively. The percentages found
in this study are thus higher than those found in these two studies, but we need to remember that the picture story description task that was chosen for this study was selected precisely for its ability to elicit more transfer than a free production task. More importantly, the difference in amount of transfer from the spoken to the written mode is the same in both this study and the two studies cited, with more transfer occurring in speaking than writing in each case.

The decrease in the proportion of transfer from the spoken to the written mode is indeed significant (p < 0.05)\textsuperscript{15}. This can most probably be ascribed to the increased processing time available in writing, thus allowing more time to find an appropriate item, as well as to employ avoidance strategies, using alternative means to express a particular idea.

We also see a strong difference in inter-learner variability across modes of production. The standard deviation in speaking is 13.89\%, while it is only 5.72\% in writing. The greater variability in speaking is mainly due to the “technique” (i.e. lower level) class of that sample. Both the “technique” and “classique” classes in writing and the “classique” class in speaking have a SD of around 5\%, while the “technique” class in speaking has a SD of around 17\%. It thus seems to be the combination of the lower TL proficiency in the “technique” class and the particularities of the spoken mode that leads to greater inter-learner variability.

\subsection*{5.1.2 Distribution across source languages}

Since the focus of this thesis is the source language of transfer in multilinguals, rather than the overall amount, in this section the group-level distribution across SLs in both speaking and writing is presented. Table 5-2 below shows that the greatest decrease in percentage of instances of transfer from speaking to writing can be seen for Luxembourgish as source language. While Luxembourgish accounts for large proportion of transfer instances in the spoken data (35.5\%), this drops to 8.1\% in the written data. On the other hand, we see a sharp increase in the percentage of instances of transfer from French in the

\textsuperscript{15} Independent-samples t-test, one-tailed, t(50)=1.86, p=0.034.
written data (23.1% vs. 8.4% in speaking). Transfer from German also slightly increases from the spoken (37.4%) to the written mode (43.4%).

Table 5-2. Amount of transfer by source language.

<table>
<thead>
<tr>
<th>Source Language</th>
<th>SPEAKING</th>
<th></th>
<th>WRITING</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Percentage</td>
<td>N</td>
<td>Percentage</td>
</tr>
<tr>
<td>Luxembourgish</td>
<td>266</td>
<td>35.51%</td>
<td>54</td>
<td>8.14%</td>
</tr>
<tr>
<td>German</td>
<td>280</td>
<td>37.38%</td>
<td>288</td>
<td>43.44%</td>
</tr>
<tr>
<td>French</td>
<td>63</td>
<td>8.41%</td>
<td>153</td>
<td>23.08%</td>
</tr>
<tr>
<td>Other</td>
<td>140</td>
<td>18.69%</td>
<td>168</td>
<td>25.34%</td>
</tr>
<tr>
<td>Total</td>
<td>749</td>
<td>100.0%</td>
<td>663</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

The category listed as “Other” includes all instances of transfer that could not decisively be assigned to one SL alone (i.e. German-Luxembourgish, French-Luxembourgish, and German-French-Luxembourgish) (§ 4.5.3.2.3), as well as transfer that originated from other languages in the sample (e.g. Italian) (§ 4.5.3.2.5). Figure 5-1 below illustrates the categorization of SLs, where only Luxembourgish, German, and French were included in the inferential statistical analysis. A discussion of the impact that the removal of the “Other” category may have on the final results is presented in § 6.1.

Figure 5-1. Categorization of source languages.

As we do not know the individual profiles of participants in each of the two groups, no conclusions can be drawn regarding the four factors’ predictive power at this stage. This also makes it difficult to compare these numbers to
previous studies. However, group-general factors, which are shared by all participants, might provide some insight into the different proportions of transfer per source language in the two modes of production.

One possible explanation could be the differences in domain usage of the three source languages. Luxembourgish is not taught at school and is not used for written academic tasks, but is mainly used in oral communication between Luxembourgers, or in informal writing, such as text messages or on social media (§ 4.1.2). Its lack of use in formal writing in a school setting may have led to the significant decrease in transfer from Luxembourgish from the spoken to the written mode. This might be an indication that languages generally not used in a particular mode are not accessed for transfer when producing language in that mode. As such, a purely written/read language like Latin, for example, might be relatively inaccessible while trying to speak Italian, despite its typological closeness. In a study on L3 French acquisition, Singleton (1987) found that Spanish dominated as source language, followed by English, despite the learner also having knowledge of Latin, which he regards as typologically closer and believes it should therefore outweigh English. However, the study focused on oral production and given the special status of Latin as a predominantly written language, we might see an effect due to the language’s typical mode of production.

The increase in transfer from French from the spoken to the written mode may be ascribed to the generally lower French proficiency levels in the sample and consequently lower accessibility in speaking, due to shorter available processing time in comparison to writing. In addition, if we develop the argument of mode-specificity, most participants in the sample are predominantly exposed to French at school, a language in which writing and reading skills are in focus, rather than oral communication skills. Finally, although there is a slight increase in German transfer from speaking to writing, it is generally used a lot in both modes. This high proportion of transfer from German might be due to its usage in all subjects at school, where it is used in both speaking and writing to convey content knowledge. Generally, it thus seems as if the mode of production a language is generally used in has an effect on the proportion of transfer from that language in that particular mode.

5.2 Preliminary Research Question

Before embarking on answering the main RQs of this study, it remains to be established which measure of L2 is the most appropriate in the context of the
L2 status hypothesis in transfer and should consequently be used in the ensuing multinomial logistic regression analysis (§ 5.3 - § 5.5). Bardel and Falk (2012) state that “[c]rucially, the role of the L2 status factor is important in formal, adult learning of a foreign language. We do not claim, for instance, that the L2 factor comes into play in learners who have acquired an L2 naturally in pre-adolescent age, when later learning an L3” (p. 69) and that such cases remain to be investigated. Since it is not clear from previous research whether age of acquisition or mode of acquisition is the most convincing explanation for the L2 status factor, participants’ L2 status was coded once based on age and once based on mode of acquisition. In the sample of participants of this study, a later age of onset did not always coincide with formal acquisition, however (§ 4.3.2.4.2) and so the two variables were tested for their predictive power of the SL of transfer each in their own right.

In Table 5-3 and Table 5-4 below, both variables (L2 status based on age & L2 status based on mode) were tested for their ability to improve model fit in a multinomial logistic regression analysis of the source language of transfer (see § 4.6.1 for a detailed account of the statistical model). The model used here includes all other variables (i.e. proficiency, psychotypology, and exposure) in both analyses.

Table 5-3. Likelihood Ratio Test. Spoken data.

<table>
<thead>
<tr>
<th></th>
<th>L2 status based on age</th>
<th>L2 status based on mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-2 Log Likelihood</td>
<td>Sig.</td>
</tr>
<tr>
<td>Intercept Only</td>
<td>589.053</td>
<td></td>
</tr>
<tr>
<td>Final</td>
<td>323.508</td>
<td>.000</td>
</tr>
</tbody>
</table>

Table 5-4. Likelihood Ratio Test. Written data.

<table>
<thead>
<tr>
<th></th>
<th>L2 status based on age</th>
<th>L2 status based on mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-2 Log Likelihood</td>
<td>Sig.</td>
</tr>
<tr>
<td>Intercept Only</td>
<td>332.067</td>
<td></td>
</tr>
<tr>
<td>Final</td>
<td>238.415</td>
<td>.000</td>
</tr>
</tbody>
</table>

Overall, both variables contribute to a significant improvement of the -2 Log Likelihood (see § 5.3.1 for an explanation of –2 Log Likelihood) in speaking (Table 5-3) and writing (Table 5-4). The results are very similar which was to be expected as in most cases a later age of acquisition coincided with a formal
(i.e. instructed) mode of acquisition. A sample with a larger number of students who had learned a language late but naturalistically would be needed to discriminate more clearly. However, an overall tendency does emerge and mode of acquisition increases model fit more than age of acquisition. The \(-2\) Log Likelihood values for the final model were lower for mode of acquisition in both speaking and writing. Whether it is age or mode of acquisition that lends an L2 its special status in L3 acquisition is a substantial question and these results provide some indication that the mode in which a language was acquired (i.e. naturalistically or formally) has a more deterministic effect on the choice of SL than the age of acquisition. Consequently, all the results and analyses presented in the next chapter are based on a full model that uses mode of acquisition as criterion for the L2 status variable. A full discussion of the implications of these results is presented in §6.2.4.

5.3 Research Question 1: Overall model

The first research question that this thesis aims to address is two-fold and concerns the following:

A. To what extent do the four factors (proficiency, psychotypology, recency, L2 status) combined predict the source language of transfer in multilingual learners?

B. Are there any differences in how well the four factors combined predict the source language of transfer in spoken versus written production?

In order to answer the first part of Research Question 1, we need to look at the global tests of a multinomial logistic regression analysis (§5.3.1). The \textit{likelihood ratio (LR) test} (Felsenstein, 1981; Huelsenbeck & Crandall, 1997; Huelsenbeck & Rannala, 1997; Swofford, Olsen, Waddell, & Hillis, 1996) provides statistical evidence that at least one of the parameters for one of the measures in one of the factors has a significant effect. In order to answer the second part of Research Question 1, we need to assess the strength of this effect in each mode (§5.3.2) by looking at the pseudo R-square values and the classification accuracy of the model.

5.3.1 Global tests

The overall test of relationship in multinomial logistic regression is based on the increase of the likelihood values from a model which does not contain any
independent variables (IVs), called the intercept, to the final model that includes all IVs. The likelihood is the probability of getting exactly the given data, given the hypothesized model, i.e. when including the four factors. The smaller the -2 Log Likelihood value, the better the fit of the model. This difference in -2 Log Likelihood follows a chi-square distribution and is referred to as the model chi-square. The significance test for the final model chi-square provides statistical evidence that there is indeed a relationship between the dependent variable and the combination of the independent variables (if the -2 Log Likelihood value of the final model indeed significantly differs from that of the intercept). It needs to be noted that chi-square statistics are strongly influenced by sample size, so that minute, and often unimportant, differences will be significant with a very large sample. However, if there is significance in a relatively small sample, such as the one in this study, then the effect is indeed notable.

Table 5-5. Model fit. Spoken data.

<table>
<thead>
<tr>
<th>Model</th>
<th>Model Fitting Criteria</th>
<th>Likelihood Ratio (LR) Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>-2 Log Likelihood</td>
</tr>
<tr>
<td>Intercept Only</td>
<td></td>
<td>589.053</td>
</tr>
<tr>
<td>Final</td>
<td></td>
<td>275.609</td>
</tr>
</tbody>
</table>

Table 5-6. Model fit. Written data.

<table>
<thead>
<tr>
<th>Model</th>
<th>Model Fitting Criteria</th>
<th>Likelihood Ratio (LR) Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>-2 Log Likelihood</td>
</tr>
<tr>
<td>Intercept Only</td>
<td></td>
<td>324.633</td>
</tr>
<tr>
<td>Final</td>
<td></td>
<td>222.294</td>
</tr>
</tbody>
</table>

In this analysis, the probability of the model chi-square for both speaking (Table 5-5) and writing (Table 5-6) was $p < 0.0005$. The multinomial logistic regression model predicts the outcome variable significantly better than the null model. From these results, it can be inferred that at least one explanatory variable was a significant predictor of the source language of transfer. Consequently, the null hypothesis that there is no difference between the intercept model, with no independent variables, and the final model, with the independent variables added, can be rejected in both speaking and writing.
In order to answer the first part of RQ1 and confirm that the four factors identified in the literature, namely proficiency, psychotypology, L2 status, and recency, form a strong explanatory model for the choice of source language of transfer in multilingual learners, the multinomial logistic regression model needed to show a statistically significant improvement in -2 Log Likelihood from the null to the full model. This was indeed the case in both the spoken and the written data.

5.3.2 Strength of the model

Having established a relationship between the dependent and the combination of independent variables, it is important to investigate the strength of this relationship. This will further allow us to compare the spoken and the written model and evaluate whether the given factors are equally relevant in both writing and speaking, thus addressing the second part of RQ1.

Goodness-of-fit statistics assess the fit of a logistic model against actual classification, i.e. the classification of transfer tokens as either Luxembourgish, German, or French. Multinomial logistic regressions computes goodness-of-fit using correlation measures via pseudo R-square. The one reported here is McFadden’s pseudo R-square.

\[
R^2 = 1 - \frac{\log(\text{full model})}{\log(\text{null model})}
\]

Pseudo R-square values are higher for the model with the greater likelihood, but its values are generally considerably lower than those of the R-square index, with values of 0.2 to 0.4 representing excellent fit (McFadden, 1974, 1979). While it was shown that the final model for both speaking and writing was significantly better than the null-model, the pseudo R-square values shown in Table 5-7 below indicate that these relationships are stronger in the spoken than in the written data. The spoken model has excellent fit (0.271), while the written model only has good fit (0.122).

<table>
<thead>
<tr>
<th>Table 5-7. Pseudo R-square.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spoken model</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>McFadden</td>
</tr>
</tbody>
</table>

It needs to be noted that pseudo R-square values do not carry the same meaning of variance explained in multinomial logistic regression as R-square does.
in ordinary least squares (OLS) (Peng & Nichols, 2003), and different pseudo R-squares can arrive at very different values. They can therefore only be interpreted as an approximation of the amount of variance in the dependent variable that can be explained by the model (Freese & Long, 2006; Long, 1997). These indices should therefore only be reported in addition to other measures of goodness-of-fit. Consequently, it has been argued that classification accuracy is a more useful measure to assess the utility of a multinomial logistic regression model. It “compares predicted group membership based on the logistic model to the actual, known group membership, which is the value for the dependent variable” (Bayaga, 2010, p. 292). In this study, a classification table thus presents the probability that an item will come from one of the three source languages as based on the given values of the independent variables.

Classification accuracy (Table 5-8) uses the model that was created based on the available data set, including both the dependent and independent variables, and tests how many of the actual outcomes can be correctly predicted with this model. The by chance accuracy is reported and compared to the correctly predicted outcomes of the model. By chance accuracy refers to the percentage of correct predictions that would be made even if there was no relationship between the groups defined by the dependent variable and the independent variables.

### Table 5-8. Classification accuracy.

<table>
<thead>
<tr>
<th></th>
<th>Predicted Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Speaking</td>
</tr>
<tr>
<td>Luxembourgish</td>
<td>74.7%</td>
</tr>
<tr>
<td>German</td>
<td>73.2%</td>
</tr>
<tr>
<td>French</td>
<td>39.3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>70.5%</strong></td>
</tr>
<tr>
<td><em>By chance accuracy</em></td>
<td>41.5%</td>
</tr>
<tr>
<td>Improvement rate</td>
<td>69.9%</td>
</tr>
</tbody>
</table>

The estimate of by chance accuracy used here is the proportional by chance accuracy rate, computed by summing the squared percentage of cases in each group. In other words, the percentages of items per source language are squared and added. In the spoken data, there were 44.8% Luxembourgish items, 45.2% German items, and 10% French items. If we square and sum these percentages, we get a proportional by chance accuracy criteria of 41.5%.
(Table 5-8). In the written data, there were 10.7% Luxembourgish items, 58.3% German items, and 31% French items. The proportional by chance accuracy criteria for the written data was thus 44.7%.

The classification accuracy rate of the final model shows 70.5% correctly predicted outcomes in speaking, which is a 69.9% improvement from the by chance accuracy criteria (41.5%). It also shows 64.4% correctly predicted outcomes in writing, a 44.1% increase from the by chance accuracy criteria (44.7%). Some authors use a benchmark of 25% improvement from the accuracy rate achieved by chance alone in order to argue that the model is indeed successful in predicting outcomes associated with the dependent variable. No such threshold is used here, but for those readers that prefer to rely on such thresholds, the improvement rate indeed surpasses 25% in both speaking and writing. What is interesting is that the model is unable to predict any of the outcomes of Luxembourgish in the written mode (0%), but can successfully predict 93.3% of all German transfer instances in the written mode. As discussed in § 5.1.2, we seem to be observing an effect of the typical mode a language is used in (i.e. Luxembourgish is mainly used for oral interaction and never for academic writing). Mode as a predictor for the SL of transfer will be further discussed in § 6.3.2.

Overall, it seems that the model has more predictive power in the spoken data than in the written data, with both the Pseudo R-square values and the classification accuracy indicating that the strength of the relationship between the explanatory factors and the dependent variable (source language) is stronger in speaking (70.5% correctly predicted outcomes & 69.9% improvement rate) than in writing (64.4% correctly predicted outcomes & 44.1% improvement rate). These results thus address the second part of RQ1 and show that model fit was not equally good in the two modes.

These differences between modes of production may come as no surprise, since the most influential studies conducted on what factors affect lexical transfer have focused on oral data (Bohnacker, 2005, 2006; Cenoz, 2003b; Dewaele, 1998; Lindqvist, 2009, 2010; Williams & Hammarberg, 1998). More research on how additional processing time in writing may affect the choice of source language is needed in order to establish what strategies are consciously being employed in L3 transfer.

Szubko-Sitarek (2015) points to the importance of studies that use off-line processing in order to illustrate learners’ strategic transfer behaviour. When
given more time to make a conscious choice, students may activate all available options more readily and choose whichever they judge to be the best fit with respect to the TL’s orthographic and/or phonological rules. Consequently, the relevance of certain factors, such as exposure, might diminish in writing when compared to speaking, while other factors, such as psychotypology, may become more relevant in a context of conscious strategy use. Furthermore, mode-specificity may prove more important than currently assumed in the literature (see § 6.3 for a detailed discussion). Future research should consider the typical mode of usage of an individual’s languages, and whether they are used in the type of context (spoken vs. written) being tested in the study. In addition, new factors that prove relevant to the writing process alone might still need to be uncovered in order to fully understand transfer in written production.

5.4 Research Question 2: Individual factors

The global tests above have shown a relationship between the dependent variable and the combination of independent variables; however, this does not guarantee that every factor has a measurable effect. The next step is thus to explore how each factor relates to the dependent variable individually. This will bring insight as to whether all factors have a significant effect or only some of them and whether there are differences across modes of production, thus answering RQ2:

A. To what degree does each factor individually predict the source language in transfer?

B. Are there any differences in how well each individual factor predicts the source language of transfer in spoken versus written production?

In this study, every factor (e.g. proficiency) has three separate measures, one for each source language (e.g. proficiency in Luxembourgish, proficiency in German, and proficiency in French) and thus constitutes three separate independent variables (see Appendix D). One way is to investigate these three variables together as one by testing whether removing all three of them from the model improves or worsens model fit. To this end, likelihood ratio tests are run for both the full model and the reduced model (in which one factor was removed) and the \(-2\) Log Likelihood for the two are then compared (Table 5-9).
and Table 5-10). Furthermore, a comparison of the results for the written versus the spoken model will help us understand whether these factors affect speaking and writing differently, thus answering the second part of RQ2.

Table 5-9. *Individual factors test. Spoken data.*

<table>
<thead>
<tr>
<th></th>
<th>-2 Log Likelihood</th>
<th>Delta sig</th>
<th>Pseudo R-square</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Full</strong></td>
<td>275.609</td>
<td></td>
<td>.271</td>
</tr>
<tr>
<td>No Proficiency</td>
<td>300.526</td>
<td>.000</td>
<td>.249</td>
</tr>
<tr>
<td>No Psychotypology</td>
<td>325.388</td>
<td>.000</td>
<td>.228</td>
</tr>
<tr>
<td>No Exposure</td>
<td>358.674</td>
<td>.000</td>
<td>.199</td>
</tr>
<tr>
<td>No L2 Status</td>
<td>366.105</td>
<td>.000</td>
<td>.193</td>
</tr>
</tbody>
</table>

Table 5-10. *Individual factors test. Written data.*

<table>
<thead>
<tr>
<th></th>
<th>-2 Log Likelihood</th>
<th>Delta sig</th>
<th>Pseudo R-square</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Full</strong></td>
<td>222.294</td>
<td></td>
<td>.122</td>
</tr>
<tr>
<td>No Proficiency</td>
<td>235.713</td>
<td>.037</td>
<td>.106</td>
</tr>
<tr>
<td>No Psychotypology</td>
<td>245.345</td>
<td>.001</td>
<td>.094</td>
</tr>
<tr>
<td>No Exposure</td>
<td>248.608</td>
<td>.010</td>
<td>.091</td>
</tr>
<tr>
<td>No L2 Status</td>
<td>257.101</td>
<td>.001</td>
<td>.082</td>
</tr>
</tbody>
</table>

Table 5-9 and Table 5-10 above show that removing proficiency as an overall factor, i.e. removing the three individual variables associated with it (proficiency in Luxembourgish, German, and French), significantly reduces model fit both in speaking (p < 0.001) and in writing (p < 0.05). Consequently, we can reject the null hypothesis that the reduced and the full model fit equally well and have evidence that proficiency has a significant effect on the choice of source language in transfer. The same was done for psychotypology, exposure, and the L2 status. In each case, the results show that removing any of these factors significantly decreases model fit (p < 0.05).

With regards to exposure, no previous study investigated its effects in isolation, instead it was always invoked as an additional factor that may have influenced the results. The results of this study thus offer a first view on the
effects of exposure in isolation from other factors. Different conceptualizations of what recency is have been used in the literature, but at least that of daily exposure has been shown to be a significant predictor by this study. Whether other conceptualizations, such as the language most recently acquired, also have an effect remains to be determined.

Psychotypology is considered to be the most important factor by many researchers (e.g. Cenoz, 2001; De Angelis & Selinker, 2001; Jarvis & Odlin, 2000). However, it is rarely formally tested (e.g. De Angelis, 2005a; Ringbom, 1986, 1987, 2001, 2007; Singleton & Ó Laoire, 2006). The results of this study seem to indicate that psychotypology indeed has a significant effect on the SL of transfer. Finally, the L2 status has never been shown to have an effect on lexical transfer without other factors being confounding variables (Ecke & Hall, 2000, 2011; Williams & Hammarberg, 1998). The results of this study, on the other hand, show that the status of a language indeed has an effect on the source language of transfer, when other factors such as proficiency or psychotypology are controlled for.

While the global tests in the previous section (§ 5.3.1) could only tell us that at least one of the independent variables has a significant relationship with the dependent variable, these results offer evidence that indeed every factor individually has an effect on the choice of source language. More generally, the fact that each factor has a significant effect weakens the claim that one factor rather than another is decisive. The evidence found in this data set strongly supports a model in which each factor contributes to an explanatory model of the source language of transfer in multilinguals, without being mutually exclusive. The evidence found here is especially important in the context of the strong dichotomy between the L2 status and psychotypology. Both are here shown to play a role in the choice of source language, rather than one outweighing the other, which supports Singleton and Ó Laoire’s (2006) suggestion that there might, in fact, be no need for any rivalry between the two camps.

Furthermore, Williams and Hammarberg (1998) and many other researchers invoked more than one factor to make sense of their findings and the results of this analysis support such a complementary analysis, given that all four factors have been shown to have an effect on the choice of SL of transfer. Similarly, results such as Bardel and Lindqvist’s (2007) finding that typology might override proficiency can be accounted for if all factors are significant predictors. It remains to be determined, however, which factor outweighs any
others in case of conflicting predictions (e.g. proficiency would suggest BL₁ to be the most prominent SL, while exposure would suggest BL₂ to be the most prominent SL).

It would thus be interesting to establish the degree of significance of individual factors. One factor might have a more prominent role in one mode but not in the other. Unfortunately, the statistical models available to us today only offer a tentative indication of which factor might be more important. The current model does not allow us to take into account the fact that some variables are continuous, while others are categorical. Furthermore, proficiency and psychotypology are comprised of three parameters, while exposure and the L2 status are comprised of six parameters. Variables may thus not be fully comparable. Allowing for the potential unreliability of such a comparison, the Pseudo R-square values (in Table 5-9 & Table 5-10) seem to show that removing the L2 status has the most detrimental effect, followed by exposure, then psychotypology, and finally proficiency. The same order is found in both the spoken and written model. It needs to be stated that there is no formal test that allows us to compare the results of removing one factor versus another and the given ranking is thus intended to be merely suggestive.

Regarding the second part of RQ2, whether individual factors may have a significant relationship to the dependent variable in one mode of production but not in the other, the results show that each factor significantly contributes to the explanatory model in both the spoken and the written data. Previous research has predominantly established that these factors affect spoken data (see § 3.1.1.2, § 3.1.2.2, § 3.1.3.2 and § 3.1.4.2). Consequently, one might have expected some of them not to be significant in writing. However, no difference in the significance of each factor between speaking and writing was found in the present study.

This is suggestive of a continuum of consciousness across the two modes, rather than a dichotomous distinction of speaking equals unconscious and writing equals conscious. During speech production, students also sometimes hesitate and pause to think before attempting to produce a word they are unsure of. Equally, in writing, students may not stop to make a strategic choice for every single transferred item. Furthermore, activation mechanisms may present certain words more readily in both speaking and writing, just that the learner has more time to monitor their selection in written production. They can more readily assess the item that spontaneously ‘popped up’ and change
5.5 Research Question 3: Direction of individual effects

The results in the previous section showed how each factor individually is a significant predictor for the SL of transfer when holding the other factors constant. They could not yet tell us, however, the direction of the correlatory relationship between each IV and the DV, which is the focus of the third research question:

A. What is the direction of the effect of each factor in predicting the source language of transfer? In other words, is the direction of the effect positive or negative (e.g. does higher proficiency in a background language increase or decrease the odds of choosing that language as source of transfer)?

B. Are there any differences in the direction of the effect of each factor in spoken versus written production?

In order to determine whether there is a positive or negative correlation between the DV and an IV, we need to look at their parameter estimates. Table 5-11 and Table 5-12 below give an overview of all the parameter estimates for the spoken and written model. Multinomial logistic regression provides individual comparisons (parameter estimates) between two groups of the dependent variable, where one group acts as reference group. In this study, the analysis provides comparisons for the three possible outcomes (Luxembourgish, German, French) of the DV (source language of transfer). Using French as the reference group, it compares Luxembourgish to French, and German to French.

Wald tests are used to assess whether or not the independent variable is statistically significant in differentiating between the two groups in each of the embedded binary logistic comparisons. Only B coefficients and their standard errors are reported, while the significance (as measured by the Wald test) of a given parameter is indicated by an asterisk. A positive B coefficient indicates that the probability of choosing the given outcome group (e.g. German) over the reference group (French) is increased with each unit increase of the independent variable (e.g. interactional exposure in German), while a negative B
coefficient indicates that the probability of choosing that group is reduced with each unit increase of the independent variable.


<table>
<thead>
<tr>
<th>Parameter</th>
<th>Relatively increased transfer from Lux. vs. French</th>
<th>Relatively increased transfer from German vs. French</th>
<th>LR df</th>
<th>LR sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Standard Error</td>
<td>B</td>
<td>Standard Error</td>
<td></td>
</tr>
<tr>
<td>1 Intercept</td>
<td>1.261 (2.697)</td>
<td>.547 (2.724)</td>
<td>0</td>
<td>.</td>
</tr>
<tr>
<td>2 Proficiency Lux.</td>
<td>.453 (.850)</td>
<td>-1.659 (.882)</td>
<td>2</td>
<td>.000*</td>
</tr>
<tr>
<td>3 German</td>
<td>-.284 (.526)</td>
<td>-.224 (.539)</td>
<td>2 .859</td>
<td></td>
</tr>
<tr>
<td>4 French</td>
<td>-.538 (.500)</td>
<td>.217 (.493)</td>
<td>2 .028*</td>
<td></td>
</tr>
<tr>
<td>5 Psychotyp. closeness to English Lux.</td>
<td>.134 (.772)</td>
<td>-1.680 (.806)*</td>
<td>2 .000*</td>
<td></td>
</tr>
<tr>
<td>6 German</td>
<td>-1.095 (.790)</td>
<td>-1.439 (.805)</td>
<td>2 .205</td>
<td></td>
</tr>
<tr>
<td>7 French</td>
<td>.010 (.844)</td>
<td>1.987 (.884)*</td>
<td>2 .000*</td>
<td></td>
</tr>
<tr>
<td>8 Proficiency Lux.</td>
<td>-.092 (.393)</td>
<td>.878 (.416)*</td>
<td>2 .000*</td>
<td></td>
</tr>
<tr>
<td>9 German</td>
<td>.366 (.453)</td>
<td>1.520 (.465)*</td>
<td>2 .000*</td>
<td></td>
</tr>
<tr>
<td>10 French</td>
<td>-.350 (.481)</td>
<td>-1.069 (.478)*</td>
<td>2 .011*</td>
<td></td>
</tr>
<tr>
<td>11 Interpersonal exposure Lux.</td>
<td>.163 (.407)</td>
<td>.439 (.416)</td>
<td>2 .427</td>
<td></td>
</tr>
<tr>
<td>12 German</td>
<td>-.506 (.466)</td>
<td>-.851 (.470)</td>
<td>2 .086</td>
<td></td>
</tr>
<tr>
<td>13 French</td>
<td>1.673 (.434)*</td>
<td>1.212 (.452)*</td>
<td>2 .000*</td>
<td></td>
</tr>
<tr>
<td>14 Lux. (both vs. formal.)</td>
<td>.840 (1.913)</td>
<td>-1.901 (2.005)</td>
<td>4 .315</td>
<td></td>
</tr>
<tr>
<td>15 Lux. (natural vs. formal.)</td>
<td>-1.724 (2.132)</td>
<td>-0.999 (2.144)</td>
<td>4 .000*</td>
<td></td>
</tr>
<tr>
<td>16 German (both vs. formal.)</td>
<td>1.570 (.749)*</td>
<td>.140 (.771)</td>
<td>4 .000*</td>
<td></td>
</tr>
<tr>
<td>17 German (natural vs. formal.)</td>
<td>-.229 (.842)</td>
<td>1.874 (.831)*</td>
<td>4 .011*</td>
<td></td>
</tr>
<tr>
<td>18 French (both vs. formal.)</td>
<td>-2.194 (.929)*</td>
<td>-2.261 (.946)*</td>
<td>4 .011*</td>
<td></td>
</tr>
<tr>
<td>19 French (natural vs. formal.)</td>
<td>-2.720 (1.282)*</td>
<td>-1.255 (1.287)</td>
<td>4 .011*</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WRITTEN MODEL</th>
<th>Relatively increased transfer from Lux. vs. French</th>
<th>Relatively increased transfer from German vs. French</th>
<th>LR df</th>
<th>LR sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
<td>B</td>
<td>Standard Error</td>
<td>B</td>
<td>Standard Error</td>
</tr>
<tr>
<td>1 Intercept</td>
<td>8.283</td>
<td>(4.687)</td>
<td>7.741</td>
<td>(2.935)*</td>
</tr>
<tr>
<td>2 Proficiency</td>
<td>Lux. -527</td>
<td>(.359)</td>
<td>-0.016</td>
<td>(.222)</td>
</tr>
<tr>
<td></td>
<td>German 1.062</td>
<td>(.540)*</td>
<td>.064</td>
<td>(.294)</td>
</tr>
<tr>
<td>3</td>
<td>French -0.072</td>
<td>(.571)</td>
<td>-.806</td>
<td>(.307)*</td>
</tr>
<tr>
<td>4 Psychotyp. closeness to English</td>
<td>Lux. .908</td>
<td>(.674)</td>
<td>.291</td>
<td>(.463)</td>
</tr>
<tr>
<td>5</td>
<td>German -.383</td>
<td>(.684)</td>
<td>-1.284</td>
<td>(.419)*</td>
</tr>
<tr>
<td>6</td>
<td>French -.620</td>
<td>(.624)</td>
<td>-1.567</td>
<td>(.397)*</td>
</tr>
<tr>
<td>7 Interactional exposure</td>
<td>Lux. .052</td>
<td>(.519)</td>
<td>-.227</td>
<td>(.299)</td>
</tr>
<tr>
<td>8</td>
<td>German -.729</td>
<td>(.719)</td>
<td>.576</td>
<td>(.384)</td>
</tr>
<tr>
<td>9</td>
<td>French -.733</td>
<td>(.947)</td>
<td>.590</td>
<td>(.412)</td>
</tr>
<tr>
<td>10 Media exposure</td>
<td>Lux. -.672</td>
<td>(.713)</td>
<td>-.368</td>
<td>(.361)</td>
</tr>
<tr>
<td>11</td>
<td>German -.978</td>
<td>(.467)*</td>
<td>-.093</td>
<td>(.218)</td>
</tr>
<tr>
<td>12</td>
<td>French -.175</td>
<td>(.453)</td>
<td>-.316</td>
<td>(.237)</td>
</tr>
<tr>
<td>13 L2 status based on mode of acquisition (reference cat. = formal acq.)</td>
<td>Lux. (both vs. formal.) .922</td>
<td>(2.312)</td>
<td>.781</td>
<td>(1.308)</td>
</tr>
<tr>
<td>14</td>
<td>Lux. (natural vs. formal.) -1.489</td>
<td>(1.231)</td>
<td>-.968</td>
<td>(.794)</td>
</tr>
<tr>
<td>15</td>
<td>German (both vs. formal.) -.149</td>
<td>(.716)</td>
<td>.613</td>
<td>(.427)</td>
</tr>
<tr>
<td>16</td>
<td>German (natural vs. formal.) 1.359</td>
<td>(1.540)</td>
<td>2.707</td>
<td>(1.091)*</td>
</tr>
<tr>
<td>17</td>
<td>French (both vs. formal.) -.529</td>
<td>(.883)</td>
<td>.042</td>
<td>(.453)</td>
</tr>
<tr>
<td>18</td>
<td>French (natural vs. formal.) -.1216</td>
<td>(1.626)</td>
<td>-.986</td>
<td>(.889)</td>
</tr>
</tbody>
</table>
The last two columns provide the degrees of freedom and significance level of the likelihood ratio (LR) tests for each variable (see Appendix E). These indicate whether removing the variable from the overall model significantly reduces model fit. It is important to remember that an independent variable, such as proficiency in Luxembourgish, may have an overall relationship to the dependent variable (source language of transfer), but it might not be statistically significant in differentiating between two groups of the dependent variable (such as transfer from German versus transfer from French). This is indeed the case with proficiency in Luxembourgish (LR $p < 0.001$, but neither of the parameter estimates is significant). This may, however, be due to the fact that the Wald tests for the parameters estimates are less accurate than the likelihood ratio (LR) tests. The former is known to be overly conservative, with increased type II error, i.e. ‘false negatives’ (Menard, 1995).

Conversely, a variable may have one significant parameter but the LR test was not significant. In this analysis, the LR significance was considered an essential prerequisite for further analysis and any significant parameter of a variable with a non-significant LR was consequently ignored. Those parameters that were significant and whose corresponding variable was significant in the LR tests, and which were thus included in the analysis, are marked in bold.

Sometimes, the test produces wildly improbable results, such as odds increased by the hundreds of thousands or millions. These implausible results can be caused by multicollinearity, which indicates that two or more predictor variables in the multiple regression model are highly correlated. An indication that there are such numerical problems are standard errors (SE) for independent variables that are larger than 2.0. Multicollinearity was considered but all SE fell below the 2.0 threshold, except for two instances, which both involved Luxembourgish. For the L2 status parameter of naturalistic vs. formal acquisition of Luxembourgish, the SE was higher than the 2.0 cut-off point in speaking. The same was the case for the L2 status parameter of having learned Luxembourgish both formally and naturalistically vs. just formally in the written data. Variables that indicate numerical problems should not be interpreted and so these values have been ignored in the analysis of the data (the relevant values have consequently been crossed out in Table 5-11 and Table 5-12, e.g. 2.132).

This overview indicates that only about a third of the parameters are significant in speaking and even fewer in writing. As discussed above, in smaller samples such as this one, only strong, highly notable effects are detected with
this type of chi-square statistics. In addition, the Wald tests for parameter estimates are known to be overly conservative and to lead to false negatives (type II error), despite the LR test showing a significant effect. To detect smaller effects a larger sample would be required. Consequently, in some cases, only a few parameters proved significant. These nevertheless illustrate the direction of the correlation and thus provide important information about how a factor affects the source language of transfer. While for some factors (e.g. exposure), the direction of the effect is not questioned, but rather the presence of an effect itself, for other factors (e.g. L2 status effect), it is the direction of the effect that is of particular interest. In the following sub-sections (§ 5.5.1 - § 5.5.4), the results from the parameter estimates are presented in more detail by focusing on one factor at a time. The complete output tables with the original variable codes can be found in Appendix E.

5.5.1 Proficiency

The likelihood ratio tests (see last two columns in Table 5-13) show that there is only a statistically significant relationship between the DV and proficiency in Luxembourgish and between the DV and proficiency in French in speaking and between the DV and proficiency in French in writing.


<table>
<thead>
<tr>
<th>Parameter</th>
<th>Luxembourgish</th>
<th>German</th>
<th>LR df</th>
<th>LR sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Standard Error</td>
<td>B</td>
<td>Standard Error</td>
</tr>
<tr>
<td>Intercept</td>
<td>1.261</td>
<td>(2.697)</td>
<td>.547</td>
<td>(2.724)</td>
</tr>
<tr>
<td>Speaking Proficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lux.</td>
<td>.453</td>
<td>(.850)</td>
<td>-.169</td>
<td>(.882)</td>
</tr>
<tr>
<td>Ger.</td>
<td>-.284</td>
<td>(.526)</td>
<td>-.224</td>
<td>(.539)</td>
</tr>
<tr>
<td>French</td>
<td>-.538</td>
<td>(.500)</td>
<td>.217</td>
<td>(.493)</td>
</tr>
<tr>
<td>Intercept</td>
<td>8.283</td>
<td>(4.687)</td>
<td>7.741</td>
<td>(2.935)*</td>
</tr>
<tr>
<td>Writing Proficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lux.</td>
<td>-.527</td>
<td>(.359)</td>
<td>-.016</td>
<td>(.222)</td>
</tr>
<tr>
<td>German</td>
<td>1.062</td>
<td>(.540)*</td>
<td>.064</td>
<td>(.294)</td>
</tr>
<tr>
<td>French</td>
<td>-.072</td>
<td>(.571)</td>
<td>-.806</td>
<td>(.307)*</td>
</tr>
</tbody>
</table>

Consequently, any subsequent analysis should only focus on these variables and their parameters. However, among these variables, only proficiency in French in writing also proves to be significant in distinguishing between two
groups (German and French, \( p < 0.05 \)). The B coefficient for proficiency in French indicates that, holding all other variables constant, an additional unit of proficiency in French, decreases the odds of choosing German over French as source language for transfer in writing.

While proficiency overall was a significant predictor for the source language of transfer in both speaking and writing, only one parameter estimate proved significant. It thus remains difficult to reliably establish the direction of this relationship. The one parameter estimate that was significant (proficiency in French in the written data), however, points towards high proficiency in a source language leading to greater transfer from that language. This is in line with results found by Williams and Hammarberg (1998), Ringbom (1987, 2001), and Lindqvist (2010).

It seems intuitive that higher proficiency in a background language would lead to greater transfer from that language. Szubko-Sitarek (2015) also finds a proficiency effect in her data and explains these results through Cummins’ Threshold Hypothesis and Developmental Interdependence Hypothesis (1976, 1979), as both promote the view that the higher the competence attained in the previous languages, the stronger the likelihood that some influence will occur. As previously discussed (§ 3.1.1.1), one important aspect of proficiency that is particularly important in lexical transfer is the simple fact that an unknown item in a source language can by definition not be transferred. Consequently, low proficiency in a source language may limit the number of occasions when a word from that language is actually available, thereby increasing transfer from other source languages, in which the word is actually available.

### 5.5.2 Exposure

Again, only those exposure variables that had a significant overall relationship (see last two columns in Table 5-14) to the dependent variable were further investigated. In the spoken data, interestingly, interactional exposure in all three languages can distinguish between whether German is chosen over French but none can distinguish between whether Luxembourgish is chosen over French. Luxembourgish and German interactional exposure significantly increase the odds of choosing German over French, while French interactional exposure significantly decreases the odds of choosing German over French. On the other hand, French exposure to media counter-intuitively increases the odds of choosing both Luxembourgish and German over French in spoken production. None of the LR tests were significant in the written data and so
exposure was not found to have an effect on the SL of transfer in written production.


<table>
<thead>
<tr>
<th></th>
<th>Luxembourghish</th>
<th>German</th>
<th>LR df</th>
<th>LR sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Standard Error</td>
<td>B</td>
<td>Standard Error</td>
</tr>
<tr>
<td>Intercept</td>
<td>1.261</td>
<td>(2.697)</td>
<td>.547</td>
<td>(2.724)</td>
</tr>
<tr>
<td>Inter. exposure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lux.</td>
<td>-.092</td>
<td>(.393)</td>
<td>.878</td>
<td>(.416)*</td>
</tr>
<tr>
<td>German</td>
<td>.366</td>
<td>(.453)</td>
<td>1.520</td>
<td>(.465)*</td>
</tr>
<tr>
<td>French</td>
<td>-.350</td>
<td>(.481)</td>
<td>-1.069</td>
<td>(.478)*</td>
</tr>
<tr>
<td>Media exposure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lux.</td>
<td>.163</td>
<td>(.407)</td>
<td>.439</td>
<td>(.416)</td>
</tr>
<tr>
<td>German</td>
<td>-.506</td>
<td>(.466)</td>
<td>-.851</td>
<td>(.470)</td>
</tr>
<tr>
<td>French</td>
<td>1.673</td>
<td>(.434)*</td>
<td>1.212</td>
<td>(.452)*</td>
</tr>
</tbody>
</table>

While the results on interactional exposure are in line with our expectation that high exposure leads to greater transfer, this was not the case for media exposure. Here, greater exposure to French media decreases the odds of choosing French as source for transfer. The first aspect one can explore in order to explain this counter-intuitive result is what kind of participant mainly watches French TV, listens to French music, and browses the internet in French (or states that they do). The second then is why this particular type of participant does not rely on French as source language in spoken production.

The most probable kind of participant to fit such a description would be a native speaker of French, who is naturally exposed to French media in the home. However, such a person is not likely to transfer more from German and Luxembourghish, as will be shown in § 5.5.4. Another kind of participant that
might report high exposure to French media is a student who has low grades in French at school, and therefore actively tries to improve their language skills by exposing themselves to French TV, music, and internet. In addition, these students may feel tempted to represent themselves as good and diligent students that put in the necessary work to improve their French and thus overestimate their actual exposure to French. Future studies that aim to test these factors through the use of a questionnaire may want to supplement their data with some more in-depth interviews, in order to better establish whether participants’ answers reflect reality.

Interactional exposure in all three source languages, on the other hand, had a significant effect in speaking, but none in writing. As would be expected, higher interactional exposure in German increased the odds of choosing German over French in speaking, while increased interactional exposure to French decreased the same odds. None of the parameter estimates were significant in writing. Overall, having regular interactional exposure to a language outside the classroom thus seems to lead to a greater level of activation in spoken production. This further supports the argument of mode-specific activation, which was already put forth in § 5.1.2. Given that exposure was established through questions regarding participants’ daily oral interactional use, it does not seem surprising that it only proves to have an effect on the source language of transfer in speaking. In addition, it seems that it is not enough to be passively exposed to oral language, since this would include exposure to oral media, but instead it is the active use of a language in oral interaction that increases the language’s odds of being relied on for transfer in speech production.

From a more cognitive point of view, it seems that interactional exposure makes potential transfer items more readily accessible. The fact that effects of daily use were only found in speaking indicates that accessibility and levels of activation are more important under processing time constraints. On the other hand, exposure in this study was measured for oral interaction. We may well see an effect of exposure to written material in written language production. Future studies should therefore aim to collect data on both oral and written exposure to language. In combination with what the descriptive statistics indicated in § 5.1, the results of this study seem to point toward a mode-specific activation of background languages, where the language most commonly used in a particular mode will also serve as the greatest source of transfer when TL production takes place in that mode.
While each language is taught at school at least twice a week for 90 minutes, it is adding active usage outside the classroom, in authentic settings, which increases the odds of choosing the respective language as source for transfer. Grosjean (2001, 2008) argues that languages that are used often and in the recent past influence the TL most. In this data set, differences in how recently a language was used may be minimal, i.e. no more than a couple of days, while how often a language is used varies significantly across students. The results thus support Hammarberg’s (2001) argument that learners are more likely to borrow items from languages they actively use as opposed to languages they have learned but do not actively use.

5.5.3 Psychotypology

In the likelihood ratio tests (see last two columns in Table 5-15), psychotypology between Luxembourgish and English, and French and English proved significant in speaking, while in writing psychotypology between German and English, and French and English were significant.


<table>
<thead>
<tr>
<th>Parameter</th>
<th>Luxembourgh</th>
<th>German</th>
<th>LR df</th>
<th>LR sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Standard Error</td>
<td>B</td>
<td>Standard Error</td>
</tr>
<tr>
<td>Intercept</td>
<td>1.261</td>
<td>(2.697)</td>
<td>.547</td>
<td>(2.724)</td>
</tr>
<tr>
<td>Psycthotypology</td>
<td>German</td>
<td>-1.095</td>
<td>( .790)</td>
<td>-1.439</td>
</tr>
<tr>
<td></td>
<td>French</td>
<td>.010</td>
<td>(.844)</td>
<td>1.987</td>
</tr>
<tr>
<td>SPEAKING</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>8.283</td>
<td>(4.687)</td>
<td>7.741</td>
<td>(2.935)*</td>
</tr>
<tr>
<td>Psycthotypology</td>
<td>Luxembourgh</td>
<td>.908</td>
<td>(.674)</td>
<td>.291</td>
</tr>
<tr>
<td></td>
<td>German</td>
<td>-.383</td>
<td>(.684)</td>
<td>-1.284</td>
</tr>
<tr>
<td></td>
<td>French</td>
<td>-.620</td>
<td>(.624)</td>
<td>-1.567</td>
</tr>
<tr>
<td>WRITING</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Looking at their parameter estimates, each of these variables is only significant in distinguishing between German and French as source language. In speaking, high psychotypology between Luxembourgish and English decreased the odds of choosing German over French, while high psychotypology between French and English counter-intuitively increased the odds of choosing German over French. In writing, high psychotypology between French and
English decreased the odds of choosing German over French, as expected. However, the same was true for high psychotypology between German and English, which seems contradictory to common expectations.

Since psychotypology between French and English has the expected effect in writing but leads to a decrease in transfer from French in speaking, there might be a mode-specific difference, where writing is a more conscious task, allowing for their beliefs about typology to be actively taken into account, while the cognitive load in speech production is too high for them to assess their choices according to their psychotypological beliefs. The question, however, remains why high psychotypology between French and English in speaking and high psychotypology between German and English in writing have a counter-intuitive effect. The type of participant, their personality, and strategies may come into play here.

In the case of high psychotypology between German and English, one could ask what kind of participant holds a certain belief but does not act accordingly in a written task that allows for sufficient time to employ conscious strategies. One possible explanation could be that these participants are overly cautious, due to a heightened awareness of false friends. They may have had greater exposure to German through content classes and thus a greater vocabulary, which provides a broader base for comparison with English and the subsequent realization of a significant number of false friends. In the case of high psychotypology between French and English in speaking, there might be an issue of inaccessibility of conscious strategies due to increased time pressure in the spoken mode.

These results raise interesting questions regarding the level of consciousness associated with psychotypology. Since it was measured through a questionnaire, thus tapping into learners’ conscious beliefs, it may come as no surprise that the results show some of its expected effect in the written mode, where there is sufficient time to access these conscious beliefs, but none at all in the spoken mode. Since these conscious judgments of similarity have no effect in speech, where spontaneity and automaticity govern the production process, the question arises whether there may indeed be some unconscious effect, due to statistical learning for example.

There have been hints in this direction in the literature, but the predominant position remains one of conscious psychotypology in lexical transfer. For example, in Bardel and Lindqvist (2007), psychotypology was investigated in a
Swedish learner of Italian, with English, French, and Spanish as background language. They point out that “the typological relationship between Spanish and Italian plays a role, […] which would allow for Spanish words to be inserted more naturally, and as it seems, unconsciously” (Bardel & Lindqvist, 2007, p. 139), thus illustrating their belief in unconscious effects of typology. Overall, however, they base their conclusions on the participant’s introspective comments, which by definition form part of her conscious metaknowledge. What we may well be observing is a combined effect of both conscious psychotypological beliefs and unconscious processes that are facilitated by statistical learning and the typological similarity between languages.

Furthermore, Schmidt and Frota (1986) argue that “the fact that we cannot observe what goes on in another person's mind should not automatically lead us to assume that we necessarily do know what goes on in our own” (p. 238). What learners report in questionnaires and diary entries is subjective and filtered through their own idiosyncratic perceptions and biases. This further supports a possible distinction between conscious and unconscious perceptions of similarity, which may not always coincide and may affect the two modes of production differently. Participants may behave in a certain way but report beliefs that contradict their transfer behaviour, as is the case in this data set. In addition, students’ transfer may follow certain rules, which seem correct or logical to the observer, e.g. choosing the more typologically related language as source, yet they may have no conscious awareness of this and may even hold beliefs that are in conflict with this behaviour. Such a mismatch between participants’ conscious psychotypology and their actual transfer behaviour seems especially characteristic of the spoken data, where the significant measures did not have the predicted effect.

In conclusion, conscious psychotypology, as tested here, does not seem to have a consistent effect. Conscious psychotypology was found to have no effect or alternatively not the expected effect in speaking, while in writing it was found to have the anticipated effect in the case of French, but an effect in the opposite direction in the case of German. In order to account for these significant, yet inconsistent results, potential methodological and conceptual issues regarding the construct of psychotypology will be discussed in § 6.2.3 (e.g. factors such as cultural similarity, the degree of familiarity with a language, or external information provided by teachers or parents).
### 5.5.4 L2 status

As with previous factors, only those variables that were significant in the likelihood ratio tests were considered for further analysis in the parameter estimates (see last two columns in Table 5-16).


<table>
<thead>
<tr>
<th>Parameter</th>
<th>Luxembourgish</th>
<th>German</th>
<th>LR df</th>
<th>LR sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (Standard Error)</td>
<td>B (Standard Error)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>1.261 (2.697)</td>
<td>.547 (2.724)</td>
<td>0</td>
<td>.</td>
</tr>
<tr>
<td><strong>SPEAKING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L2 status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lux. (both vs.form.)</td>
<td>.840 (1.913)</td>
<td>-1.901 (2.005)</td>
<td>4</td>
<td>.315</td>
</tr>
<tr>
<td>Lux. (nat. vs.form.)</td>
<td>1.724 (2.132)</td>
<td>-.099 (2.144)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>German (both vs.form.)</td>
<td>1.570 (.749)*</td>
<td>.140 (.771)</td>
<td>4</td>
<td>.000*</td>
</tr>
<tr>
<td>German (nat.vs.form.)</td>
<td>-.229 (.842)</td>
<td>1.874 (.831)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>French (both vs.form.)</td>
<td>-2.194 (.929)*</td>
<td>-2.261 (.946)*</td>
<td>4</td>
<td>.011*</td>
</tr>
<tr>
<td>French (nat.vs.form.)</td>
<td>-2.720 (1.282)*</td>
<td>-1.255 (1.287)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>WRITING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L2 status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lux. (both vs.form.)</td>
<td>.977 (2.317)</td>
<td>.781 (1.308)</td>
<td>4</td>
<td>.094</td>
</tr>
<tr>
<td>Lux. (nat. vs.form.)</td>
<td>-1.489 (1.231)</td>
<td>-.968 (.794)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>German (both vs.form.)</td>
<td>-.149 (.716)</td>
<td>.613 (.427)</td>
<td>4</td>
<td>.021*</td>
</tr>
<tr>
<td>German (nat.vs.form.)</td>
<td>1.359 (1.540)</td>
<td>2.707 (1.091)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>French (both vs.form.)</td>
<td>-.529 (.883)</td>
<td>.042 (.453)</td>
<td>4</td>
<td>.605</td>
</tr>
<tr>
<td>French (nat.vs.form.)</td>
<td>-1.216 (1.626)</td>
<td>-.986 (.889)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Within each variable, e.g. L1/L2 status of Luxembourgish, there are three possible answers: 1) the language was acquired naturalistically, 2) it was acquired formally, and 3) it was acquired both naturalistically and formally. Naturalistic acquisition and acquisition through both modes are compared to the reference group of formal acquisition. So, for example, in speaking, we see that if the mode of acquisition of German was naturalistic instead of formal, then...
this significantly increased the odds of choosing German over French as source language. In the spoken data, we also see that when German was learned both naturalistically and formally instead of just formally, then this increases the odds of choosing Luxembourgish over French significantly.

Regarding French, if a student has acquired French both naturalistically and formally then this significantly decreases the odds of both choosing Luxembourgish and German over French. Also, having learned French purely naturally decreases the odds of choosing Luxembourgish over French. In the written data, German learned naturally leads to a significant increase in the odds of choosing German over French as source language.

Every significant parameter estimate indicates that transfer from a language is more probable when that language was acquired naturally (or both naturally and formally), as opposed to only formally. These results are in opposition to theoretical expectations of the L2 status factor, which states that greater transfer occurs from another foreign language which was also formally acquired (see § 3.1.4.1.2 for a discussion of different hypotheses regarding the underlying reasons for the L2 status effect).

Williams and Hammarberg (1998) find more transfer from L2 than L1 in their case study and report the participant’s introspective comments as to why this might be the case. The participant, who is also the first author, says that she has consciously tried to avoid L1 English terms in order to not sound like a native speaker of English. This seems to be a rather idiosyncratic goal for this particular learner and may further be related to the fact that she lived in the target language society. Affective aspects of wanting to fit into a new cultural and linguistic environment may have impacted the learner’s transfer strategies. In the case of English as L3, it is most often learned outside of the target language society, with no aspect of social integration attached to it, and thus the sentiment expressed by the participant in Williams and Hammarberg (1998) may lack generalizability.

Similarly, Cenoz (2001) argues that her data supports the L2 status hypothesis. While both her L1 Basque speakers and L1 Spanish speakers prefer to transfer from Spanish into English, and this is ascribed to typology, she also argues that since 3/11 (27%) L1 Spanish speakers transferred from their L2 Basque and 3/25 (12%) L1 Basque speakers transferred from Basque that L1 Spanish speakers transfer proportionally more from Basque (their L2) than Basque L1 speakers themselves and argues that this can be explained by the L2 status
hypothesis. It seems rather questionable, however, whether these differences are statistically significant, considering the low number of participants demonstrating transfer. In order for any generalizations to be made, a token count of L1 and L2 transfer would need to be presented to determine the pervasiveness of L2 transfer and a t-test would need to be conducted to establish whether Spanish L2 speakers truly display greater transfer from their L2 Basque than L1 Basque speakers themselves, thus confirming the L2 status hypothesis.

Bardel and Falk (2012) and Falk and Bardel (2010) have done extensive work on the L2 status hypothesis and have argued that the L2 status factor is valid for formal, adult learning of a foreign language, but not for naturalistically acquired languages (see § 5.2). Since naturalistically acquired languages were coded as L1 in the present study, nothing in the data should have hampered the L2 status to come into effect. Yet we see the odds of choosing a SL increased by its status as L1 (i.e. naturalistically learned language), thus lending support to an L1 status effect.

A number of other studies have also found more lexical transfer from students’ L1 than their L2(s). Lindqvist (2006, 2009) reports greater amounts of transfer from Swedish L1 into English with varying L2s. Näf and Pfander (2001) also find that two thirds of transferred items into English in their data set can be assigned to participants’ L1 French, rather than their L2 German. While there is evidence of an L2 status effect in syntax (Bardel & Falk, 2007; Falk & Bardel, 2011), the results from this study, as well as previous research, seem to suggest that the L2 status factor has a different effect on lexis than on syntax. Falk and Bardel (2010) and Bardel and Falk (2012) rely on Paradis’ (1994, 2004, 2009) framework of procedural versus declarative memory (see § 3.1.4.1.2 for a detailed account), thereby providing a convincing case for the L2 status factor in syntax.

However, the same framework cannot account for the results found here. Paradis argues that vocabulary knowledge in the L1 and L2 are both sustained by declarative memory. Consequently, both background languages are on a par with regards to the cognitive functions governing them and should thus be equally probable to be the source of transfer in third language acquisition (all other things being equal). The results of this study, however, show a clear L1 status effect. Given that proficiency, recency, and psychotypology were controlled for, there must be something inherent in the status of an L1 that
makes it a more probable source for transfer. A discussion of the theoretical implications of these results will be presented in § 6.2.4.

5.6 Research Question 4: Item-specific transferability

The quantitative analysis of this thesis has tested four factors that previous qualitative research had identified as important predictors for the source language of transfer. The preceding analysis was thus confirmatory in nature and aimed to test the significance and generalizability of these factors.

The present section, on the other hand, seeks to explore additional factors that thus far remain empirically unexplored. In order to address the complexity of CLI and to fully understand the phenomenon, it is necessary to “uncover as many specifics as possible about how CLI manifests itself in the language and cognition of real individuals” (Jarvis & Pavlenko, 2008, p. 33), and so Research Question 4 aims to investigate item-specific aspects that affect an individual word’s transferability, independent of (or in spite of) language-general factors:

A. To what extent can item-specific transferability contribute to our understanding of the source language of transfer in multilingual learners?

B. Are there differences in how item-specific transferability affects the source language of transfer in spoken versus written production?

In this more qualitative analysis, the individual transfer items are put into focus, as well as how learners transfer. First, the systematicity with which different individuals tackle the same TL lexeme is discussed and how the orthographic and phonological make-up of individual items impacts their choices (§ 5.6.1). Second, an in-depth analysis of how exactly foreignisings are achieved is presented, illustrating learners’ highly developed knowledge of target language rules and constraints (§ 5.6.2).

5.6.1 Systematicity in transfer patterns by target lexeme

In this section, the analysis will zoom in onto a selection of target lexemes from the picture story description task (e.g. frog, bees, ground) that elicited transfer from a large number of participants. Each instance of transfer for that lexeme will be discussed with regards to its source language of transfer, aiming to gain insight into the variability that the statistical analysis could not
account for. The four factors tested in the quantitative part of this study were less well able to predict the source language of transfer in writing in particular and this more in-depth analysis is hoped to provide some answers as to why this is so.

During the piloting stage of this project, three different production tasks were tested: a picture naming task, a picture story description task, and a free production task (§ 4.3.1). While the picture story description task was chosen for the main study, the picture naming task revealed some interesting transfer patterns. While in some cases no clear preference for one source language throughout the whole task was found per participant, certain pictures (i.e. TL lexemes), however, consistently elicited transfer from one SL across all participants, with some items being transferred from the same source language by up to 94% of the participants.

In a study on L2 Dutch transfer into L3 English by French native speakers, Bouvy (2000) (§ 3.1.5.2) showed how learners seem to conduct an intra-linguistic comparison of markedness based on TL orthographic norms. Learners assessed the transferability of synonyms (sparen vs. bezuinigen) within a background language (Dutch) in relation to the target language in question (English). The results from this project’s pilot study seem to indicate that the process of comparing degrees of markedness is also at work across background languages (e.g. comparing the transferability of French “grenouille” vs. German “Frosch” for the target lexeme frog).

This seems to be a necessary consequence of applying aspects of markedness to third language acquisition, as it needs to be considered both within each BL and across all BLs. This is not to say that such comparisons always take place. A learner might simply use the first word that comes to mind, or they might assess within-language markedness and be satisfied enough with the outcome to not conduct a cross-language search. Any given item may thus be either accepted or discarded for comparison with items from other source languages based on an initial assessment of transferability into the TL.

During the pilot study of this project, none of the learners transferred German “Süßigkeiten” (English: candy) in the picture naming task, despite a general preference for German as source language throughout the pilot study. It seems that this particular item was judged to be too marked for the TL in question (English), containing a multitude of markers that do not fit English orthographic and phonological rules (e.g. “ü”, “ß”, “keit”, “-en”).
Other examples from the pilot study include a preference of French “facture” over German/Luxembourgish “Rechnung” (English: bill/check) in 94% of the cases. The consonant cluster “ch” followed by “n” in the German/Luxembourgish item, as well the “-ung” suffix may all have contributed to its rejection as transfer option, while French “facture” may have been likened to English fracture or other English words ending in “-ure”. Indeed the frequency of “ure” is almost three times as high as that of “ung” in the English language (CLEARPOND) and so observing such patterns in multilingual learners seems to reflect a strong awareness of TL typicalities. In addition, one item may be chosen over another because a form equivalent or near-equivalent in the target language has been identified, imbuing strong confidence in the learner that this item is the best choice across all SLs (e.g. the lexeme matching “fresh” to mean frog, from Luxembourgish “Fresch”).

Given the observed patterns in the picture naming task of the pilot study, each TL word that occurred in the main study’s picture story was investigated for the source language it was transferred from and the ways in which it was transferred by the learners (e.g. borrowing, foreignising, etc.). Five TL lexemes (frog, ground, hole, bees, disappear) were chosen based on the high number of learners that relied on transfer to describe these objects/actions depicted in the story. In the ensuing analysis, each table presents all the instances of transfer for that target lexeme, ordered by mode of production and source language (e.g. Table 5-17 shows all the transferred words for the TL lexeme frog). In the heading row indicating the source languages, the correct SL spelling or pronunciation is indicated in brackets, while the examples of transferred items are shown in the exact form the learner produced them in. After each example, the number of individuals that transferred the item in this form, followed by the number of times this particular item was transferred in this way throughout the whole data set are shown in brackets.

Looking at Table 5-17 above, we see that in every instance learners relied on transfer in the written production task to refer to frog, they used the German word “Frosch” and slightly foreignised it by changing “sch” to “sh”. French “grenouille” and Luxembourgish “Fresch”, on the other hand, were not used
at all in the written production. While the French option does not seem sufficiently “despecified”\textsuperscript{16} to be considered for transfer, the Luxembourgish word’s form is as acceptable in English as the German word, yet is not used in the written data.

Table 5-17. Transferred items for the target word: frog.

<table>
<thead>
<tr>
<th></th>
<th>FROG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Writing</strong></td>
<td></td>
</tr>
<tr>
<td>Lux. (“Fresch”)</td>
<td></td>
</tr>
<tr>
<td>German (“Frosch”)</td>
<td></td>
</tr>
<tr>
<td>French (“grenouille”)</td>
<td></td>
</tr>
<tr>
<td>Frosh (2, 5)</td>
<td></td>
</tr>
<tr>
<td>frosh (3, 20)</td>
<td></td>
</tr>
</tbody>
</table>

|                |      |
| Lux. [fʁɛʃ] (7, 15) | German [fʁɔʃ] (4, 10) | French [ɡʁənuj] (1, 4) |
| Lux. [fəʃ] (3, 5) | German [fəʃ] (3, 6) |      |
| Lux. [fɪʃ] (1, 3) |      |      |

In the spoken data, we see a different pattern with learners now also relying on Luxembourgish. As previously discussed (§ 5.1.2), there seems to be a strong mode-specific effect in the case of Luxembourgish, which is a predominantly oral language never used for written academic tasks. Finally, there is only one learner who used French “grenouille” in speaking, which is very few in proportion to the overall number of learners who relied on transfer for this word (19 in total). This participant, however, is a French-Luxembourgish bilingual from birth, with extremely low TL English proficiency, who mainly uses borrowings. Her high proficiency and exposure to French, as well as its L1 status, necessarily lead to higher activation levels of French items, while her low proficiency in English entails low awareness of target language orthographic and phonological rules. This in turn prevents her from choosing the

\textsuperscript{16} “Sufficiently despecified” here means “not specific to a language” (Bouvy, 2000), i.e. it is not only acceptable in the SL, but also according to TL orthographic norms. It is used synonymously with “unmarked according to TL ortho-phonological rules”.

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source language item most closely fitting English spelling, and does not offer her the necessary skills to successfully foreignise.

The next TL word presents a more mixed picture. Table 5-18 below shows the transfer options used for English *ground*. First, we see semantic extensions in both the spoken and written data. Luxembourgish and German do not distinguish between *ground* and *floor*, and despite the picture showing an outdoor scenery, two learners in the written production use *floor*, which is generally only used to denote an indoor surface in English. Similarly, one learner in the spoken production uses a lexeme matching by using “bottom” (from L: “Buedem” or G: “Boden”). German “Erde” (English *earth*) is also used via foreignising. French does distinguish between *floor* (“sol”) and *ground* (“terre”) and two learners produced a lexeme matching based on the latter using English *there* in writing, and one learner borrows French “terrain” (English *plot* or *field*) in speaking. The fact that there are mainly semantic extensions or lexeme matchings for this TL word shows learners’ awareness of the high similarity between each SL item and items in the TL. Neither of the SL words is especially marked or specified for its language of origin and we consequently see a mixed set of chosen source languages.

**Table 5-18. Transferred items for the target word: ground.**

<table>
<thead>
<tr>
<th></th>
<th>GROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writing</td>
<td></td>
</tr>
<tr>
<td>Lux. (“Buedem”)</td>
<td>German (“Boden”, “Erde”)</td>
</tr>
<tr>
<td>floor (1, 2)</td>
<td>there (2, 2)</td>
</tr>
<tr>
<td>flor (1, 1)</td>
<td>Boden (1, 1)</td>
</tr>
<tr>
<td></td>
<td>eard (1, 1)</td>
</tr>
<tr>
<td>Speaking</td>
<td></td>
</tr>
<tr>
<td>Lux. [bʊədəm]</td>
<td>German [boːdən] [ɛədə]</td>
</tr>
<tr>
<td>[bʊədəm] (2, 2)</td>
<td>[boːdən] (1, 1)</td>
</tr>
<tr>
<td>English [bɒtəm] (1, 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[ɛəb] (1, 1)</td>
</tr>
</tbody>
</table>
Another example for which we mainly see foreignisings and lexeme matchings is the target word *hole* (Table 5-19 below). Especially for the French source item “trou”, we see an interesting lexeme matching to English in “true” and a foreignising in “trough”. In the spoken data, we further find a lexeme matching from Luxembourgish “Lach” to English “lack”, while the German “Loch” is mainly used as a borrowing. This item does not actually fit typical English orthography or phonology, but it may well be that learners matched it onto *Loch* from *Loch Ness* and therefore did not think to reject it or foreignise it.

Table 5-19. Transferred items for the target word: hole.

<table>
<thead>
<tr>
<th></th>
<th>Writing</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HOLE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>French</strong></td>
<td></td>
<td>(“terrier”, “trou”)</td>
<td></td>
</tr>
<tr>
<td><strong>German</strong></td>
<td></td>
<td>(“Loch”)</td>
<td></td>
</tr>
<tr>
<td><strong>Lux.</strong></td>
<td></td>
<td>(“Lach”)</td>
<td></td>
</tr>
<tr>
<td>leek (1, 1)</td>
<td>lok (1, 2)</td>
<td>terrier (1, 2)</td>
<td></td>
</tr>
<tr>
<td>Loch (4, 11)</td>
<td></td>
<td>trough (1, 1)</td>
<td></td>
</tr>
<tr>
<td>Leek (1, 1)</td>
<td></td>
<td>true (4, 14)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Speaking</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lux.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[lak] (1, 2)</td>
<td>[lɔx] (3, 4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[lax] (1, 2)</td>
<td>[lɔx] (3, 4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The next example is the target word *bees* (Table 5-20), for which there is a clear difference in orthographic and phonological acceptability in the TL for each source language word. Luxembourgish “Beien” is never transferred in writing and only by one learner in speaking. Similarly French “abeilles” is only used for transfer by three students, while German “Bienen” is transferred and generally foreignised by 17 learners. In some case, there is spelling transfer (e.g. “Bies/bies”), but generally it is foreignised as “beens” or “bines”, both of which are highly acceptable within English orthography. French “abeilles”, on the other hand, is marked for French by the “eille” component of the word, which is also the part of the word that learners consistently tried to foreignise. Each student dropped the double “l”, and two of three also dropped the final “-e”. In speaking, the changes are even more significant. One learner removed the -aille- component completely and replaced it with -ase-. However, the fact that we see 34 instances of German transfer and only 4 instances of French
transfer illustrates the strong preference for German as a source language for this particular word. The German item offers greater ease of foreignising, thereby reaching an item that is orthographically and/or phonologically acceptable in the target language. It needs to be noted that there might also be some effect of partial acquisition, where the learner remembers that the word in English starts with something like “b… bee… bea…” and uses the cognate from German to supplement their incomplete knowledge.

Table 5-20. Transferred items for the target word: bees.

<table>
<thead>
<tr>
<th>BEES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Writing</strong></td>
</tr>
</tbody>
</table>
| **Lux.**
(“Beien”,
“Wespen”) |
| **German**
(“Bienen”,
“Wespen”) |
| **French**
(“abeilles”,
“moustiques”) |
| bies (4, 5) |
| bie (1, 1) |
| bines (2, 4) |
| bienens (1, 1) |
| bienen (2, 2) |
| Bienes (1, 3) |
| Biesen (1, 3) |
| wesp (1, 2) |
| **Speaking** |
| **Lux.**
[bàin] [mustikan] |
| **German**
[bi:nən] |
| **French**
[abej] |
| [bàin] (1, 2) |
| [bi:nən] (8, 9) |
| [abej] (1, 1) |
| [barz] (1, 1) |
| [bi:ns] (6, 10) |
| [mustikan] (1, 1) |
| [bi:na] (1, 1) |
| [bi:n] (2, 4) |
In writing, one learner avoided using any kind of word for bees and instead used a foreignising of the Luxembourgish/German cognate for wasp (G/L: Wespen, foreignised as “wesps”). The French alternative in this case would have been “guêpe”, which (a) is a rather difficult, low-frequency word and so the learner may not have it in their repertoire, and b) its orthographic form is very specified for French with its “gu” combination, where the “u” hardens the “g” before the subsequent “e”, as well as the strongly French-marked use of the circumflex diacritic “ê”. It is thus not surprising that the learner chooses the Luxembourgish/German item. Its double cognate status across Luxembourgish and German may have further led to greater confidence in the choice.

In speaking, another learner also avoided using bees and used a borrowing of the Luxembourgish word for mosquito (L: Mustiken [mustikan]) instead. Here the German alternative would have been “Stechmücke”, which would be equally difficult to adapt to English phonological rules, with its typically German “ü” and “ck” letter combination, as well as general length due to its compound structure. Neither Luxembourgish nor German seem to be a good choice for transfer in this case, but this learner heavily relied on Luxembourgish throughout the task and almost exclusively used borrowings, which is indicative of low TL proficiency, necessarily entailing low awareness of English ortho-phonological rules.

The last example shows the predominant use of French as source language for the target word disappear (Table 5-21 below). The French source item “disparaître” (infinitive form) or “disparu” (past participle form) may not at first sight appear much more transferable than Luxembourgish “verschwannen” or German “verschwinden”. After all, “aître” is highly specific to French orthography and appears in a high number of French words (e.g. “maître”, “connaître”, “traître”, “paraître”). The Luxembourgish and German words, on the other hand, contain the very language-specific prefix “ver-”, followed by the strongly Luxembourgish/German-specified consonant cluster “schw”. Both options thus seem on par regarding their overall degree of markedness in relation to the TL, yet we see a consistent pattern of choosing the French word (13 out of 14 participants who used transfer for this target word used the French item). When we look at the way the French word was transferred, we see that in none of the cases the aspect most specified for French (“aître”) was retained. While the prefix in the German and/or Luxembourgish word could
also have been removed in order to increase its acceptability in English, this did not occur.

Table 5-21. Transferred items for the target word: disappear.

<table>
<thead>
<tr>
<th>DISAPPEAR</th>
<th>Writing</th>
<th>French (“disparaître”/ ”disparu”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lux. (“verschwannen”)</td>
<td>German (“verschwinden”)</td>
<td>disparent (1, 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>dispareted (1, 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>disparut (1, 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>disparated (1, 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>disparation (1, 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>disparate (1, 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>disparu (1, 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>disparesed (1, 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>deceptioned (1, 1)</td>
</tr>
<tr>
<td>Speaking</td>
<td>Lux. [fəʃvanən]</td>
<td>German [fɛʃvindən]</td>
</tr>
<tr>
<td></td>
<td>[fɛʃvindən] (1, 1)</td>
<td>[disparaʃən] (1, 1)</td>
</tr>
<tr>
<td></td>
<td>[dɪspeəd] (1, 1)</td>
<td>[dɪspəreʃən] (1, 1)</td>
</tr>
</tbody>
</table>

In a study on receptive skills and strategies, Müller- Lancé (2001) found that learners used the first syllable of an unknown word to look for its meaning in other languages, e.g. Italian arcivescovo (English archbishop) was interpreted as German Archiv (English archive). Similarly, the markedness and TL acceptability of the first syllable might take precedence over other syllables in this context, independent of how strongly marked subsequent syllables are for the source language. Learners might rely most heavily on the first syllable to establish whether a source item should be transferred. In this case, the prefix “dis-“ of the French word is as frequent in French as it is in English, while the prefix “ver-“ of the Luxembourgish/German word is ten times less frequent in English than in German (CLEARPOND). Another potential explanation may
be that the learners have encountered the English target *disappear*, but have not fully acquired it, leaving them with some intuitive feeling that the word was something like “disparaître” without being able to correctly produce *disappear*. Levelt (1993) proposes that the syllable inventory of different languages is shared and that the activation of a syllable from one language co-activates the same syllable in other languages. Such an integrated syllable inventory would support the account that French “disparaître” was co-activated when the learner remembered something starting with “dis-”.

In conclusion, this item-specific analysis of transfer patterns has provided important insights into how orthographic and phonological markedness influences the choice of SL. How exactly learners are able to correctly perceive ortho- and phonotactic probabilities in the target language remains to be established, however. In research on first language acquisition, Apel et al. (2006) found that typically developing 5-year-old children use “orthotactic pattern knowledge to judge the plausibility of pseudo-word spellings”. They were introduced to novel and pseudo words during storybook readings and orthotactic probability was found to significantly influence fast mapping, with children spelling and identifying novel words with higher orthotactic probability at greater accuracy. It may be that second language learners rely on similar processes to judge an item’s transferability. Ellis (2006) writes that second language learners are “intuitive statisticians” (p. 164) known to analyse the target language input for patterns employing unconscious statistical learning mechanism (Mirman, Magnuson, Estes, & Dixon, 2008; Newport & Aslin, 2004; Saffran, Johnson, Aslin, & Newport, 1999). Through this process of statistical learning, knowledge of orthotactic and phonotactic probability (hereafter shortened to KOPP) in the TL emerges, which in turn seems to be of relevance to transfer processes. In the context of third language acquisition, the effects of KOPP on the SL of transfer thus present a new area of investigation.

17 Different concepts are used to describe the characteristics of multilingual learners, e.g. crosslinguistic awareness (Jessner, 2008a), intuition (Jarvis, 2016b), etc. In the present text knowledge of ortho- and phonotactic probabilities is generally preferred over the terms awareness or intuition, as it leaves room for a potential distinction between conscious and unconscious knowledge of such probabilities.
The present analysis has also shown that a preference for one particular source language across all participants was more prominent in the written than the spoken data. In the spoken data, we see more variation in learners’ preference of a SL, while a more consistent choice of one specific SL was found in the written data. These results thus complement those from the quantitative analysis well. The four factors tested in the quantitative part of this study could predict a large proportion of the outcomes in speech production, which is more spontaneous and subject to processing constraints, thus favouring background languages with a heightened activation due to high proficiency, high exposure, and their status as L1. The four factors predicted written production less well, however, which indicates a higher level of conscious monitoring. Item-specific markedness thus seems to counteract effects of spontaneous activation in the written mode. This cross-language assessment of markedness appears to be rather systematic, with strong inter-learner consistency in SL choices found in the qualitative analysis presented here. The results from both the quantitative and the qualitative analysis thus present evidence of a high degree of systematicity in the SL of transfer.

5.6.2 Systematicity in foreignising

Assessing an item’s transferability in accordance with one’s KOPP (knowledge of orthotactic and phonotactic probability) in the TL is the first step in the SL selection process\(^{18}\). In many cases, the learners (especially more proficient learners) do not stop at this passive assessment, however, but will also actively increase an item’s transferability. This process seems to be equally governed by their KOPP and is evidenced in their ways of foreignising. Foreignisings make up 29% of all transfer instances in writing and 12% in speaking (see Appendix A). It seems that the active application of one’s knowledge of TL constraints requires a certain amount of processing time, therefore favouring the occurrence of foreignising in written production. Given the greater proportion of this type of transfer in writing, the present analysis will predominantly rely on those examples.

Once an item has been judged to be sufficiently despecified and transferable to the TL, it can then also actively be made to fit the TL better in a variety of

\(^{18}\) This process does not have to occur consciously.
ways: through vowel changes, pronunciation or suffix changes. In this analysis, first the number of changes per item are discussed and what this tells us about learners’ perception of transferability (§ 5.6.2.1). Second, patterns of foreignising are analysed and discussed in light of inter-learner systematicity, as well as learners’ KOPP in the target language (§ 5.6.2.2).

5.6.2.1 Number of changes

On average, a transferred item underwent 1.8 changes in writing and 1.67 changes in speaking. In both cases phonemes were counted, so that if in writing the participant replaced two letters, but they denote just one phoneme, this was counted as one change, rather than two. Capitalization changes were also counted. Graph 5-1 below indicates the number of items by the number of adaptations applied to them in both speaking (dotted line) and writing (continuous line).

![Graph 5-1](image)

**Graph 5-1. Number of changes applied to transferred items.**

The majority of words underwent only one or two changes. If we assume that words are only used for transfer if they are sufficiently despecified (§ 5.6.1), it does not seem surprising that the majority of items are easily adapted with just one or two changes in spelling or pronunciation. If an item requires 4 or 5 different changes in order to become acceptable in the target language, then this item is simply not despecified enough and will not be chosen for transfer in the first place. The fact that there is an even lower number of changes in speaking might be due to less processing time being available to strategically rely on one’s TL knowledge. However, a large number of words in writing underwent one change simply due to the removal of capitalization, which might make the comparison moot.
The examples below illustrate how the number of changes were counted. Example (81) shows a word that only underwent one change. The vowel phoneme “ie” (the most commonly used grapheme to denote /i/ in German) was replaced by “ea” (which is more common in English than “ie” to denote /i/).

- **1 change**

  (81) “feal” (from G: “fiel”; English: it fell)
  “[it] feal down and Marco run away.”

Example (82) shows 2 adaptations to the French word “prend”; first the learner changed the vowel phoneme and then removed the final -d, thereby approximating English words such as brain, train, strain, or drain.

- **2 changes**

  (82) “prain” (from F: “prend”; English: take)
  “[…] the boy prain his pullover, short, and his *schus.”

Example (83) shows an item that underwent 3 changes. The initial consonant was changed from “k” to “c”, the verb ending was removed from the original SL item and one of the final double consonants was dropped. Interestingly, the learner put the word in quotation marks, thereby indicating their uncertainty regarding its correctness and signalling to the reader that this is a conscious attempt to fill a gap in their TL knowledge.

- **3 changes**

  (83) “clam” (from L: “klammen”; English: he climbs)
  “The owl fly behind Paul, also he “clam” on a *fels.”

There were no items with 4 changes, and only one in the spoken data that underwent 5 changes (example 84).

19 The examples provided in this section are but a small selection of the total amount of occurrences of the phenomenon presented and are thus not exhaustive.
• 5 changes

(84) [pɜr'ʧeɪst] (from F: “pourchassé” [pʊʁʃase]; English: chase)²⁰
/ the bees [pɜɹ'ʧeɪst] the dog and the boy fell from the tree /

The learner foreignised the source language word through the following changes, thus achieving fully acceptable target language pronunciation:

  o Vowel change: /u/ -› /ɜ/
  o Consonant change: /ʁ/ -› /ɹ/ (corresponding to unchanged grapheme: r)
  o Consonant change: /ʃ/ -› /ʧ/ (corresponding to unchanged grapheme: ch)
  o Vowel change: /a/ -› /eɪ/ (corresponding to unchanged grapheme: a)
  o Verb suffix change: /e/ -› /t/

Five phonemic changes were made. However, it needs to be stated that three of them would not imply any change of the corresponding grapheme if the transferred word was produced in writing, while only two imply an actual change of grapheme (the first vowel sound of the word and the verb tense suffix). In this sense, this token from the spoken data should be considered as transferable as any of the items that only underwent 2 changes in written production. An orally produced item that had required 5 phonemic changes that corresponded to 5 grapheme changes would most probably not have been judged to be transferable. Whether participants’ judgements about transferability are indeed partially based on a word’s written form remains to be determined. Research into spelling effects on spoken word production, however, has shown that in prompt-response²¹ word generation tasks, the preparation of the response words was disrupted when the responses shared initial phonemes

²⁰ It needs to be noted that this example may also be interpreted as a lexeme matching to the English verb purchase, of which the learner might have (partial) knowledge. Given the low frequency of the word and the low TL proficiency, however, this is rather unlikely.

²¹ In prompt-response word generation tasks, participant first learn small sets of prompt-response pairs such as FRUIT – “melon”. An auditory prompt is then presented to which the participant needs to produce the associated response. Both homogeneous and heterogeneous sets are included. In homogeneous sets, the response words share a part of their form, such as the first syllable in “melon” and “metal”. In heterogeneous sets, the response words were unrelated in form. Word production latencies are then compared across conditions.
but *differed* in spelling (e.g. longer latency for “camel” and “coffee,” but not for “kennel” and “coffee”), indicating that spelling constrains speech production (Damian & Bowers, 2003).

5.6.2.2 Ways of foreignising

Based on previous theoretical accounts of transferability, examples of learner behaviour (e.g. Bouvy, 2000), and the analyses presented in this thesis thus far, it is reasonable to hypothesize that learners will foreignise in such a way that a grapheme-phoneme sequence in the original item that is uncommon in the TL will be replaced by a sequence that is more frequent in the TL. The following section investigates whether this is indeed the case and whether the adaptations the learners make follow any systematic patterns.

Before discussing phonological and orthographic changes, examples of changes in inflectional morphology are considered. Both plural suffixes and verb suffixes were regularly dropped and replaced by the English equivalent (examples 85-93), illustrating learners’ already well-established understanding of English morphemes. While the correct English plural suffix was added every time, this was not the case for verb suffixes. Here, in half the cases the original verb suffix was removed, but then not replaced by the TL suffix (examples 94-97).

- **English morpheme added:**
  
  (85) G/L: “Wespen” → “wesps” (English: wasps)
  (86) G: “Bienen” → “bines” (English: bees)
  (87) F: “cherche” → “cherching” (English: searching)
  (88) F: “disparaître” → “dispareted” (English: disappeared)
  (89) F: “grimpe” → “gramped” (English: climb)
  (90) G: “klettern” → “klettering” (English: climb)
  (91) F: “mordre” → “morded” (English: bite)
  (92) G: “springen” → “springing” (English: jump)
  (93) F: “poursuivre” → “poursuived” (English: followed/chased)

- **No English morphemes added:**
  
  (94) G: “helfen” → “help” (English: help)
  (95) G/L: “kippen” → “kipp” (English: tilt/fall over)
  (96) G: “trinken” → “trink” (English: drink)
  (97) F: “piquer” / L: “picken” → “pic” (English: sting)
Regarding orthographic changes, one of the most common and consistently applied foreignisings in writing is the removal of capitalization in German and Luxembourgish nouns (examples 98-100). Interestingly, capitalization changes most often co-occur with other adaptations; in the case of borrowings, learners often do not remove capitalization. This may be because the learner wants to show that they are aware that the word is transferred and therefore does not even make basic changes.

(98) “frosh” (from G: “Frosch”; English: frog)
“A little boy and his dog have a frosh.”

(99) “gaier” (from G: “Geier”; English: vulture)
“A gaier search *nach *Beute.”

(100) “stean” (from G: “Stein” or L: “Steen”; English: stone)
“The boy is *sure stean.”

With regards to vowel changes in the spoken data, one interesting adaptation that was made consistently across different individuals is the use of Luxembourgish “Bockal” [boːkaːl] (English: jar), in the form of [bɔkl]. Three different students used this SL word and they each foreignised it in the same way. The long /aː/ vowel in Luxembourgish that appears in the final syllable is highly uncommon in English and learners seem to be aware of this. They replace it with the more high-frequency suffix [əl] or [l] that generally follows /k/ sounds at the end of English words, as in ankle, buckle, or pickle.

Regarding vowel changes in the written data, one consistent pattern across a high number of learners is the dropping of final “e” (examples 101-106), especially in the case of French words. While final -e is not uncommon in English, it serves a different function in the two languages. In English, it generally has an effect on the way the preceding vowel is pronounced (e.g. English fin /fin/ vs. fine /fʌɪn/), while in French it also indicates that the final consonant needs to be pronounced (e.g. French fin /fɛ̃/ vs. fine /fin/). The learners seem to be aware that final silent -e is not necessary in English to make sure the final consonant is pronounced and in order to avoid an unwanted change in the preceding vowel, learners drop it. Furthermore, final silent -e might be perceived as a rather stereotypically French characteristic (given the language’s propensity for unpronounced letters) and is therefore removed. Such
a logic is independent of the target language and the same behaviour should thus be observed in the case of transfer to e.g. German (see § 3.1.5.2 for a discussion of different aspects of markedness and transferability).

- Final “e” drop

(101) F: “abeille” → “abeil” (English: bee)
(102) F: “cache” → “cach” (English: hide)
(103) F: “cherche” → “cherch” (English: search)
(104) F: “derrière” → “derier” (English: behind)
(105) F: “grimpe” → “grimb” (English: climb)
(106) G: “Eule” → “Eul” (English: owl)

In addition, single vowels and vowel combinations representing /iː/, such as “ie” or “i”, were consistently changed to “ee” or “ea” (examples 107-109). When looking at the probability with which the grapheme “ie” vs. “ee” or “ea” to denote /iː/ occurs in the English language, we see a clear difference. The odds that the grapheme “ie” represents /iː/ in English is only 16.78%, while the odds that “ee” and “ea” represent /iː/ are 87.28% and 36.10% respectively (“ea” further represents /ɪə/ 22.23% of the time, as in the word real, which is rather similar to /iː/ to the untrained ear) (Gontijo, Gontijo, & Shillcock, 2003).

(107) G: “Bienen” → “beens” (English: bees)
(108) G: “fiel” → “feal” (English: fell)
(109) F: “nid” → “nead” (English: nest)

Another typical vowel change that students made was the removal of the graphemes “ei” and “eu” in German, replacing them with “ea” (examples 110 & 111). In this case, there was not only a change in grapheme for the same phoneme, but the phoneme was changed altogether. However, looking at the frequency with which the graphemes “eu” and “ei” occur in English in comparison to “ea”, there is a strong frequency effect with “ea” at 0.22% and “eu” and “ei” both only at 0.05% (CLEARPOND).

(110) G: “Stein” → “stean” (English: stone)
(111) G: “Eule” → “Eal” (English: owl)

In comparison to vowel changes, learners showed even higher systematicity in their consonant adaptations. English vowel spellings are less predictable than consonant spellings and so it is not surprising that learners present some variation in their sound-symbol associations of vowels. The foreignising of
consonants, on the other hand, seems more consistent. Certain consonants and consonant clusters were changed in the same way by a large number of students. If the consonant cluster “sch” was adapted, it was always adapted to “sh” (example 112), seemingly reflecting the learners’ awareness of the greater probability of “sh” denoting $/ʃ/$ (100%) than “sch” denoting $/ʃ/$ (4.13%) (Gontijo et al., 2003). Similarly, “ß” was also always changed to either “s” or “ss” (examples 113 & 114), demonstrating the participants’ awareness of the non-existence of this letter in the English alphabet. While “t” was only changed in two instances, it was changed to “th” in both cases (example 115 & 116). It seems that “th” is perceived to be a grapheme specifically marked for English from a cross-language perspective (“th” indeed has a higher frequency in English than in German, 0.82% vs. 0.13% respectively) (CLEAR-POND) and is therefore applied in order make a SL word look more target-like.

- “sch” → “sh”
  (112) “The Frosh (from G: “Frosch”; English: frog) jumping.”
- “ß” → “s” or “ss”
  (114) “[…] he Filipe schiessen by (from G: “schießen”; English: shoot) Ray.”
- “t” → “th”
  (115) “Pitty is happy and he think the frog is his new House theer (from G: “Haustier”; English: pet).”
  (116) “The reenthier (from G: “Rentier”; English: reindeer) going with Tim away.”

The most striking pattern found in the data, however, is the systematic double consonant reduction at the end of words. In 83% of all possible cases (i.e. words that end in a double consonant in the source language, or which have lost a final vowel through foreignising and now end in a double consonant), students dropped one of the consonants (examples 117-125).
Final double consonant reduction

(117) G: “klämmt” → “clam” (English: climb)
(118) G: “Bett” → “bet” (English: bed)
(119) G: “dann” → “dan” (English: then)
(120) L: “gudd” → “gud” (English: good)
(121) G/L: “Bett” → “beet/bet” (English: bed)
(122) G: “kommen” → “kom” (English: come)
(123) G: “nimmt” → “nim” (English: take)
(124) F: “abeille” → “abeil” (English: bee)
(125) G: “bellen” → “beel” (English: bark)

English has very specific rules governing final consonants (“Useful English,” 2016). For example, the consonants "p, b, t, d, g, m, n, r" standing after a single vowel are always single at the end of one-syllable words. If we now look at the examples given above, indeed double consonant reduction was applied in all cases ending in these letters. There is one additional final consonant in the data that does not fall under the rule above (example 124 & 125): the letter “l” in “abeil” and “beel”. The rule regarding the letter “l” is that at the end of one-syllable words, it is single if there are two vowel letters or a vowel and a consonant before them, which indeed is the case for “beel”. There is no specific rule regarding final “l” in two-syllable words and so “abeil” is also acceptable in its presented form. Given these patterns, it seems that learners have somehow acquired knowledge of English orthographic rules.

These examples continue to illustrate the degree of systematicity in students’ transfer patterns. While there is always some degree of variability that we cannot (yet) account for, the data presented here speaks in favour of highly skilled language learners. Even at this low level of English proficiency, they have already acquired important knowledge about orthotactic probabilities in the TL and have the ability to apply this knowledge to source language items when they foreignise.

Furthermore, the fact that learners foreignise in such similar and appropriate ways demonstrates that the process of transfer (whether in the choice of source language or in ways of foreignising) is in no way random or unsystematic,

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22 Exceptions: ebb, butt, add, odd, egg, inn, err, purr.
quite the opposite. Consequently, the question we need to answer is what shared underlying mechanism could explain this degree of consistency and TL appropriateness in these learners’ transfer behaviour. A number of researchers believe that there is a multilingual advantage (e.g. Herdina & Jessner, 2002) in the acquisition of additional languages, where multilinguals are suggested to have higher crosslinguistic awareness (see § 2.1.5 for a definition), due to their greater experience of language learning. However, no study has yet attempted to objectively measure crosslinguistic awareness, nor tried to compare monolinguals and bilinguals in this regard. While multilinguals’ greater language learning experience may indeed prove to play a role in the type and quality of transfer we see, other factors that are equally relevant to second language acquisition, such as general statistical learning from input and consequent knowledge of orthotactic probabilities in the target language, may prove to play a more important role.

Statistical learning refers to the discovery of patterns in the input that the language learner makes (Romberg & Saffran, 2010). It was first identified in first language acquisition because of the rapidity with which infants acquire language and this despite its complexity. Statistical learning, however, is now thought to be a generalized learning mechanism. Consequently, there is no reason not to assume that second (and third) language learners also rely on statistical learning to identify patterns in the target language (or to assume that there is a difference between second and third language learners). The systematic patterns of source language and foreignising across learners and items illustrate learners’ seemingly intuitive knowledge of ortho- and phonotactic probabilities in the target language and this after only one year of English classroom instruction. The data examined here have shown that the adaptations that transferred items undergo are by no means random, but indeed follow target language orthographic and phonological rules. Given the short amount of English instruction these learners have thus far received, it seems unrealistic that such rules have been consciously acquired and subsequently applied to SL items in transfer. The observed inter-learner systematicity in transfer instead seems to be governed by the unconscious, statistical learning of orthographic and phonological patterns in the TL.

5.7 Conclusion

Within research on lexical transfer in L3 acquisition, this study is the first of its kind in its comparative perspective, as well as comprehensiveness, including five different predictors for the SL of transfer. In the quantitative analysis,
it was shown that proficiency and exposure are significant predictors of the source language of transfer in both speaking and writing (§ 5.4), thus confirming results from previous qualitative research. Furthermore, an L1 status effect was found, which highlights the need for further research on the effects the L1/L2 status of a language has on vocabulary, as opposed to syntax. It was further found that psychotypology does not have a consistent effect in the absence of a typological difference (the implications of these results will be discussed in § 6.2.3). Most importantly, the results show that indeed each of these factors has an effect in isolation (i.e. when controlling for other factors).

In addition, the study has provided insight into differences between the SL of transfer in spoken and written production, which, thus far, had not yet been investigated in direct comparison. The multinomial logistic regression analysis has shown that the factors identified by previous research can predict the SL better in spoken production than in written production (§ 5.3.2). More research into the specificities of the written mode and other, additional factors is thus needed to gain a more complete picture of the processes underlying transfer in written production.

It needs to be noted that, while the four factors did not predict the SL of transfer as well in the written as in the spoken data, they were nevertheless found to be significant predictors in writing. While the two modes of production differ and future research should aim to uncover predictors specific to each mode, we also need to recognize that the underlying processes governing language production in the spoken and the written mode might not be as distinct as we think.

The importance of modal, as well as contextual, specificities was highlighted by the descriptive statistics (§ 5.1), which showed different proportions of transfer by source language in speaking and writing. The relevance of modality-specificity was further supported by the results on exposure. The more a participant used a language for oral interaction in their daily lives, the more they transferred from that language in the spoken mode, not, however, in the written mode (§ 5.5.2). A background language typically used in one mode of production during daily use thus seems to play a more dominant role as source language of transfer when data is collected in that same mode. Since this is an incidental finding of this study, the research design does not allow for the issue to be explored more fully (e.g. no data on written exposure was collected), but these findings represent interesting indicators for future research.
Finally, the present study has also conducted a more exploratory analysis of item-specific aspects that may further our understanding of transfer processes in a new way. The analysis at the item-specific level has demonstrated participants’ heightened knowledge of ortho- and phonotactic probability (KOPP) in the target language. This was evidenced by their choice of source language based on a comparative analysis of the degree of markedness of SL items (§ 5.6.1), as well as their successful ways of foreignising (§ 5.6.2). It seems that these young third language learners rely on statistical learning to gain knowledge of orthotactic and phonotactic probability, in the same way first language learners do to identify patterns in the input.

The results of both the quantitative and qualitative analyses presented in this chapter highlight the high degree of systematicity and predictability of transfer behaviours, which had not yet been this clearly delineated in previous research. In chapter 6, these results will be discussed in light of previous research, as well as in terms of their theoretical implications for models of multilingual lexical organization and processing.
6 Discussion and Theoretical Implications

The aim of this thesis is to gain greater understanding of the processes underlying multilingual language acquisition, lexical organization and crosslinguistic influence during language production. More specifically, the study has investigated the predictability of the source language of lexical transfer in both speaking and writing by testing four factors that previous qualitative research had found to have an effect, as well as item-specific aspects that might affect the degree of transferability a word.

The quantitative and qualitative analyses in this study have yielded important findings, which add to the current state of knowledge in the field. The present chapter aims to discuss these findings in light of previous research and their theoretical implications. First, methodological considerations are presented (§ 6.1), focusing on multinomial logistic regression as an important methodological addition to other, more established methods in the field. Second, the role of each of the five factors (proficiency, exposure, psychotypology, L1/L2 status, and item-specific transferability) is discussed in turn, relating the findings of this study to previous research, as well as considering their theoretical implications (§ 6.2).

In addition, the differences in the source language of transfer between modes of production that were found in this study will be discussed from a comparative perspective (§ 6.3.1), where the four factors’ ability to explain SL patterns in speaking and writing is compared, and from a predictive perspective (§ 6.3.2), where the typical mode of use of a language is discussed as a predictor for the SL of transfer. Finally, theoretical implications for models of lexical organization and processing that emerge from the combination of individual findings are discussed (§ 6.4).

6.1 Methodological considerations

The vast majority of studies on lexical transfer in third language acquisition to date have relied on qualitative and exploratory methods to investigate the
source language of transfer in multilingual learners. These methods represent an excellent tool to uncover new phenomena, delineate certain patterns of behaviour, generate hypotheses, and establish potential explanatory factors. Indeed, the present study has relied on the same methods to explore additional factors relevant to the source language of transfer. However, the question remains why so few studies use inferential statistics to further explore factors that qualitative methods have brought forth.

First and foremost, in many cases there is simply a lack of access to sufficiently large samples of participants that share the same combination of background languages. Sample size is extremely important to ensure reliable results when using inferential statistics and securing a large enough sample was difficult even in this study. In addition, there needs to be sufficient variability in the sample with regards to the factors under investigation. While all the factors were indeed independent of each other, this is due to the particularities of this specific geographical and linguistic context. Generally, one would expect high proficiency in French to correlate with high psychotypological beliefs regarding French and English or with the L1 status of a language, which illustrates the degree of difficulty associated with statistical analyses, such as this one, given the learner profiles that researchers typically have access to. Since quantitative research can only be conducted with a particular pool of participants and variation in the factors tested, it is not surprising that few prior studies have employed inferential statistics to test the predictive power of certain factors.

Second, quantitative methods come with certain limitations. In some instances, we may encounter significant results that intuitively do not make sense (like some of the psychotypology measures in this study), but due to a lack of more sensitive data, such as post-task interviews or stimulated recalls, it remains difficult to provide reliable explanations as to why these results have arisen.

Third, the quantification of qualitative data (i.e. counting and categorising transferred items) necessarily implies a reduction of information, as it forces the researcher to make a choice in certain cases when there is no perfect choice to make. For example, in this data set there was a large number of tokens that could have originated either from German or from Luxembourgish, or both simultaneously (§ 4.5.3.2.3). These were added to the SL category of “Other” (§ 5.1.2), together with words that could have originated from either French
or Luxembourgish, or all three SLs, and any other type of transfer that could not clearly be assigned to one of the three languages under investigation.

This mixed category of “Other” was excluded from the statistical analysis. However, the category of unidentifiable German/Luxembourgish transfer was rather large in comparison to other unidentifiable transfer (e.g. Luxembourgish/French). Since these were excluded from the statistical model, the difference in proportion between these different types of unidentifiable transfer may have led to some distortion in the data. Given that German and Luxembourgish were the most frequently used SLs in the sample, being able to tease apart the German/Luxembourgish items and adding them to the analysis would have made the proportions currently found even more prominent (i.e. the German and the Luxembourgish pool would have become even larger). It is doubtful that the results would have been very different if these items had been added, but it is clear that quantitative methods are less sensitive to such issues than qualitative methods.

Despite the above-mentioned limitations, the present study has aimed to explore whether a quantitative approach to the investigation of crosslinguistic influence might be a useful complement to the current qualitative body of research. Rather than dismissing prior methodological approaches, its intention was to engage with the results found in previous, more qualitative studies and to test the predictive power of established factors through inferential statistics.

The findings of the current project illustrate how inferential statistics can indeed provide interesting insights into lexical transfer. The first important contribution is that they offer a solution to the common problem of confounding variables that was identified in a large number of previous studies (e.g. Bardel & Lindqvist, 2007; De Angelis, 2005a; Hammarberg, 2001; Jessner, 2006; Sánchez, 2015b; Singleton & Ó Laoire, 2006). The results have thus shown how well proficiency, exposure, psychotypology, and the L1/L2 status, each in their own right, predict which background language will dominate as source for lexical transfer in any given individual.

The second important contribution is the capacity of inferential statistics to provide generalizable results, thereby offering greater bearings on practical aspects of language learning. While SLA (and TLA) is sometimes approached from a purely theoretical perspective (e.g. UG), it is generally rooted in applied linguistics. The aim is thus to gain greater understanding of language phenomena in order to inform language learning and teaching practices.
Changes in teaching methods or national curricula need to rely on results that are generalizable to the greater population of language learners. Generalizability therefore represents the most important added value of employing quantitative methods in a predominantly qualitative research area.

However, there are limits to the generalizability of the results of this study. It remains to be determined whether the same factors are significant in the case of typologically distant languages (e.g. an L1 Chinese speaker, with L2 Indonesian, learning English). The present study controlled for typology in order to test psychotypology as a distinct variable and while psychotypology did not seem to have a consistent effect, this does not mean that typology does not affect transfer (see § 6.2.3.2 for a more detailed discussion). In the case of very remotely related background languages, typology may even override other factors that have been found to have an effect in the case of typologically related languages (i.e. proficiency, exposure, L1 status).

Finally, given the complexity of the phenomenon, neither qualitative nor quantitative methods should be used exclusively; rather different methodological paradigms should be employed in cooperation. Mixed methods are often employed in applied settings where the field “require[s] multiple methods to understand complex social phenomena” (Tashakkori & Teddlie, 2003b, p. 679). Mixed methods thus emerges as a useful methodological approach in this context, as it allows us to complement and expand results through a secondary method. While the aim of the quantitative analysis of this study was to offer cross-study validation of previous results through the use of a different method, the analysis also included a more in-depth analysis, in order to explore item-specific transferability, an aspect that has been present in the literature for a long time, but had remained empirically unexplored. The use of mixed method thus offered the most comprehensive analysis of the data, given the research questions at hand.

6.2 The role of the five factors

In the ensuing section, I will discuss the results of each factor in light of previous research, as well as their implications for theoretical accounts of cross-linguistic influence. First, the finding that high proficiency increases a background language’s odds to act as source for transfer is discussed in the context of studies that found transfer from low proficiency background languages into a low proficiency TL (§ 6.2.1). Second, exposure is discussed in terms of the modal differences that were found in this data (i.e. oral exposure leading to
greater transfer in oral production, but not in written production) (§ 6.2.2). Third, the conflicting results found for psychotypology are examined both from a methodological perspective (§ 6.2.3.1) and a theoretical perspective (§ 6.2.3.2). Fourth, the strong evidence of an L1 status effect in lexical transfer is considered in light of different theoretical models, such as Paradis’ model of declarative/procedural memory and models of network activation (§ 6.2.4). Finally, the findings regarding item-specific transferability are discussed in relation to previous studies that also found learners to scan all available options and to conduct cross-language comparisons. These results also have theoretical implications for explanatory models of crosslinguistic influence that predominantly present transfer as an unconscious, automatic process, but ignore strategic aspects of transfer.

As was done throughout chapter 3, the results of this study will be discussed in terms of how they relate to previous studies and theoretical accounts of lexical transfer, rather than syntactic or phonological transfer. It is quite likely that different factors operate at those linguistic levels than at the lexical level. Previous research, for example, seems to suggest that the L2 status is a factor mainly relevant to syntax (§ 3.1.4.1). One the other hand, it may well be that the L1 is the most common source of transfer in phonology, similar to the L1 status effect found for lexical transfer in this study. Furthermore, there may be differences in transfer patterns by linguistic level depending on the typological distance between languages. An L1 Chinese speaker may show phonological transfer into English, but very little lexical transfer, for example. The focus of this discussion will therefore be limited to lexical transfer.

6.2.1 Proficiency

The results on proficiency point towards high proficiency in a source language leading to larger amounts of transfer from that language, supporting the results found by Ringbom (1987, 2001) and Lindqvist (2010). In a number of previous studies, proficiency was confounded with other factors, such as the L2 status hypothesis (Williams & Hammarberg, 1998) or typology (Jessner, 2006; Tremblay, 2006). In this study, it was shown that proficiency in a SL positively correlates with the amount of transfer from that SL when all other factors are controlled for (§ 5.5.1).

When discussing previous research (§ 3.1.1.1), two questions regarding proficiency remained to be answered:
1. Should proficiency be considered across all SLs (L1 and L2s) or only across L2s?

2. Do learners draw on low-proficiency SLs when their TL is at low proficiency and on high-proficiency SLs when their TL is at high proficiency (Lindqvist, 2010; Odlin & Jarvis, 2004).

The first issue relates to how studies often invoke higher proficiency in one L2 versus another L2 to explain the greater number of transfer instances from that language, without, however, taking into consideration the level of proficiency in the L1 (Williams & Hammarberg, 1998). It seems that many exclude the L1 when discussing the effects of proficiency, because the learners usually have the highest level of proficiency in their L1, which would consequently eclipse any differences in proficiency effects across L2s. In this study, proficiency in all the background languages was included, independent of the language’s status. However, since the L1/L2 status of a language is controlled for in the statistical model, the results clearly isolate proficiency effects. Whether one chooses to only compare L2s or include the L1 in the comparison, the effect will be the same (i.e. higher proficiency leads to higher numbers of transfer instances from that SL), since the L1/L2 status was controlled for.

Regarding the second question, Bardel and Lindqvist (2007) found that learners relied more on low-proficiency background languages when the TL was also at low proficiency (let’s call it the “low-to-low” pattern). In the present study, TL proficiency was very low (learners were at the beginning of their second year of English instruction, where the first year only contained one 90-minute class per week). For the same “low-to-low” pattern to occur in this sample, we would have to see more transfer from low-proficiency background languages. The results of this study, however, show an effect of high proficiency. The question that arises is how to reconcile the findings of this study with those found in Bardel and Lindqvist (2007).

Bardel and Lindqvist (2007) conducted a longitudinal study in which they observed greater transfer from low-proficiency Spanish to the TL Italian when TL proficiency was also low. With increasing proficiency in the TL, transfer from low proficiency Spanish decreased, while transfer from high proficiency French and Swedish increased. It is difficult to compare different studies, since TL proficiency was not objectively measured in either of the two studies discussed here. It seems, however, that the TL proficiency level of the learners of this study is most similar to recording No. 2 in Bardel and Lindqvist (2007),
which occurred two weeks into the intensive language course (or potentially recording No. 3, which occurred after 4 weeks of intensive lessons, plus 7 weeks of self-study), rather than recording No. 1, which was conducted at the beginning of the course. For recording No. 2 and No. 3, we actually see a large predominance of transfer from high proficiency French and Swedish, which is in line with the results of this study. Since recording No. 1 in Bardel and Lindqvist (2007) took place so early, when TL proficiency was virtually inexistent, it may be that the learner relied on Spanish because it is typologically the closest, rather than because it is also a low proficiency language. Given the confounding nature of proficiency and typology in their study, it remains difficult to know whether there indeed is a pattern of “low-to-low” proficiency transfer. The results of this study seem to indicate that high proficiency increases the odds of a BL to be relied on for transfer, even if the TL is still at low proficiency, but more research is needed with participants that have reached higher levels in the TL to fully understand proficiency effects.

6.2.2 Exposure

The present study has shown that greater interactional exposure (i.e. the language spoken at home, with friends at school, and friends outside school) leads to greater transfer from that language in the spoken mode, but not in the written mode, while media exposure (i.e. TV, music, internet) has no effect in either mode.

Three different definitions of recency are generally considered: (1) the most recently acquired language (see Jarvis & Pavlenko, 2008), (2) the most recently used language (Gabrys-Barker, 2012; Szubko-Sitarek, 2015), and (3) the language used most often (Hall & Ecke, 2003; Jessner, 2006; Tremblay, 2006; Tullock & Fernández-Villanueva, 2013) (§ 3.1.2.1). The majority of studies, including this one, conceptualize it as the language used most often (i.e. exposure). It is usually only invoked as a supporting factor, in addition to other explanatory variables, but has never been tested in isolation (Szubko-Sitarek, 2015). This study thus adds important new insights to the effect of exposure on the source language of transfer as a determining factor in its own right. While most of the discussion on recency and/or exposure in the literature relates to how the construct should be defined and what it is that should be measured, the results of this study point to a different issue altogether, namely the mode in which exposure to a language occurs.
The questions eliciting information about interactional exposure all pertained to oral interaction and so it seems that a language’s typical mode of production is an important factor in predicting in what mode transfer from that language occurs (see § 6.3.2 for further evidence and a more detailed discussion). Future research should include a measure of written exposure in order to further corroborate the mode-specific effects found in this study. There may also be a difference in the degree of activation in the mind depending on whether exposure is active or passive (speaking and writing vs. listening and reading), consequently affecting the availability of a language as source for transfer in subsequent language production.

6.2.3 Psychotypology

The introduction of the term psychotypology reflects the assumption that there are two separate concepts, typology and psychotypology, where one can differ from the other (R. Ellis, 1994; Odlin, 1989; Ringbom, 2007). Psychotypology is the subjective perception of similarity that a learner has, while typology is the objective distance between two languages. In that sense, psychotypology can be at play even when the languages involved are typologically distant. However, there is a discrepancy between the theoretical distinction of typology and psychotypology and the practical implementation of this distinction. Despite psychotypology being regularly invoked by researchers to explain particular patterns in the choice of source language of transfer, there is a general lack of direct measures of psychotypological beliefs in the literature (§ 4.3.2.3). Results are usually analysed using objective typological distances between languages rather than the learners’ subjective perceptions of these, assuming that they coincide (e.g. De Angelis, 2005a; Jessner, 2006; Ringbom, 1986, 1987, 2001, 2007; Sánchez, 2012; Singleton & Ó Laoire, 2006). However, in order to validate psychotypology as a separate concept from typology, the former needs to be measured (Haghverdi et al., 2012; Hall et al., 2009; Lindqvist, 2015; Sánchez & Bardel, 2016) and the latter needs to be controlled for.

The present study consequently aimed to investigate whether psychotypology can be measured and tested as part of a statistical model (multinomial logistic regression). Secondly, it aimed to test whether there can be a meaningful effect of psychotypology in the absence of actual differences in typological distance between the SLs and the TL. The three background languages under investigation were judged to be at equal distance to the TL (at least for lexis).
(§ 4.1.4), thereby controlling for typology and allowing us to investigate the
effects of psychotypology in isolation.

The results showed psychotypology to have a significant effect on the source
language of transfer, meaning that the learners’ judgments of similarity did
affect their choice of SL in both speaking and writing. However, the direction
of the effect was inconsistent across measures for different SLs and modes of
production. These results raise both methodological (§ 6.2.3.1) and theoretical
(§ 6.2.3.2) concerns, which will be discussed below.

6.2.3.1 Methodological concerns

The inconsistent, yet significant, results found for the construct of psychoty-
pology raise important questions regarding the validity of the construct and
the reliability of the measurement tools employed to establish it. The present
study used a questionnaire to elicit data on psychotypology, rather than in-
depth interviews or other more qualitative methods. Concerns about the suit-
ability of large scale studies to measure psychotypology have been voiced by
Bardel and Lindqvist (2007), who argue that case studies provide more de-
tailed introspection and subsequently a better understanding of a learner’s psy-
chotypological beliefs. Furthermore, questionnaire data can be an unreliable
measure in some cases, due to biases, such as an acquiescence bias (i.e. yea-
saying) (Watson, 1992).

However, the risk of participants voicing a “random” opinion was minimal-
ised in this study through the use of multiple questions pertaining to the same
aspect, allowing for the rigorous testing of internal consistency. If a participant
had indeed answered randomly, their answers to these questions would not
have correlated. The Cronbach’s alpha values indicated strong internal con-
sistency (§ 4.3.2.3.2) and the questionnaire was thus judged to be a reliable
measure.

Methodological issues may nevertheless have arisen from the data distribution
and the way this distribution influences the statistical model. There was a ra-
ther important difference in the number of tokens for the DV from German
versus French, which can lead to differences in the B coefficient value. The B
coefficient for German-English psychotypology, for example, was -1.284,
while the B coefficient for French-English psychotypology was -1.567. Ger-
man-English psychotypology did not have the expected effect, but rather predicted less transfer from German, a result which may be related to its lower B coefficient.

Another potential methodological explanation for the inconsistent results is that the questionnaire actually did not measure the intended construct (i.e. a person’s conscious and subjective perception of similarity between languages). The strong internal consistency tells us that something was measured consistently, but it is up to the researcher to judge whether this is indeed the intended construct. In this case, it was considered unlikely that the questions used in the questionnaire measured something other than psychotypology, given the high number of items, which covered a variety of different aspects of similarity (e.g. orthographic, phonological) and were formulated in a straightforward manner so as to avoid duplicity of meaning. From a methodological point of view, using a questionnaire that has undergone appropriate psychometric testing to establish psychotypological beliefs was thus judged to be a reliable approach; however, caution is warranted regarding the basis for these beliefs and how this may affect the predictive power of psychotypology as an explanatory factor. Such theoretical concerns are addressed below.

6.2.3.2 Theoretical concerns

The methodological concerns discussed above represent rather minor issues that do not seem to provide sufficient explanation for the inconsistent results found in this study. The issues may thus be more theoretical in nature. One theoretical implication of the incoherent results on psychotypology we may have to consider is that the construct itself is inherently incoherent across language pairs. We do not know how these perceptions of similarity developed and what they are based on; psychotypology may be internally or externally driven, with perceptions potentially being based on different underlying mechanisms for each language pair. Possible non-linguistic factors include, for example, what teachers, parents, or peers convey, perceived cultural or geographical closeness, the degree of familiarity with each language or whether the source and the target language are both written and/or academic languages. It is rather telling in this context that Luxembourgish, a predominantly spoken and non-academic language, was ranked the least similar to the TL English at the group level, while German, the most commonly written and academic language was ranked the closest. Alternatively, psychotypology may be related to how easy it is for the student to acquire the target language,
drawing parallels to those background languages that were also easy to learn, leading them to believe that they must be similar to each other.

If we believe that psychotypology is mainly constructed by a combination of non-linguistic factors (and potentially different factors for different language pairs), then it may come as no surprise that it has no consistent influence on the source language of transfer. The idea that psychotypology can be based on different aspects was already part of Kellerman’s initial formulation.

\[\text{Actual learning experience will thus tend to affect perceptions of distance which may have originated from ‘folk linguistics’. Thus experience affects the provisional typology the learner is building up.}\]

Kellerman, 1979, p. 40

While an initial perception of similarity may be based on “folk linguistics”, i.e. what people in your surroundings believe about language and convey to you, this perception may then develop through exposure to the language. This conceptualization of psychotypology as dynamic, subject to change due to a variety of external factors was developed within second language acquisition, where there is only one source language available. Consequently, psychotypology did not contain a comparative aspect across different background languages. By extension, however, one could argue that psychotypology of different language pairs in the case of multilingual learners may be at different stages of development and may rely on different underlying evidence (e.g. “folk linguistics” vs. actual TL exposure and consequent awareness of similarity). This may be especially true in the case of young learners, such as the participants in this study.

In the present study, the underlying reasons for German and English psychotypological beliefs may thus be different from those underlying French and English psychotypological beliefs. For example, an awareness of the high number of English loanwords in German may lead to high psychotypology, but once confronted with specific gaps in their lexical knowledge this same metalinguistic awareness may lead the student to rely more heavily on French, as particular French words may seem more appropriate given TL orthographic rules.
Another potential issue may be the difference between psychotypology at the language-general level and the item-specific level. Kellerman (1979) discusses how individual items may be perceived as marked (i.e. “specific” to a language) (§ 3.1.5.2) and therefore non-transferable, despite the language as a whole being closely related to the target language. He writes that “it seems as if there are categories of items that tend to be specific however close the TL is perceived to be” (Kellerman, 1979, p. 40).

This is further supported by the findings in § 5.6, which have illustrated the importance of item-specific form features in the choice of source language. Given that the picture story used in this study requires the use a particular set of words (e.g. boy, dog, frog, bees, trees, hole, owl, deer, cliff, pond), it is conceivable that learners have certain psychotypological beliefs regarding the overall degree of similarity between languages, but that in the particular case of each of these items, the translation equivalent from a language perceived as more distant has been considered less “specific” and therefore more transferable. Including item-specific psychotypology in our future analyses may allow us to better tease apart language-general and item-specific psychotypological effects. Initial explorations at the item-specific level were therefore conducted in this study (§ 5.6). Their relevance to the source language of transfer will be discussed in § 6.2.5.

While item-specific psychotypology may take a more prominent role in the case of typologically equidistant languages, language-general psychotypology might override item-specific considerations in the case of typologically more distant languages. For example, Ecke and Hall (2000, 2011) investigated transfer from L1 Spanish and L2 English into German and found that learners relied more heavily on English, even in the case of words that were cognates in Spanish and German. In such a language constellation, perceived similarity (even of individual structures) and ensuing transfer behaviour may be based on judgments of similarity at a language-general level. Through extended exposure to both languages and the overall number of cognates encountered, the learner develops an overall perception of language relatedness, which may override the degree of closeness of individual items to the TL. Generally, English is more closely related to German, and it is therefore not surprising that learners transfer more from their L2, even if for these particular items L1 Spanish would have been a better match.

These examples are merely meant to be illustrative of the variety of potential reasons that could explain the results found in this study, but are not intended
to be exhaustive. Understanding how psychotypology develops over time and what factors influence its development (e.g. teachers’ comments, metalinguistic awareness, perception of cultural similarity, proficiency, exposure, etc.) seems crucial in understanding any potential effects psychotypology may have on the SL of transfer. On the surface, however, language-general psychotypology does not appear to be a good predictor for the source language of transfer in the absence of an actual typological difference.

Cenoz (2003b) writes that “languages are relatively distant or relatively close, not distant or close in absolute terms” (p. 104), thereby stressing the comparative aspect of psychotypology in transfer. In this sense, Spanish may be considered rather distant from English in comparison to Dutch, but very close to English when compared to Japanese. It remains to be established in future research whether psychotypology has a clear and consistent effect in the case of BLs that highly differ in their typological distance to the TL (e.g. Japanese and Dutch with TL English); however, it is extremely doubtful that psychotypology would a) differ from actual typology in such a context and b) if it did differ, have a significant effect. If psychotypological beliefs are based on a learner’s personal experience of a background and the target language, on exposure, metalinguistic awareness, and/or statistical learning of recurrent patterns, it seems doubtful that it could differ from actual typology. If, on the other hand, it is based on external input, such as teachers or peers, on perceptions of cultural or geographical closeness, or other more sociological factors, the chances that psychotypology and typology differ may be higher, but are still comparatively low. For example, it is rather improbable that a Chinese native speaker, who speaks L2 English and is learning L3 French, would ever perceive Chinese to be closer to the TL French than English, no matter how insistent external voices (e.g. teachers, peers, etc.) in this direction appear to be.

Given the lack of empirical evidence of a consistent effect of psychotypology in the absence of typology in this study and the common sense realization that psychotypological beliefs most probably do not differ from objective typology in the context of more distant BLs, the relevance of conscious, language-general psychotypology as an additional construct alongside typology is called into question. In the context of lexical transfer, it may well be that language-general psychotypology is less relevant due the greater degree of consciousness associated with lexis, and it may be that it is item-specific psychotypology that more strongly informs strategic decisions in lexical transfer choices.
While there are concerns regarding the construct of psychotypology and its effects on transfer, a number of studies have demonstrated that typology does affect learners’ transfer behaviour (Cenoz, 2001; Lindqvist & Bardel, 2014; Müller-Lancé, 2001; Ringbom, 1986, 1987, 2001, 2007). It may even be that transfer is in line with objective typology (as would seem logical to the researcher), but that the learner’s psychotypology is in mismatch to objective typology and their own behaviour. Such an analysis would, for example, account for the typology effect found in studies where the variable examined was objective typology, as well as for the lack of a psychotypology effect in this study, where psychotypology was measured.

If we believe that typology has an effect, independent of psychotypology, then the same question that we face with psychotypology needs to be answered. What underlying psycholinguistic mechanisms make that typology correlate with the SL of transfer? The results from the qualitative analysis in § 5.6 seem to indicate that pattern recognition through statistical learning is taking place, whereby learners gain knowledge of ortho- and phonotactic probabilities in the target language. Avoidance of redundancy in language learning is a well-established phenomenon in the literature and entails constant comparison of linguistic features, such as cognates, in order to ensure the most efficient acquisition process. Furthermore, research on cross-linguistic homographs has shown that words similar in form (even when unrelated in meaning, e.g. French “four” [Eng: oven] and English “four”) act as primes and lead to faster reaction times, indicating a stronger network connection between items of similar form despite a meaning disparity. The accumulation of a multitude of such item-based connections may in turn lead to a stronger mental connection between two languages, showing how typological relatedness can affect the organization of the mental lexicon. Likewise, more general form patterns, such as syllable structure and ortho/phonotactic probabilities may further strengthen the connection between two typologically related languages. In the context of language production, the closer ties that have developed over time between a typologically related language and the target language will lead to greater levels of activation and consequently greater availability for transfer of the related language.

Much remains to be explored regarding the construct of psychotypology, the effects of typology on transfer, and the underlying processes that account for these effects. In addition to language-general psychotypology or typology, we
may need to consider item-specific psychotypology in order to fully grasp the effects of language (or item) similarity on transfer phenomena.

6.2.4 L1/L2 status

As with the other predictors tested in this study, the L2 status has often been confounded with other factors in prior studies on lexis and it has therefore been difficult to establish its relevance at this linguistic level. The most common confounding variable is typology (e.g. Hall & Ecke, 2003; Williams & Hammarberg, 1998 [in oral production], Sánchez, 2015 [in written production]). Schmidt and Frota (1986) had found L2 transfer despite the L2 being typologically very distant from the TL, but no numbers are provided that could demonstrate an actual predominance of L2 over L1 transfer. Studies often do not specify whether they perceive the simple presence of transfer from the L2 as indicative of an L2 status effect or whether the number of instances of L2 transfer needs to outweigh the number of L1 transfer instances.

Since it is now generally accepted in the field that all background languages are active and drawn on in language production (Bardel & Lindqvist, 2007), observing some transfer from an L2 should not be considered sufficient evidence of an L2 status effect. In this study, an L2 status effect was only considered to be present if the odds of choosing an L2 were higher than the odds of choosing an L1. Conversely, if the odds of choosing an L1 were higher than the odds of choosing an L2 then this was taken as evidence of an L1 status effect. Some previous studies also found an L1 status effect (Lindqvist, 2009; Tremblay, 2006 [in oral production], Näf & Pfander, 2001; Ó Laoire & Singleton, 2009; Tullock & Fernández-Villanueva, 2013 [in written production]). However, either typology, proficiency, and/or recency were confounding factors in these studies. The use of multinomial logistic regression in this study has offered the opportunity to control for these factors and thus test the effects of the L1/L2 status in isolation. The results have shown a clear L1 status effect in both written and spoken production (§ 5.5.4).

Finding an L1 status effect in isolation from proficiency, exposure, and psychotypology is in itself a highly interesting result, with important theoretical implications for models of lexical organization (see § 6.4.1). In addition, these findings may shed light on results from previous studies that were previously difficult to explain. Singleton (1987) investigated crosslinguistic influence in an L1 English learner of L3 French, with L2 Spanish, Latin, and Irish
The participant had learned Irish and Latin in a formal school setting and had not used either of the two languages outside the classroom. He acquired Spanish “informally” as an adult during a three-year working visit to Spain. The data showed that the majority of his transfer instances in French originated from L2 Spanish, followed by L1 English. Singleton interprets the results as showing a typology effect in the case of Spanish, but concedes that “[o]bviously, a neater result from a psychotypological point of view would have been for Latin to have outstripped both English and Irish as a posited transfer source” (p. 330). He goes on to argue that the higher proficiency level in English must have overridden typology effects in the case of Latin. However, if we categorize the languages not by age of acquisition, but by mode of acquisition, both Spanish and English would be categorized as naturalistically acquired, while Latin and Irish would be categorized as formally acquired. Such a re-analysis of the data from Singleton (1987) would support the results found in this study, in that transfer from naturalistically acquired languages outweighs transfer from languages learned in the classroom.

These results also have important implications for more theoretical accounts of language processing and differences between an L1 and an L2. As was discussed in § 2.2.4, Herdina and Jessner’s (2002) Dynamic Model of Multilingualism does not attribute the L1 ex officio prominence as the most established system in the multilingual mind, but it is argued that there is mutual interaction between components, which can lead to reverse transfer (i.e. from an additional language to the L1) and attrition in the L1. The results of this study, however, seem to suggest that the L1 indeed holds a special place in the multilingual mental lexicon, as transfer was most probable to originate from an L1, even when proficiency and exposure were controlled for.

Meisel (1983) had already pointed out that one cannot a priori rule out that there are neuropsychological differences between the storing and processing of first and second languages. More recently, Bardel and Falk (2012) also argue that formally learned L2s and an L3 share cognitive features, which the L1 does not share. Their reasoning is that we therefore see more L2 transfer into the L3. The results of this study indicate that indeed the status of a language as L1 or L2 has an effect on transfer behaviour; however, the direction of the effect is so that the L1 is the most commonly relied upon source language in L3 production (§ 5.5.4). Paradis’ (2004, 2009) model of declarative and procedural memory that Bardel and Falk (2012) and Lindqvist and Falk (2014) have applied to the L2 status hypothesis also cannot explain the L1
effect found in this data, as it predicts no effect of language status in the case of lexical transfer. Vocabulary knowledge is considered to be governed by declarative knowledge in both the L1 and additional languages.

It thus appears difficult to account for the results of this analysis through previous theories. While it seems logical to assume that an L2 and L3 have similar representations and processing routes and consequently affect each other more than the L1, the present data suggests otherwise. The fact that there is an effect of mode and age of acquisition, where a naturalistically learned language or a language learned before age 3 (i.e. L1) is the preferred SL of transfer, suggests that indeed there are underlying differences in the way first and second languages are stored and accessed.

De Bot (2004) argues that in a simple model of multilingualism, the L1 should exert greater influence, as it is used more often and thus has a higher default level of activation. In the present study, however, language use (exposure) was controlled for. Consequently, there must be something other than greater language use and proficiency in the status of a naturalistically learned language which leads to inherently greater levels of activation and consequently to greater amounts of transfer. The mode of acquisition (but also the age of acquisition, since both were shown to be significant predictors) may have an effect on the way the lexical network of a language is built, with naturalistically learned languages having a more coherent and stronger network. De Bot (2004), for example, suggests that stronger networks are harder to suppress, which in turn could explain the greater L1 transfer observed in this study.

Alternatively, we may find an explanation for the preference of the L1 in the particular task that participants were asked to complete. An L1 is typically richer in connotations and memories, and carries a “greater emotional arousal” (C. L. Harris, Gleason, & Ayçiçegi, 2006, p. 257). Reading a story about a young boy who lost his pet may have elicited an emotional engagement with the story in these young participants, which in turn may have led to the greater activation of their L1. Furthermore, this type of story may have more commonly been previously encountered in learners’ L1 (e.g. bedtime stories read to them by their parents).

In conclusion, the findings of this study highlight the need to (1) clearly distinguish between different linguistic levels in theoretical models of crosslinguistic influence, since important differences in L1/L2 status effects in syntax vs. lexis have been found, and (2) formulate new hypotheses as to why we see
an L1 status effect in lexis. The results of an L1 status effect and how they relate to models of lexical organization and processing will be further discussed in § 6.4. Finally, the current dichotomy between psychotypology (or typology) and the L2 status needs to be reviewed. Based on the results of this study, it seems likely that each factor has an effect of its own when all other factors are controlled for, and that the source language of transfer is more the result of an accumulative effect, than an either-or effect (Singleton & Ó Laoire, 2006; Williams & Hammarberg, 1998). Given that the present study did not find an L2 status effect, nor an effect of psychotypology, future methodological designs should aim to test the effects of typology (instead of psychotypology), and the reliability of the L2 status in the case of lexical transfer, in order to further resolve the current dichotomy in the literature.

6.2.5 Item-specificity

The transferability of individual items remains rather unexplored in crosslinguistic influence and its importance often underestimated. While markedness and prototypicality feature in theoretical accounts of transfer, little empirical work has been done on the topic. While the four factors tested in the quantitative analysis explained a large portion of the variability in the source language of transfer, there nevertheless remained an important amount of unaccounted variance in the data. The qualitative analysis of the data in § 5.6 explored the effects the form of a particular word has on the source language of transfer. The present discussion will address theoretical aspects of learners’ assessment of markedness that was observed in § 5.6.1, as well as how learners’ knowledge of ortho- and phonotactic probabilities, which was illustrated in their ways of foreignising (§ 5.6.2), drives perceptions of similarity at the item-specific level.

6.2.5.1 Relational markedness constraining transferability

Based on the results of this study (§ 5.6), it appears that knowledge of the target language and of its typical features and patterns affects transferability in important ways. Kellerman (1979) sees transfer as a cognitive process that is subject to three constraints:

(1) The learner’s perception of the distance between the first and the second language (psychotypology)

(2) The learner’s perception of the degree of markedness of a potentially transferable item in the L1 (perceived transferability)
In the context of lexical transfer, it seems that Kellerman’s second constraint requires the third constraint, in that the perception of markedness of an item in the L1 is not a constant, but changes in relation to the target language in question (§ 3.1.5) and the knowledge learners have of TL ortho- and phonotactic probabilities. The preference for source language A for a particular target lexeme by all participants observed in § 5.6.1 may differ if the target language changes. The words that were produced were the best option given English orthographic and phonological constraints, but may have differed had the TL been Portuguese.

Some authors argue that form similarity is mainly relevant in the case of lexeme matchings or partial target word acquisition. De Angelis (2007a), for example, argues that instances of crosslinguistic influence can occur from typologically distant languages, but that “learners tend to draw upon those elements of the source language that are phonetically similar, hence formally similar, to those in the target language. This is not an unfailing rule, but a definite tendency, which additionally entails that the learner must be somewhat familiar with the target form in order to transfer” (p. 31). The implication is that the learner only produces such transfer when they have some idea of what the target word is, as in, for example, Schmidt and Frota (1986), where the learner was incorrectly pronouncing the word “sittenta” (English: seventy), presumably due to the influence of Arabic “sitta” (English: six).

Bouvy (2000) (§ 3.1.5.2 and § 5.6.1) also focused on the formal aspect of lexical transfer and found that her L1 Dutch speakers were more reluctant to transfer “bezuinigen” than “sparen” into their L2 English, presumably due to the latter’s greater similarity to English spare. Furthermore, Jessner (2006) (§ 3.1.1.3 and § 3.1.2.3) showed that German/Italian native bilinguals relied more heavily on German in their search for lexical items when writing in English. However, in the case of English target words of Latin origin, learners relied on Italian to confirm and support their choices, illustrating how the form of individual items can determine the source language that learners rely on.

In each of the examples listed above, it is suggested that item-specific form similarity only plays a role in the case of lexeme matchings and instances of partial target word knowledge. I would argue, however, that transfer of items that are orthographically acceptable in the TL is not limited to such cases. Individual words from typologically distant languages may be perceived to fit
TL rules, even without an immediate form equivalent in the TL. Ringbom (2003), for example, discusses formal similarities between Swahili, a Bantu language, and Finnish, a Finno-Ugric language, such as agglutination and vowel-dominance. Similarly, Turkish and Swedish do not seem to allow heavy consonant clusters the way German, French, or English do. In addition, individual words from a BL may fit typical TL form patterns, despite the majority of words from that language being different. Markedness in lexical transfer is thus relational (i.e. judged in relation to target language patterns, rather than in isolation), even in the absence of an interlingual equivalent.

In addition, perception of markedness is not only relevant in relation to the target language, but also in cross-language searches and in relation to other potential transfer candidates. The fact that the findings regarding SL patterns by target lexeme (§ 5.6.1) show alternating tendencies for different SLs depending on the TL lexeme and not consistent transfer patterns from one SL for all TL lexemes is evidence that a) item-specific transferability and markedness is an important factor in the choice of SL and b) learners are indeed scanning all options to find the most appropriate transfer candidate. If item-specific transferability did not play a role, then we would not see such clusters of multiple students choosing the same SL for a particular item, but each student would follow a pattern of SL choice according to their level of proficiency in each BL, exposure, and the L1/L2 status. In addition, if learners did not scan and compare all options, they could not reach the same outcome, i.e. if one learner stopped at the first option, e.g. the French word, and another learner stopped at the second option, e.g. the German word, then we would not see the kind of clustering around a word from one particular SL that we saw in the data of this study (§ 5.6.1). Different options may thus be perceived to be more or less transferable due to their degree of markedness not just in relation to other candidates from the same language, but also in comparison to cross-language candidates and this always in relation to the target language.

These results are in agreement with studies by Herwig (2001), Hufeisen (1998), and Tullock and Fernandez-Villanueva (2013) who each found evidence of learners’ cross-activation of all available resources. Herwig (2001) has shown how learners use associative chains when a lexical item is inaccessible during a translation task, using both automatic and deliberate scanning of several languages to reach an appropriate translation product. Hufeisen (1998) found that learners seem to “scan through all (other) foreign languages
in search for help”23 (p. 131). Tullock and Fernandez-Villanueva (2013) also show how “the activation of lexical items across several languages was a common approach to tackling lexical problems” (p. 420). Their study underlines multilingual writers’ ability to scan through and strategically draw on their full linguistic repertoire in their search for lexical items, thus activating multiple languages at once.

Earlier in this text (§ 3.1.5.2), the question was raised whether transferability and markedness not only have an effect on whether an item will be transferred or not in the context of L2 acquisition, but whether it might also have an effect on the choice of source language in L3 acquisition. The level of inter-learner systematicity in the choice of SL per target lexeme observed in this study, despite individuals’ great variation in the four factors tested in the quantitative part, offers support that this is indeed the case. It is therefore argued that relational markedness should be added to the current set of predictive factors for the source language of lexical transfer.

6.2.5.2 Learners’ knowledge of ortho- and phonotactic probability

As was demonstrated above (§ 6.2.5.1), the effects of markedness and transferability on lexical transfer need to be considered in relation to target language norms, rather than in universal terms (in the case of lexical transfer at least; no such claims are made regarding transfer at other linguistic levels). The evaluation of markedness or transferability of an item thus occurs in consideration of what the learner knows about the target language and is consequently dynamic in nature. The results from the investigations conducted at the item-specific level (§ 5.6) of this study have shown that there is inter-learner systematicity in transfer patterns and the choice of source language, which are illustrative of these learners’ (implicit or explicit) knowledge of target language orthographic and phonological patterns. In this section, I will discuss the effects of learners’ knowledge ortho- and phonotactic probability (KOPP) on transfer and argue for a probabilistic interpretation of these effects, as opposed to a more generative, rule-establishing account.

23 Original text: “durchstreifen’ aller (anderen) Fremdsprachen auf der Suche nach Hilfen”
Multilinguals seem to employ statistical learning to gain knowledge of its orthographic and phonological rules (§ 5.6), thereby allowing them to make informed decisions (whether conscious or unconscious) when transferring from their previously acquired languages. Singleton (2016b) discusses results from a study by Nam (2009), which investigated the extent to which Korean learners of English rely on foreign loanwords from their L1 in L2 production. He argues that learners have an “awareness of their foreign, Western origins” (p. 58), therefore leading to transfer. Nam herself, however, writes that some English loanwords are not actually recognized as such. While awareness of the historical origin of these loanwords may be at play, knowledge of ortho- and phonotactic probabilities (KOPP) in the target language provides a broader explanation that does not require an awareness of the historical origin of a word for it to still be considered a strong transfer candidate. Singleton may not use the concept of KOPP, markedness, or statistical learning, but his text hints at each of them in various ways. He writes that learners draw “on their L1 lexical resources on the basis of a (perhaps informed) hunch that these resources might be of help to them in English” and that “even in naïve learners there is a vague awareness that they have something to do with English” (p. 58). I believe that this “informed hunch” or “vague awareness” stands for what I discuss as learners’ knowledge of ortho- and phonotactic probabilities in the target language. In addition, Singleton’s assertion that “the factors of distinctiveness of English loanwords’ sound shapes […] apply” echoes the relevance of markedness in relation to the target language discussed above (§ 6.2.5.1). Finally, he concludes that “what seems in fact to be operative is a highly sophisticated set of processes based on experience-driven language awareness which takes language differences fully into account” (p. 61). This “experience-driven language awareness” is reflective of the analysis of how statistical learning and pattern recognition might be at the heart of learners’ development of KOPP.

Proficiency in the source language is considered necessary for the learner to perceive similarities between the source and the target language (Ringbom, 1986). However, experience of the target language is equally essential (Cenoz, 2001). Experience of the target language may be operationalized as proficiency and exposure, both of which are essential for statistical learning to occur. Greater exposure to the target language offers a larger data pool for learners to extract ortho- and phonotactic patterns and thus for statistical learning of such probabilities to take place. Increased knowledge of the target language
then allows learners to make more informed decisions when evaluating transfer candidates. Assuming that proficiency in and exposure to the target language correlate with KOPP and that KOPP is one of the underlying factors that determines the source language of transfer, there will inevitably be individual variation. It is therefore essential to not only control for the four factors tested in the quantitative analysis of this study, but also for KOPP (potentially through TL proficiency and exposure), if we want to explore remaining variability in the choice of source language and any additional factors that may contribute to it.

The four factors tested in the quantitative part of this study, as well as other factors found to have an effect, should be considered in terms of probabilistic tendencies. A particular combination of factors does not require or prohibit a particular transfer behaviour, but increases the probability of such behaviour. Dewaele (1998) discusses how a common pronunciation error in L1 Dutch learners of French, who also have knowledge of English, is the insertion of [kt] at the end of French words like “projet”, “objet”, or “respect”. Learners thus transfer the final consonant cluster [kt] of the Dutch and English cognates “project”, “object”, and “respect”. He goes on to argue that “[t]he establishment of a rule in the learner’s IL, namely that the final consonant cluster [kt] is not to be pronounced in these short words, is probably hindered by the knowledge that in the same paradigmatic field the consonant cluster [kt] occurs in French ‘objecter’, ‘objectif’, ‘respecter’, ‘respectif’, or ‘conflictuel”’ (p. 481). What Dewaele calls the establishment of a rule in the learner’s IL could be equated with what is considered statistical learning here. While a more generative account of language acquisition assumes an innate grammar, where learners extract a rule from the input, which is correct, and then apply it, the perspective taken here is more probabilistic. From this perspective, learners do not extract rules, but extract statistical regularities or patterns.

In the context of first language acquisition, it is argued that statistical elements such as frequency of words, frequent frames, phonotactic patterns, and other regularities are relied upon to advance learning (Mirman et al., 2008; Newport & Aslin, 2004; Saffran, Aslin, & Newport, 2012; Saffran et al., 1999). Such an analysis thus relies on probabilistic frequencies, rather than set rules, and can be equally applied to second and third language acquisition. Rather than categorising transfer instances as either correct or incorrect in the TL, it would be more relevant to discuss the odds that a certain choice of word, source lan-
guage, spelling, or pronunciation works better than another choice. In the example provided by Dewaele, it may thus be useful to assess the odds of [kt] occurring in the target language at the end of such cognate items instead of [∅]. Given the large number of cognates that indeed retain the [kt] ending in French, the overall probability that the pronunciation turns out to be correct when [kt] is produced is indeed high. Using a statistical learning framework in transfer entails that the effects of KOPP are probabilistic in nature, where the learner chooses the most probable option.

So far, I have discussed how the form (or degree of markedness) of a source language word affects its transferability in relation to the target language and how this is driven by learners’ KOPP. Learners were thus presented as passively accepting or rejecting items based on their knowledge of the target language. However, they also apply KOPP actively. The high degree of inter-learner systematicity in their ways of foreignising (§ 5.6.2) shows that learners actively use their knowledge of orthotactic probability to increase an item’s chances for comprehension and acceptance in the target language. These results thus support findings by Tullock and Fernandez-Villanueva (2013), whose learners’ meta-comments illustrated “awareness of their strategic behavior as well as their degree of satisfaction with their solutions” (p. 420). The authors argue that nonstandard forms are not the result of ignorance, but reflect learners’ “conscious decisions made despite an awareness of their deviation from the normative standard” (p. 439). Learners rarely assume that the chosen item is fully correct in the target language, but rather choose the most appropriate candidate based on semantic and formal characteristics, which they judge to be the best fit with respect to the target language’s orthographic and/or phonological rules.

6.3 Mode of production

The current study is the first study on lexical transfer that explicitly compares spoken and written production by the same population. The aim was to compare how well the four factors (proficiency, exposure, psychotypology, and the L1/L2 status) predict the source language of transfer in each mode. Since each factor is associated with different degrees of automaticity, the results of

24 This type of decision necessarily also depends on whether the context demands accuracy or communicative effectiveness.
this comparison were intended to provide further insights into the specificities of the processes underlying each mode of production. In addition, however, it has emerged that the mode in itself may be a predictor of the SL of transfer. The SL distribution patterns observed at the group level (§ 5.1.2), as well as the classification accuracy regarding Luxembourgish as SL in the written mode (§ 5.3.2), and the effects of interactional exposure on speech production, all indicate that the typical mode of production of a background language increases its probability of acting as source for transfer. In this section, first the comparative aspect regarding the predictive power of the four factors in each mode is discussed (§ 6.3.1), followed by a discussion of how the mode, purpose, and context of a task seem to lead to the activation of background languages typically used in those circumstances (§ 6.3.2).

6.3.1 Comparative perspective

An important aspect of the present study is its inclusion of both spoken and written data. Most previous research has focused on oral data (Bohnacker, 2005, 2006; Cenoz, 2003b; Dewaele, 1998; Lindqvist, 2009, 2010; Williams & Hammarberg, 1998), and the explanatory factors that have emerged from previous studies were thus expected to prove more relevant in speech production than in written production. When the four factors were tested for each mode of production separately and model fit was compared, it was shown that each factor is a significant predictor of the source language of transfer in both the spoken and the written model, but that indeed model fit was better for the spoken data (§ 5.3.2).

Speaking is a more automatized as well as unconscious process than writing and may therefore be more uniform across participants, leading to greater predictability of transfer behaviours. The increased processing time available in writing provides room for the conscious and consequently more idiosyncratic retrieval of information. This idiosyncratic nature of more conscious processes is evidenced in a study by Jarvis (2016a) in which the strategies learners employed to memorize words from an unknown language were investigated using post-task comments. It was found that learners used highly idiosyncratic approaches, often involving personal life experiences to remember the new words. Equally, learners in this study may have used the greater time available to them in writing to produce more thought-through lexical choices, based on their personal experiences, preferences, and strategies. Such transfer patterns necessarily become more difficult to predict than the more automatic processes of speech production.
In addition, the analysis of individual items in § 5.6 has shown effects of learners’ knowledge of ortho- and phonotactic probability in the target language on the way they transfer. However, the greater processing time available in writing allows learners to apply this knowledge of TL rules more broadly, as illustrated by the greater number of foreignisings in writing than in speaking (29% vs. 12%). These results have theoretical implications for explanatory models of crosslinguistic influence that predominantly rely on unconscious, automatic processes, but ignore strategic aspects of transfer.

On the other hand, one should not forget that all four factors actually also were significant predictors in writing; they just explained slightly less of the variance in comparison to speaking. Future research should therefore focus on the specificities of transfer in the written mode, but also on the potential similarities between the two modes of production with regards to how proficiency, exposure, and the L1 status govern language activation and constrain transfer.

6.3.2 Predictive perspective

Usage-oriented research has highlighted the interaction between multiple variables, both linguistic and non-linguistic, in the second language acquisition process (Wang, 2016). Diverse areas such as the language system, the social environment, and the psychological make-up of an individual are all considered to dynamically interact and impact language learning. Dynamic Systems Theory (DST) has emerged as an important theoretical framework for the constantly changing inter-related variables that make up a learner’s interlanguage and language systems in general. Wang (2016) writes that “[t]he interactive view in DST suggests that the accurate and appropriate use of a linguistic form depends on the proper integration of contextual variables in the learning process, that is, what co-occurs with a linguistic form being learned will affect its storage, retrieval and use [emphasis added]” (p. 227). In this context, Marian and Neisser (2000), for example, found that Russian memories were more easily retrieved when the participants were interviewed in Russian than when they were interviewed in English. This trend thus seems to indicate that memories are more accessible when the language of retrieval matches the language used when the memory was encoded, suggesting that “language and context of use are mentally stored in an interconnected manner” (Wang, 2016, p. 227). If we extend this analysis to crosslinguistic influence, we may find that contextual variables, such as the context in which a background language was acquired, for which purpose, using which task, and the mode it is typically
used in, affect the source language of transfer by activating the language most closely interconnected to each of these aspect.

Table 6-1. Typical mode, purpose, and contexts of use of BLs.

<table>
<thead>
<tr>
<th>Mode of production</th>
<th>Purpose/Task</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>speaking</td>
<td>academic</td>
<td>in school</td>
</tr>
<tr>
<td>writing</td>
<td></td>
<td>outside school</td>
</tr>
<tr>
<td>Lux.</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>German</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>French</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Other BLs</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

As an overview, Table 6-1 indicates the typical mode of production, purpose/task, and context for each of the background languages tested in this study. Those marked in bold will be the focus of the analysis in the ensuing sections.

The usage distribution of the languages in Luxembourg allows us to investigate the potential effects such a distribution has on transfer. First, the typical usage of Luxembourgish in speaking and not writing can be related to the high proportion of transfer from Luxembourgish in speech production (§ 6.3.2.1). Second, the typical usage of German as the language of all school-related tasks can be related to the proportion of transfer across SL for the elicitation task used in this study, which was an academic task (§ 6.3.2.2). Finally, the absence of other background languages within the physical context of the school can be discussed in terms of the lack of transfer from these languages in the data (§ 6.3.2.3).

6.3.2.1 Mode-dependency

Looking at differences in the proportion of transfer per source language in each mode, Luxembourgish more than quadruples from the written data (8.1%) to the spoken data (35.5%). In addition, it is rather telling that the four factors were unable to predict any of the outcomes of Luxembourgish transfer in the written data (classification accuracy: 0%, § 5.3.2, Table 5-8). This seems to be the result of each language’s general mode of production. Luxembourgish is predominantly used in spoken production. Its status is similar to that of Swiss German in Switzerland, with recent efforts, however, aiming
to establish an official orthography. These efforts have not come to fruition yet, as public schools rarely offer formal instruction in the Luxembourgish language. Participants’ inability to write Luxembourgish correctly is further highlighted by their notes in the ‘comment’ sections of the questionnaire. Participant D04, for example, writes that they can write German better than Luxembourgish, while participant D11 states that they have never even learned Luxembourgish orthography. While all students use Luxembourgish in text messages, social media posts, and other informal written communication (§ 4.1.2), they have not followed formal language instruction in Luxembourg. Also, they are never required to write in Luxembourgish in an academic context. Given the evidence found by previous research that the context in which data collection takes place and the particular task that is completed can influence transfer, it should not be surprising that a written task, which is common in their French and German class, but which they never do in Luxembourg, would elicit more transfer from French and German.

The presence of one predominantly oral language in multilingual language communities is a common sight across the world (e.g. Sami-Swedish-English in Sweden or Moroccan Arabic-French-English in France) and the impact such a mode-specific usage has on language transfer should not be underestimated. Given the widespread presence of oral languages in multilingual societies, the examination of mode-specific effects in this study represents a useful addition to previous research on the SL of transfer. The fact that the use of Luxembourgish as source for transfer significantly increased from written to spoken production seems to indicate that this background language is more strongly activated when the TL mode of production matches the SL’s typical mode of production.

Effects of a language’s typical mode can not only be traced to the results on Luxembourgish, but also to the results on exposure. The questionnaire items pertaining to exposure all related to oral interaction (e.g. How often do you use language at home with your family?). The result showed that this type of exposure increased the odds of choosing that particular background language as source for transfer in the spoken mode, but not in the written mode (§ 5.5.2). It thus seems that there is activation of background languages based on what their typical mode of usage is, thereby affecting the proportions of transfer by SL across the two modes.
6.3.2.2 Purpose- and task-dependency

German is the most commonly used SL in both speaking and writing (37.4% and 43.4% respectively). Only in the spoken mode does Luxembourgish come close to this amount (35.5%). The difference in the proportion of Luxembourgish between speaking and writing was discussed in terms of mode-dependency above (§ 6.3.2.1). It remains to be investigated, however, why German dominates in both modes. Grosjean (1998) discusses how the purposes for which a person has acquired a particular BL can affect crosslinguistic influence from this language into the TL, depending on the purpose for which the TL is currently used. Alternatively, Jarvis (2000) has suggested that the area of language use can interact with transfer.

If we look at the general purpose or area of use for which German, French, and Luxembourgish were acquired, clear differences can be observed in the sample overall. Luxembourgish serves communicative purposes outside the classroom, while German and French predominantly serve academic purposes. German in particular is strongly associated with education, given its status as the vehicular language of all non-language subjects (e.g. geography, history, biology) at this stage of the students’ education (grade 8). All the textbooks are in German, tests and assignment are produced in German, and all classroom work (whether spoken or written) is done in German (§ 4.1.2). By contrast, German is not actively used in any social contexts outside the classroom. German thus clearly serves a more academic purpose than either Luxembourgish or French. Given the academic nature of the task employed in this study (a picture story description), it thus seems possible that the type of task activated background languages that are typically used for academic purposes. A number of other studies have suggested that transfer is task-dependent, whereby the same learner may transfer in one task but not another (Jarvis, 2003; Stepanova Sachs & Coley, 2006). The choice of source language of transfer in multilingual learners may equally depend on task type and the particular purpose the task serves.

25 We need to remain aware that some students in the sample might be German native speakers, but the general pattern in the sample is that German was learned at school.
6.3.2.3 Context-dependency

While German predominates over the other two background languages that all participants share, in part due to purpose- and task-dependency, we nevertheless also see transfer from Luxembourgish and French. This is not the case, however, for individual learners’ other known languages, that were not tested in the statistical model. Twenty-three other languages featured in the sample (§ 4.2), but almost never appear as source of transfer.

Similar results are discussed by Gunnarsson & Källkvist (2016), who found more transfer from Swedish into English than from the participants’ home language in both L2 Swedish speakers and bilingual L1 Swedish/‘Other home language’. The study was conducted in Sweden and the authors argue that Swedish is more prevalent as source of transfer because it is the school’s “base language”, as well as the majority language in society as a whole. Their analysis thus supports the proposal of context-dependency made here. They further argue that the participants’ greater writing competency in Swedish affected the source of transfer, since the data was collected through a written task.

In contrast, both oral and written data were collected in this study and if the lack of home languages as source for transfer in written production was purely due to a discrepancy between oral and written skills, we should see no difference between transfer from Luxembourgish and other oral home languages. This is not the case, however. Luxembourgish is heavily relied upon as source for transfer in spoken production, but not other home languages. While a whole range of factors may provide an explanation for this lack of transfer (e.g. typology, proficiency), it may be that the physical environment in which these languages are usually produced in has an effect, as it is outside the physical space of the school setting.

The difference between Luxembourgish and other background languages is that Luxembourgish is part of the physical space at school. It is the common language of interaction between students during breaks and other non-academic interactions amongst themselves. It is also the language students typically rely on in class if they run into difficulties in German. The other languages in the sample, however, generally do not form part of the school environment, as they are not languages commonly shared by all students. Eskildsen (2009) found that L2 expressions that were learned in a classroom context could be recalled in the same context after 7 months and argues that
the contextualization of a language form can facilitate its recall, as the context promotes the activation of any forms learned in this environment (e.g. Hong et al., 2000; M. Ross et al., 2002; Trafimow et al., 1997). Given the presence of Luxembourgish transfer in spoken production in this study and the absence of transfer from other oral languages, it seems as if context-dependency outweighs mode-dependency in the choice of SL. Institutional recognition and the wide use of an oral language (in this case Luxembourgish) appears to make it available for transfer. This is an important finding, especially in the context of its implications for the multilingual classroom. It seems that home languages are not available as a resource to the language learner in their regular school environment and can thus not be benefitted from.

Context-dependency may further be conceptualized along Grosjean’s (1998) continuum of language modes. In its initial formulation, language users can be in either a monolingual or a bilingual mode based on the person they address, the topic of conversation, and the location or setting in which the interaction occurs. By extension, a learner can be in a multilingual mode, activating all the languages in their repertoire. The interesting question that arises, however, is whether a multilingual may be in an activated state of any combination of the languages available to them. In other words, could a multilingual speakers be in a bilingual Arabic-Luxembourgish mode when at home, but in a trilingual Luxembourgish-German-French mode while at school? Given that the school environment, as well as the interlocutor, in this study belongs to the trilingual space of Luxembourgish-German-French, it seems reasonable to assume that there is only activation of those languages that are relevant to the particular environment.

As demonstrated in the above discussion, a usage-based approach to psycholinguistic phenomena can provide illuminating, new insights. Aspects such as mode, purpose, task, and context, what Hall and Ecke’s (2003) call “event factors”, should consequently be taken into consideration in the analysis of transfer patterns. While task- and mode-dependency are common points of discussion in the field of SLA, they are rarely considered or empirically tested in transfer research. However, they provide important new additions to the variety of influential factors that are currently discussed in the literature in TLA and should therefore receive greater attention in future studies on the source language of transfer.
6.4 Models of lexical organization and processing

Crosslinguistic influence offers illuminating surface evidence of the complex mechanisms that govern the multilingual mental lexicon. Research within second language acquisition has resulted in a variety of different theoretical models of lexical organization and access, some of which have been extended to encompass multilingual individuals (§ 2.2). The results from this study can further contribute towards our understanding of the mental lexicon and the intricate ways in which different languages are inter-connected in the mind. The four factors tested in the quantitative part of this study, as well as item-specific form similarity and contextual factors will be discussed in terms of their ability to inform lexical organization (§ 6.4.1), activation (§ 6.4.2), and access (§ 6.4.3). Lexical activation and language access are closely related and not always easy to differentiate. The distinction is especially blurred in the present analysis, since it is suggested that language access is bound by activation, which in turn is suggested to depend on a plenitude of different factors (e.g. mode of production, context, proficiency, exposure, etc.) and not just on the language tag of a word.

6.4.1 Lexical organization

Within bi- and multilingual lexical organization, items across different languages are often discussed in terms of the connection strength between them. Stronger connections across languages are often attributed to shared meaning (i.e. shared conceptual representation), but Pavlenko (2009) argues that the strength of interlingual connections may also be related to other factors, such as proficiency, the context of acquisition and use, or the similarity of word forms (see § 2.2.1.3). Since the focus of this study is on transfer and consequently on gaps in the TL, one cannot discuss interlingual pairs as is common in theories on lexical organization. There simply is no translation equivalent available in the TL. Theoretical accounts of the predominance of one SL over another are therefore discussed in terms of a gap in the TL.

The first factor that was found to have an effect on the source language of transfer in this study is increased proficiency. Looking at this factor from a perspective of lexical organization, it has been argued that improved lexical proficiency comprises not only “a larger vocabulary but also a more structured organization of the lexicon with a larger number of associative links, predominantly semantic, for each word” (Ringbom, 2001, p. 65).
While proficiency leads to greater associative links as well as higher levels of activation, its main effect in the context of transfer in TLA relates to the fact that a BL’s vocabulary is small at low proficiency, thereby greatly decreasing the number of potential transfer candidates in comparison to a high proficiency BL. If we think of it in terms of interlingual lexical organization, there is simply no translation equivalent available and consequently no connection that could outweigh another (see Figure 6-1).

![Figure 6-1. Low proficiency effects on lexical organization.](image)

The second factor that was found to influence the choice of SL in this study was the status of a language as L1 (or naturalistically learned language). Jarvis and Pavlenko (2008) note that researchers (e.g. De Angelis & Selinker, 2001; Hammarberg, 2001) believe that the acquisitional order of the L1 assigns it a special status in CLI. Other models, such as the Dynamic Model of Multilingualism (Herdina & Jessner, 2002), on the other hand, do not grant the L1 an *ex officio* status as the most established system, but believe that there is constant interaction between all components of a system, which necessarily also entails changes to the L1.

The findings of this study, however, seem to indicate that there is something unique about the L1 (at least for these participants at this point in time) which

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26 Only two BLs are presented in the figure for visual ease.
affects the source language of transfer (§ 5.5.4). Since the statistical model controlled for proficiency and exposure, this effect is due to the language’s status as L1 itself. It seems that connections between naturally acquired items (L1 words) and the underlying concepts are stronger than connections between formally learned items (L2 words) and the underlying concepts (Figure 6-2).

The L1 status effect found in the present data is in line with Pavlenko (1999), who found that learners who had only had classroom learning, lacked the necessary context to “form an experiential multi-model representation which goes beyond the word definition and forms a concept” (p. 222), leading to scarcity of associations and weakness in their links. On the other hand, natural-environment learners who had acquired new concepts contextually and experientially had better representations and thus stronger links. It may thus be the case that words learned naturally have a fuller conceptual representation, allowing for better connections, thereby increasing its probability of being chosen for transfer.

The findings of an L1 status effect in this study also fit with Kroll’s (1993) and Kroll and Stewart’s (1994) Revised Hierarchical Model (RHM) (§ 2.2.1.2). They argue that L1 items have a stronger connection to the concept and that translating from the L1 to the L2 occurs via the concept. If we extend this to a multilingual learner who encounters a gap in their target language, presumably their starting point for their lexical search is the concept which
they are trying to name (Figure 6-2). If we assume that L1 items are more strongly connected to the concept than L2 items, then this would explain the greater influence from the L1.

Both proficiency and the L1 status of a language affect the organization of a language subset as a whole. In other words, the connections of each item of a language are equally influenced by these language-general factors. However, the strength of both intra- and interlingual connections can be further influenced by factors that are only relevant to some items. These item-specific factors can thus lead to differences in strength between connection pairs. For example, the number of orthographic and/or phonological neighbours a BL item has may have an impact on how strongly it is embedded/connected to the TL in general, where BL items that fit TL orthographic and phonological rules better necessarily have more such neighbours (Figure 6-3).

![Figure 6-3. Difference in number of orthographic and phonological neighbours in the TL of cross-language translation equivalents and/or within-language synonyms.](image)

Bartolotti and Marian (2015) found that L2 learners were better at memorizing new words that had a high neighbourhood density in the L1, as they extracted probabilistic information from the novel vocabulary. Conversely, being
closely related to a large number of TL words may also increase an item’s probability of being selected for transfer.

Such an analysis is relevant to both within-language comparisons (synonyms) as we saw in Bouvy (2000) and cross-language comparisons (translation equivalents in the BLs) as we saw in this study (§ 5.6.1). If we return to the within-language example of bezuinigen vs. sparen from Bouvy (2000), it is obvious that sparen has a higher number of orthographic and phonological neighbours than bezuinigen (even if the English cognate spare did not exist). Equally, if we take the example of frog from this study, we saw that in a cross-language comparison, German “Frosch” or Luxembourgish “Fresch” were generally preferred over French “grenouille” (§ 5.6.1). The Levenshtein distance to the first 20 target language words (OLD20) is much lower for “sparen” and “Frosch” than for “bezuinigen” and “grenouille” and it may be the co-activation of a higher number of interlingual neighbours in the target language that increases an item’s acceptability and thus its odds of being chosen.

It is in this context that typology could have an effect on lexical organization and consequently on transfer. Ringbom (2001) writes that “[l]anguages perceived to be similar (roughly = related) to the target language naturally provide many more reference points for the learner than do wholly unrelated languages” (p. 65). Reference points here mean items that the learner encounters in the TL that seem to resemble words from their background languages. Due to their similarity in form, such items are stored in close connection to their interlingual orthographic and phonological neighbours. If two languages are typologically related, the number of such close interlingual connections between individual items will be higher than for unrelated languages. This in turn may increase the overall probability of a language being chosen as source for transfer.

6.4.2 Lexical activation

Closely related to lexical organization are theories of lexical activation. While some factors predominantly affect the organization of the mental lexicon (e.g. L1/L2 status, proficiency), other factors are mainly relevant to language activation during language production. Presumably the mind is organised in the same way at any one point in time, independent of where the learner is, who they are talking to, in what mode they are producing language and for what
purpose. Nevertheless, the results of this study have shown that these contextual factors seem to lead to important differences in transfer patterns. In this sense, models of language activation offer an insightful account of why the prevalence of a background language in one context does not necessarily imply its prevalence in another.

The first relevant findings of this study in the context of language activation is that the tested factors were better predictors for the SL of transfer in spoken than in written production (§ 5.3.2). These results align well with an activation model of language production, given that activation levels are less relevant in writing where conscious choices have a greater impact. Activation occurs unconsciously and relies on intra- and interlingual connections in the multilingual mental lexicon. Similarly, proficiency, exposure, and the L1 status act on the organization and activation of languages in an implicit manner. While speech is limited by processing constraints (Strömqvist et al., 2004) and consequently uses what is most readily available, writing allows for the learner to pause, edit, and conduct a new lexical search if need be (Christen & Näf, 2001). Activation levels are consequently less determining in the choice of source language in written than in spoken text. The fact that the factors tested in this study affect activation and were found to predict transfer patterns better in speaking than in writing illustrates how activation levels play an important role in the choice of SL.

The second relevant finding is that the same factors that are considered determinative of a “standard” level of activation, such as contact and use, age of acquisition, and proficiency (de Bot, 2004) proved to be predictors for the source language of transfer (i.e. exposure, L1 status/naturalistic acquisition, proficiency) (§ 5.5). The results of this study thus support theoretical accounts that suggest activation to be at the heart of crosslinguistic influence. Exposure to a language will generally increase its level of activation, while proficiency seems to affect the strength of a language’s network and consequently its degree of activation. Similarly, the L1 status of a language and its stronger links to the underlying concept (Kroll, 1993; Kroll & Stewart, 1994) appear to lead to stronger activation levels of this language.

In addition to factors that determine a language’s general level of activation (e.g. proficiency, exposure), this study also found factors that affect transfer at the item-specific level (§ 5.6). Within an activation/inhibition model, individual lexical items can have different crosslinguistic relations and thus levels of activation, rather than only being governed by language-general factors (De
Bot et al., 2005). Such a perspective offers important explanatory insights into transferred items that seem odd at first sight, such as words from a low proficiency background language that is rarely used and is typologically distant from the target language (see Schmidt & Frota, 1986). Such a language is used proportionally little as source of transfer overall, yet some few items do emerge, which an activation model at the item-specific level can explain.

Furthermore, factors such as the context or mode of production can change the “standard” level of activation of a language, thereby leading to greater transfer from a language that is generally not the most dominant SL. These results are in line with Dewaele (1996), who found that the L1 was not necessarily always the dominant active language in third language production, but that the source language correlated with the formality of the situation. The type of context or environment thus appears to have an effect. Similarly, this study found that the physical context of the classroom, the task type and task purpose, all seemed to contribute to higher activation levels of those languages generally associated with these contexts. The activation process thus seems connected to the environment, which can trigger the activation of a particular language or particular words (Hong et al., 2000; M. Ross et al., 2002; Trafimow et al., 1997).

Grosjean’s (1998) model of a language mode continuum engages with these contextual factors and suggests that bilinguals can be in a fully monolingual mode depending on who they talk to and in what context, while they can also be in a fully bilingual mode, freely using code-switches in their communication. Dewaele (2001) extends Grosjean’s language mode to multilinguals in order to investigate transfer patterns in trilingual speakers in contexts that vary in their degree of formality. He argued that the language mode a learner is in affects the level of activation of different languages. So while proficiency has an effect on activation no matter what the context is, a particular setting (in Dewaele’s case: informal vs. formal setting, in this case: the physical setting) may nevertheless activate a low proficiency language that then overrides other languages as source for transfer. The results of this study showed that at the group level, German dominated as source language, presumably due to its status as an academic language, as the most commonly used language for this type of task in this type of environment. Furthermore, being at school, in an environment that generally only requires the oral use of Luxembourgish, German, and French, may have put learners that know additional languages in a
mode where those other languages are not activated. Given the methodological implications of the language mode continuum, it would be of great value to test the same individuals in different environments (e.g. their home), in order to gather more evidence in this respect.

6.4.3 Language access

Language access has incited an important discussion in the literature regarding whether bi- and multilingual mental lexicons are accessed as either integrated or separate entities. In other words, it remains to be determined whether all available languages are scanned or whether there is selective access, which delineates the pool of potential word choices to one language from the very beginning. The question arises as to whether we search through languages in parallel, with words being primarily organised by, for example, frequency, or whether we search by language assignment (de Bot, 2004). For now, we can only rely on surface evidence, such as that provided by crosslinguistic influence, to further our understanding of language access as selective or non-selective in nature. There are strong arguments on both sides of the argument (§ 2.2.2) and the reality of it probably falls somewhere between the two.

The aim of the present study was not to investigate lexical access as such, but the investigations at the item-specific level (§ 5.6) nevertheless illustrate how all languages are scanned in order to find the best transfer candidate. The results have shown the use of the same source language by a multitude of students for a particular item that differed from the source language predominantly used for another item. It thus seems that lexical searches across different languages occur in parallel and individual items are chosen for their similarity to the target language. These results further support previous studies that found parallel activation of multiple languages during production (Christoffels, de Groot, & Kroll, 2006; Costa & Santesteban, 2004; Kaushanskaya & Marian, 2007; Kroll et al., 2006). Such scanning of all available options is indicative of some type of non-selective access to language. It seems that the choice of SL item is based on what item is the most active at any point in time, whether due to stronger connections in the mental lexicon (e.g. L1 status, proficiency, exposure, number of orthographic neighbours) or whether due to the particular environment activating a certain language (e.g. mode of production, context, task type).
As discussed in the context of multilingual lexical organization above (§ 6.4.1), an item may have many interlingual connections in the form of orthographic or phonological neighbours in the TL (e.g. German “Frosch” has more orthographic and phonological neighbours in English than French “grenouille”), thereby increasing its level of activation when the TL is selected. Lexical items can be connected to items in other languages at any level (e.g. form, concept, language, register, context, phonemes, syllables, etc.), not just to their translation equivalent. Such a conceptualization would entail a more integrated lexicon that relies on tags for language affiliation (A. Dijkstra, 2003). In the case of a SL item from German whose form is closely related to the orthotactic and phonotactic patterns of the TL English and which consequently has many neighbours, its incorrect language tag (i.e. German instead of English) might in some cases be outweighed by form aspects that indicate strong acceptability in English.

Alternatively, a language tag may be outweighed by aspects such as the context in which a learner finds themselves. An item may be selected because it is contextually marked or because it has many neighbours in the TL, despite being tagged for a language other than the selected TL (Wang, 2016). Such item-specific features may not suffice to outweigh another language, however, if the language as a whole is strongly inhibited (de Bot, 2004). Essentially, no one aspect guarantees activation and subsequent selection, but activation through multiple features (including the language feature) increases the probability of a word being selected.

The evidence found at the item-specific level of this study, as well as previous research, defy a position of complete separation of lexicons. In the present data, the selection of SL words was at times independent of language-general factors, and instead seemed to be based on the particular word’s degree of similarity to the TL (§ 5.6.1). Examples such as transfer from Arabic, a low proficiency and typologically distant language, into Portuguese in Schmidt and Frota (1986) further illustrate how orthographic neighbours across languages are closely linked in the mental lexicon. It thus seems that lexical access is heavily dependent on the form of individual words, and potentially less on language networks as a whole.

In order to understand the implications of these findings, looking at Dewaele’s (2001) step-by-step description of potential access routes for lexical selection is a useful starting point. He suggests that there is a set of production rules that are hierarchically organised, where the rule at the top is considered first and
alternative options are only considered if the first rule did not provide a satisfactory result. He proposes the following example, with the speaker being in a multilingual mode.

<IF the concept is HOUSE(X) and the language is French, THEN select ‘maison’.>

<IF no lemma is found matching exactly the concept in French, THEN check next most activated lemma in French.>

<IF still no lemma is found matching the concept in French, THEN select next most activated lemma from different language tags.>

Dewaele, 2001, p. 85

This offers an interesting conceptualization of how crosslinguistic lexical selection may occur. The first step reflects the situation of a lexical gap in the target language, where the learner reaches an impass. The second step in this process suggests that a word that contains a language tag for French is higher up in the hierarchy than a word with a different language tag. So the “next most activated lemma in French” is assumed to have a higher probability of being chosen than the “next most activated lemma from different language tags”. In a sense, this presumes a model of the mental lexicon where the language tag is ranked higher than the exact target concept, i.e. a French word that does not fully describe the concept is preferred over a word from a different language that does fully describe the intended concept. However, we do not know enough about the underlying processes to know whether this is indeed the case, and it may well be that word selection is mainly based on activation levels, where a language tag is just one of multiple features a word contains (e.g. register, context, form, pronunciation, etc.), as is suggested in this text. This would then entail a merging of steps 2 and 3 in the selection process presented above, leading to the following.

<IF the concept is HOUSE(X) and the language is French, THEN select ‘maison’.>

<IF no lemma is found matching the concept in French, THEN select next most activated lemma.>
Naturally, since French is the selected language, all its words are at higher activation and thus at a higher chance of being selected over items from other languages. Nevertheless, reducing the selection process in this way allows us to also explain instances of transfer when a French alternative could have been used, but the translation equivalent was preferred. Indeed, this is the case in all instances of transfer. If a TL alternative was always preferred, then we would encounter much greater avoidance and circumscription than we saw in this data.

A further alternative to this selection process is one that does not presume the selection of a TL word because it is available (step 1 above), but one which solely relies on activation levels as the determining factor. This would then merge the remaining two steps above, producing the following selection process.

<IF the concept is HOUSE(X), THEN select most activated lemma.>

Removing the language specification in the if-clause is only possible if we assume that a language that has been selected for output has the highest level of activation and is thus the most probable candidate for selection. The advantage with this last formulation is that it offers space for slips-of-the-tongue, when the target word is known, but is not produced. In the two earlier options, it is assumed that a non-target intra- or interlingual word is only chosen when no lemma matching the concept in French is found (e.g. gap in the TL). In slips-of-the-tongue, however, the target lemma is present, but a different word is more active at that point in time. Such a selection process is also in line with accounts of co-activation of all languages during production, but solely relies on activation to explain word selection, where activation is based on the combination of different factors and not the pre-eminence of the language tag. In this sense, the concept “house” would activate all translation equivalents, their orthographic and phonological neighbours, as well as semantic neighbours. In addition, factors such as the selected language, the context, the mode of production, the purpose and task, the interlocutor, frequency of use/exposure, proficiency, the L1 status and any other activating factors would further make certain items available for selection (e.g. all the words in the selected language, all items typically used in that environment or that mode of production, all the words from languages the interlocutor shares with the speaker, words that are frequently used, etc.). The accumulation of all these activating factors
thus determines which item has the highest level of activation and will be chosen at any given point in time. Naturally, some factors weigh more heavily than others. Selecting a language for output will raise the activation of words from this language proportionally more than, for example, frequency of use. Nevertheless, in some instances a non-target word can be selected over a TL word (e.g. slips-of-the-tongue), if the combination of activating factors for this item outweighs the combination of activating factors for the TL item.

Whichever selection path one believes to be the most probable, it becomes clear that activation levels of individual items, independent of the level of activation of their language network as a whole, are an important aspect and should be incorporated in theoretical models of multilingual lexical organization and processing. Such an item-level approach is supported by Herwig (2001), who believes that interlingual links probably differ more in strength and quantity than in quality. Through frequent co-usage, intra-lingual links grow stronger, thereby creating a subset of items typically used together. Since the particular form of an item was found to have an effect on its probability of being selected, rather than its language membership per se (§ 5.6), a model of crosslinguistic connections based on individual words and the strength of their connection to both intra- and inter-linguistic neighbours may be a useful way of conceptualizing the multilingual mental lexicon. Paradis’ (1987) subset model has aimed to provide an answer to the integration/separation dichotomy by offering a model that incorporates aspects of both, as well as item-level connections. Words can be tagged for language membership but also other features just as register and individual items can thus belong to multiple subsets at once. He further argues that language subsets must have their own neural traces, accounting for selective aphasia.

The results from the quantitative part of this study have shown that the source language of crosslinguistic influence is systematic and predictable by factors that affect languages as a whole (proficiency, the L1 status, exposure). Languages in the multilingual mind do thus seem to be stored and accessed as separate entities to some degree, but the results at the item-specific level showed that individual words can defy language-general predictions of the source language of transfer, if their particular form is more closely related to the TL than that of the competing candidate from the overall more probable source language. While the multilingual mental lexicon appears to be non-integrated at some level, it also seems to be integrated to some extent. An activation model, which incorporates intra- and interlingual links at different
levels of strength and in different quantities, which then form a variety of subsets, thus seems to provide the most viable theoretical account of the multilingual lexicon and crosslinguistic influence.

6.5 Conclusion

The present thesis set out to evaluate a variety of factors in their ability to predict the source language of transfer. In order to do so it explored a new statistical method (multinomial logistic regression), which proved to be a useful tool to test different factors, while controlling for confounding variables. Quantitative methods have thus been shown to provide a useful addition to the more established, qualitative methods, by offering greater generalizability of research findings in the field.

Each of these findings not only contributes to a better understanding of transfer patterns in multilingual learners’ choice of source language, but also carries implications for theoretical accounts of how the multilingual lexicon is organised and accessed in language production. The multilingual mental lexicon is a highly complex, dynamic, and interactive entity, which remains elusive in many ways. This study has provided some additions to our understanding of multilingual language production by finding that proficiency, exposure, and the L1 status affect language choice in transfer and discussing how this may be related to the underlying lexical organization in the multilingual mind.

While the construct of language-general psychotypology has been shown to potentially suffer from methodological and/or theoretical issues, typology, in the form of accumulated reference points, has been argued to lead to an increase in interlingual connections between certain languages, thereby influencing transfer patterns. Similarly, it has also been shown that features at the word-level affect the source language of transfer, which appears indicative of item-specific links that can differ in strength. The results are thus suggestive of a language subset model, which is reliant on both language-general and item-specific aspects for activation and word selection. The investigations conducted at the item-specific level have further led to new insights regarding the ways in which markedness of individual words constrains transferability in relation to the TL, as well as the ways in which KOPP develops through statistical learning, illustrating the probabilistic nature of transfer phenomena.

Finally, in addition to the five factors specifically investigated in this study, new insights also emerged from differences in transfer patterns by mode of
production. The results have illustrated that the typical mode a language is used in, as well as for what typical purpose, task, and context, has an effect on which source language is used most prominently when producing language under the same circumstances. These factors may influence the activation level of a language by means of contextual and modal tags, which make candidates more readily available in particular circumstances.

This final chapter aimed to draw inferences from the combination of individual findings about the organization of the multilingual mental lexicon and the processes that underlie transfer in multilingual learners. Inferences are the most important aspect of a research project (Tashakkori & Teddlie, 2003b), as they not only answer research questions but also “provide a fertile ground for developing new understandings and new explanations for events, phenomena, and relationships” (p. 691). It needs to be noted that while this process of induction and deduction produces a coherent and clearly delineated abstraction, the phenomenon itself remains highly complex and it is thus impossible to state with certainty what the underlying mechanisms truly are,

[a]s in all research on crosslinguistic influences, one must remain circumspect when considering results and how they are to be interpreted.

The only evidence we have available is a product and one can often only guess about the possible underlying psycholinguistic processes.

Dewaele, 1998, p. 488

The degree of complexity of the multilingual mind and lexical processing continues to challenge researchers and few definite answers can be provided. However, we seem to be observing a highly connected mental lexicon, which can act in deeply different ways depending on a wide variety of factors. A number of researchers have adopted dynamic systems theory in order to encompass the mind’s chaotic, not predictable, self-organising, and constantly changing nature (De Bot et al., 2005). While the mental lexicon is a truly dynamic and complex system, I believe it should be any researcher’s aim to seek out predictability to the greatest possible extent. Some aspects may remain volatile or random, but the present study has shown that a large portion of transfer behaviours is indeed predictable and systematic. The field of cross-linguistic influence in multilingual learners is still young, but its ability to inform on the internal workings of the mental lexicon, how it is organised and accessed, entrusts it a crucial place in the broader research field of language acquisition.
7 Conclusions, Contributions, and Future Directions

The focus of this thesis lay with crosslinguistic influence in multilingual learners and understanding the distribution patterns of lexical transfer across multiple source languages. In the first chapter, an overview of current theoretical models and hypotheses concerning the organization of the multilingual mental lexicon (§ 2.2.1) and the processes underlying language production in multilingual users (§ 2.2.2 & 2.2.3) was presented. The remainder of the text has aimed to contribute to this body of theoretical models by investigating transfer as surface evidence of these underlying processes and constraints. In chapter 3, a broad overview of current research on the source language of transfer in third language acquisition was offered. Previous studies had been able to identify a number of influential factors on the choice of SL, such as proficiency, recency/exposure, psychotypology, the L2 status and item-specific transferability. This study aimed to elaborate on these results and thereby contribute to a better understanding of crosslinguistic influence in multilingual learners.

7.1 Significance & contributions to the field

The study of transfer has the potential to offer “unique perspectives on human cognition” (Odlin & Yu, 2016, p. 12) and the ultimate goal of transfer research is “the explanation of how the languages a person knows interact in the mind” (Jarvis & Pavlenko, 2008, p. 11). Odlin and Yu (2016) argue that most studies do not directly contribute to this ultimate goal, but contribute to what they call enabling goals, which represent the intermediate steps that eventually lead to the ultimate goal. Odlin and Yu list four such goals:

- **empirical discoveries**
  which expand our pool of knowledge of the phenomenon

- **theoretical advances**
  that account for these empirical discoveries and which offer further empirically testable hypotheses concerning the nature of CLI
**methodological tools**

for testing those hypotheses, for disambiguating cases where CLI is uncertain

**argumentation heuristics**

that count as standards for what is valid evidence for or against the presence of transfer and which clarify the criteria for achieving methodological (or argumentative) rigor in one’s analysis and interpretations

Odlin & Yu, 2016, p. 20

The present thesis has endeavoured to contribute to these enabling goals in the following ways. First, it has used a new methodological approach to testing the predictive power of factors found to influence the choice of source language in transfer. Second, it offers new empirical evidence of distribution patterns across source languages. Finally, it also hopes to have made some valuable theoretical suggestions that can account for the empirical discoveries made in this study.

Regarding methodological tools, this study aimed to offer an additional methodological approach to the phenomenon of crosslinguistic influence and the choice of source language inherent in the acquisition of a third language. Multinomial logistic regression has been shown to successfully test the significance of factors previously established in the literature and has illustrated the high degree of predictability and systematicity in the choice of source language. While the majority of previous research has relied on qualitative methods to investigate lexical transfer in TLA, the present study shows that a quantitative approach to the phenomenon can contribute important insights to the current body of research and advance the field in a new way. Previous studies have raised important hypotheses regarding what factors predict the SL of transfer, and multinomial logistic regression has offered an important new methodological tool to test these hypotheses.

In addition, the use of multinomial logistic regression has solved the issue of confounding factors that previous studies have encountered, by testing each factor while holding all others constant. It also allowed for the direction of the effect to be determined (e.g. whether high or low proficiency in a BL predicts transfer from that language). Finally, the use of inferential statistics brings about another important advancement for the field, namely the greater generalizability of research findings. Multilingualism is not only a psycholinguistic
phenomenon, but also a social reality in the world today. Globalization has led to greater mobility at different societal levels, as well as increased interaction between countries, with English often acting as lingua franca and facilitating communication between speakers of different languages (Cenoz, 2013).

Given the widespread phenomenon of multilingualism and the acquisition of English around the world, it becomes essential for research findings to gain in generalizability, in order to inform learning strategies and teaching methods. The practical application of research results is considered a side goal of scientific research (Odlin & Yu, 2016), where new findings should be used for “the development of treatment interventions designed to minimize the negative effects of transfer in language learners or language communities and to take maximum advantage of its positive consequences” (p. 20). In order to implement research findings, however, it is essential that these have been found to be generalizable to the greater population.

Regarding empirical discoveries, the present study investigated the effects of five different factors on the source language of transfer in multilinguals. Proficiency, exposure, and the L1 status were found to contribute to an explanatory model of transfer in multilingual learners. That each factor in its own right was shown to be a significant predictor offers important new evidence against an either/or dichotomy of certain factors. High proficiency in a background language correlated with more transfer from this language. Similarly, high exposure to a background language also increased its odds of being chosen as source for transfer. One important new revelation is that the L1 status, rather than the L2 status, affects the SL of transfer.

A number of previous studies had found an L2 status effect, while some theories (Bardel & Falk, 2012) would predict no status effect at all in the case of lexis. This study presents compelling evidence that there is something special about the L1, independent of proficiency or exposure, which affects transfer processes. Finally, the results on psychotypology have raised a number of theoretical issues about the construct and its ability to predict the SL of transfer. Almost a decade ago, Jarvis and Pavlenko (2008) stressed that “more studies of the multilingual lexicon are necessary to disambiguate the effects of perceived versus real crosslinguistic similarities” (p. 234) and the present study has been an attempt in this direction. Psychotypology was not found to have a coherent effect in the absence of an actual typological difference. Given that a number of studies have found typology effects, it remains to be determined how objective typology interacts with transfer.
Furthermore, item-specific transferability was explored as an additional predictor for the source language of transfer. The results illustrated how an item’s degree of markedness in relation to the TL affects its transferability. Learners were found to conduct cross-language comparisons in order to identify the best candidate for transfer from their available background languages. They were also shown to have excellent knowledge of target language norms and constraints, which it was argued is based on statistical learning mechanisms, similar to those in first language acquisition. While previous accounts have included markedness as a relevant factor in transfer, few studies have conducted an empirical investigation in this regard. The present study thus contributes initial empirical evidence of the effects of markedness, which remain to be explored in more detail in future research.

In addition to the investigations of the factors discussed above, this study also aimed to explore differences in transfer patterns by mode of production. The four factors tested in the quantitative analysis were found to predict the SL of transfer better in the spoken than the written mode, which may be related to differences in the degree of consciousness associated with each mode and consequent differences in underlying processes. Transfer research has mostly been concerned with oral production and so it is not surprising that the factors that previous studies have found to have an effect are slightly less relevant in writing. Researchers working on L2 and L3 writing may eventually have to develop their own theoretical frameworks and taxonomies that better reflect the processes underlying transfer in the written mode (Jarvis & Pavlenko, 2008).

From the analysis of differences across modes of production, new insights into the importance of mode, purpose, task, and context of use as predictors of the SL of transfer also emerged. It appears that the typical mode a language is used in has an effect on its probability of being used as source for transfer when the target language is produced in that mode. The same seems to be true for the typical physical context a language is used in (e.g. at school or at home), as well as the tasks for which a language is typically used (e.g. academic vs. non-academic). Previous studies have found that the linguistic and social contexts can activate or inhibit certain concepts that are linked to one language (e.g. M. Ross et al., 2002; Trafimow et al., 1997), but different contexts had not yet been connected to the source language of transfer. These results have important implications for the classroom, as some languages (e.g. home languages) will be less accessible as a resource for positive transfer if
the language is not widely used in the school context. Efforts towards translanguaging in the multilingual classroom (e.g. García, Ibarra Johnson, & Seltzer, 2016) represent excellent initiatives in this context, as it makes the learners’ full linguistic repertoire available to them during language acquisition in the classroom.

Finally, regarding Odlin and Yun’s (2016) enabling goal of theoretical advances, that can account for empirical discoveries, some tentative suggestions have been made (§ 6.4). It was suggested that the predictive factors tested in this study seem closely related to theoretical models of activation, as well as the strength of both intra and inter-linguistic connections. In particular, it was argued that the neighbourhood density of a SL item in the target language has an effect on its probability of being selected for transfer. It was further suggested that lexical items may not only be tagged for aspects such as language and register, but also for the context or mode they are typically used in. Finally, it was suggested that it is the accumulation of different tags being activated that leads to word selection, providing a framework for why one item is chosen over another, whether intra- or cross-linguistically.

7.2 Future directions

The findings of this study have offered some new insights into transfer processes, but they also evoke new questions. Individual factors were tested while other factors were kept constant, thus controlling for confounding variables. This has been an important first step in the process of testing the predictive power of these factors. The statistical model, however, cannot speak to the interplay or potential additive effect of these factors. One interesting next step would thus be to investigate whether and in what way these factors interact with each other and whether there are any emergent properties in multilinguals’ transfer patterns that differ from behaviour observed in speakers of just one of the background languages (De Angelis, 2005b). Is the behaviour of a German-French speaker learning English a combination of the behaviours observed in a monolingual German and monolingual French learner of English, or is it something else altogether? Furthermore, it was not possible to reliably establish whether one factor can outweigh another or which factor has the strongest effect. Looking at interaction effects thus presents itself as an excellent continuation of the study presented here.
Furthermore, while the factors under investigation were shown to be significant predictors of the SL of transfer in this population, for this language combination, and at this TL proficiency level, it remains to be determined whether they have the same predictive power in an older (or younger) learner population, for typologically more distant language pairs, and at higher proficiency levels. Future research may, for example, find that typology overrides the L1 status effect in the case of an L1 Chinese learner of French, who also knows L2 Spanish. Furthermore, it might be worth exploring whether psychotypology has a more consistent effect in older learners. It would also be interesting to follow a group of learners longitudinally and observe whether (and how) the effect of these factors changes over time and with increased proficiency.

Another relevant aspect for future investigations is the degree of similarity and dissimilarity between the written and the spoken mode. On the one hand, the four factors predicted speaking better than writing, highlighting the need for more research on writing and explanatory factors that are specific to the writing process. On the other hand, the four factors were indeed also significant predictor in the written mode, which goes to show that both modes of production fall on the same continuum of automatized vs. monitored language production. Further research may want to explore potential similarities between the two modes of production with regards to how proficiency, exposure, and the L1 status govern language activation and constrain transfer from a particular SL. As mentioned above, the degree of significance of individual factors remains to be established, but doing so would also be of interest in this context, as it can contribute to our understanding of the differences in spontaneity, activation, and control in the two modes.

The results of this study also indicated that mode in itself may be a predictor of the SL of transfer. The predominantly oral language Luxembourgish was used significantly less as source in writing than in speaking. The statistical model was unable to predict any of the Luxembourgish outcomes in writing and interactional exposure was only a significant predictor in oral production. However, since it was not the purpose of this project to investigate the effects of a language’s typical mode of production, the research design was not optimized to test such effects. A clear pattern nevertheless seems to have emerged from the data, which appears to be consistent enough to justify further research into the matter. In order to truly test mode of production, context, and type of task as predictors, the research design would have to include language profiles that include oral vs. written languages, data elicitation tasks that are academic
vs. non-academic, as well as collect data in the physical environments where these languages are typically used (e.g. home vs. school). Furthermore, questionnaire data should not be limited to interactional exposure, but should also include exposure to written material.

The explorations of item-specific transferability in this study also raised a number of questions for future research to explore. Item-specific features, such as word frequency, neighbourhood density in the TL, or markedness, remain a highly neglected area in empirical research on CLI. Language-general factors, such as the L1 status, however, can only take us so far and future research should thus specifically aim to test a range of item-specific aspects for their ability to predict the SL of transfer. Such research also carries important implications for theoretical accounts of multilingual lexical organization and processing. Any theoretical model needs to take into account “the idiosyncratic nature of the links in the bilingual lexicon and thus transferability constraints” (Jarvis & Pavlenko, 2008, p. 221). In order to understand the idiosyncrasies of individual links, future research should engage with item-specific features in a more hypothesis-testing manner. Neighbourhood density, word frequency, and markedness all contribute to the idiosyncratic links formed in the lexicon, yet remain empirically under-investigated. One important future direction is thus the exploration of the strength of individual interlingual links and how word selection may be related to the specific features of an individual word, and not just to its language membership.

It may even be necessary to delve into even smaller units than individual words, e.g. syllables, trigrams, and bigrams, as well as their position in the word, to truly grasp the processes underlying the choice of source language in CLI. Through such research, we may also gain better understanding of statistical learning in second and third language acquisition and how it underlies learners’ knowledge of ortho- and phonotactic probabilities, which seems to affect transfer. With the focus of future research shifting towards item-specificity, issues of token/type count and task dependency also need to be addressed. If we believe that a word’s individual form can determine its transferability independent of the language as a whole, then the number of times a particular item occurs in a picture story, for example, has important consequences for quantification of transfer instances. The effect may be negligible, but it may nevertheless prove fruitful to test how large the effect is. One could, for example, compare a number of different picture stories described by the same participant at the same moment in time and compare the distribution of
transfer across SL for each story. While this issue may not be very relevant to syntactic transfer, it could prove crucial for lexical transfer.

Reliably identifying and categorizing transfer has been and remains one of the biggest challenges in the field of crosslinguistic influence. Concerns regarding the lack of well-established criteria has been largely voiced in the literature (Felix, 1977; Jarvis & Pavlenko, 2008; Meisel, 1983) and a number of attempts have been made to redress the situation. Jarvis (1998, 2000) and Jarvis and Pavlenko (2008) have suggested intragroup homogeneity, intergroup heterogeneity, and crosslinguistic performance congruity (§ 4.5) as ways to ensure that the errors we observe are indeed the result of crosslinguistic influence. The importance of relying on group level tendencies is further stressed by Jarvis (2017), who argues that if an error is caused by influence of a learner’s L1, then we should see other speakers of the same L1 producing the same error. As was discussed in § 4.5, the examples that are presented by these authors are almost exclusively drawn from syntax and the question that remains is how these criteria apply to lexical transfer. In this study, a list of criteria was given for what was considered lexical transfer (§ 4.5.3.1). Given the particular nature of lexical transfer, these criteria all related to the level of individual cases and not to group-level tendencies. Furthermore, a second rater was used to increase the reliability of the coding procedure. As has been argued throughout this text, crosslinguistic influence and related predictor of the source language of transfer may considerably differ across linguistic levels (e.g. L1/L2 status factor in syntax vs. lexis) and it is therefore important that future research proposes ways to improve methodological rigour in lexical transfer. Understanding and engaging with the specificities of each linguistic level seems a necessary first step to a more unified account of CLI at all linguistic levels.
Appendices

Appendix A: Word class and type of transfer

*Distribution across word classes.*

<table>
<thead>
<tr>
<th></th>
<th>SPEAKING</th>
<th>WRITING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nouns</td>
<td>47.1% (353)</td>
<td>51.1% (339)</td>
</tr>
<tr>
<td>Verbs</td>
<td>21.9% (164)</td>
<td>31.2% (207)</td>
</tr>
<tr>
<td>Adverbs</td>
<td>5.6% (42)</td>
<td>4.8% (32)</td>
</tr>
<tr>
<td>Adjectives</td>
<td>1.6% (12)</td>
<td>5.0% (33)</td>
</tr>
<tr>
<td><strong>CONTENT WORDS</strong></td>
<td><strong>76.2%</strong></td>
<td><strong>92.2%</strong></td>
</tr>
<tr>
<td>Preposition</td>
<td>9.6% (72)</td>
<td>5.0% (33)</td>
</tr>
<tr>
<td>Determiners</td>
<td>7.3% (55)</td>
<td>0.5% (3)</td>
</tr>
<tr>
<td>Pronouns</td>
<td>3.7% (28)</td>
<td>1.1% (7)</td>
</tr>
<tr>
<td>Conjunctions</td>
<td>3.1% (23)</td>
<td>1.4% (9)</td>
</tr>
<tr>
<td><strong>FUNCTION WORDS</strong></td>
<td><strong>23.8%</strong></td>
<td><strong>7.8%</strong></td>
</tr>
<tr>
<td></td>
<td>100% (749)</td>
<td>100% (663)</td>
</tr>
</tbody>
</table>

*Distribution across types of transfer.*

<table>
<thead>
<tr>
<th></th>
<th>SPEAKING</th>
<th>WRITING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borrowing</td>
<td>70.8% (530)</td>
<td>41.6% (276)</td>
</tr>
<tr>
<td>Foreignising</td>
<td>12.4% (93)</td>
<td>29.0% (192)</td>
</tr>
<tr>
<td>Lexeme matching</td>
<td>15.1% (113)</td>
<td>21.7% (144)</td>
</tr>
<tr>
<td>Spelling</td>
<td>N/A</td>
<td>4.8% (32)</td>
</tr>
<tr>
<td>Semantic extension</td>
<td>0.8% (6)</td>
<td>0.8% (5)</td>
</tr>
<tr>
<td>Direct translation</td>
<td>0.8% (6)</td>
<td>2.1% (14)</td>
</tr>
<tr>
<td></td>
<td>100% (749)</td>
<td>100% (663)</td>
</tr>
</tbody>
</table>

---

27 Numbers appear to not always add up due to rounding effects.
Distribution across word classes by source language. Spoken data.

<table>
<thead>
<tr>
<th></th>
<th>Lux.</th>
<th>German</th>
<th>French</th>
<th>Other(^{28})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nouns</td>
<td>26.4% (93)</td>
<td>43.6% (154)</td>
<td>4.0% (14)</td>
<td>26.1% (92)</td>
</tr>
<tr>
<td>Verbs</td>
<td>27.4% (45)</td>
<td>35.4% (58)</td>
<td>22.6% (37)</td>
<td>14.6% (24)</td>
</tr>
<tr>
<td>Adverbs</td>
<td>52.4% (22)</td>
<td>45.2% (19)</td>
<td>0% (0)</td>
<td>2.4% (1)</td>
</tr>
<tr>
<td>Adjectives</td>
<td>41.7% (5)</td>
<td>8.3% (1)</td>
<td>41.7% (5)</td>
<td>8.3% (1)</td>
</tr>
<tr>
<td>Prepositions</td>
<td>43.1% (31)</td>
<td>23.6% (17)</td>
<td>5.6% (4)</td>
<td>27.8% (20)</td>
</tr>
<tr>
<td>Determiners</td>
<td>63.6% (35)</td>
<td>34.6% (19)</td>
<td>1.8% (1)</td>
<td>0% (0)</td>
</tr>
<tr>
<td>Pronouns</td>
<td>67.9% (19)</td>
<td>17.9% (5)</td>
<td>7.1% (2)</td>
<td>7.1% (2)</td>
</tr>
<tr>
<td>Conjunctions</td>
<td>69.6% (16)</td>
<td>30.4% (7)</td>
<td>0% (0)</td>
<td>0% (0)</td>
</tr>
</tbody>
</table>

Distribution across word classes by source language. Written data.

<table>
<thead>
<tr>
<th></th>
<th>Lux.</th>
<th>German</th>
<th>French</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nouns</td>
<td>2.4% (8)</td>
<td>50.2% (170)</td>
<td>15.0% (51)</td>
<td>32.5% (110)</td>
</tr>
<tr>
<td>Verbs</td>
<td>12.1% (25)</td>
<td>32.9% (68)</td>
<td>35.3% (73)</td>
<td>19.8% (41)</td>
</tr>
<tr>
<td>Adverbs</td>
<td>6.3% (2)</td>
<td>56.3% (18)</td>
<td>31.3% (10)</td>
<td>6.3% (2)</td>
</tr>
<tr>
<td>Adjectives</td>
<td>6.1% (2)</td>
<td>39.4% (13)</td>
<td>36.4% (12)</td>
<td>18.2% (6)</td>
</tr>
<tr>
<td>Prepositions</td>
<td>27.3% (9)</td>
<td>39.4% (13)</td>
<td>18.2% (6)</td>
<td>15.2% (5)</td>
</tr>
<tr>
<td>Determiners</td>
<td>0% (0)</td>
<td>66.7% (2)</td>
<td>33.3% (1)</td>
<td>0% (0)</td>
</tr>
<tr>
<td>Pronouns</td>
<td>0% (0)</td>
<td>42.9% (3)</td>
<td>0% (0)</td>
<td>57.1% (4)</td>
</tr>
<tr>
<td>Conjunctions</td>
<td>88.9% (8)</td>
<td>11.1% (1)</td>
<td>0% (0)</td>
<td>0% (0)</td>
</tr>
</tbody>
</table>

\(^{28}\) Other = G-L, F-L, G-F-L, and other L1s (e.g. Dutch, Portuguese)
**Distribution across types of transfer by source language. Spoken data.**

<table>
<thead>
<tr>
<th></th>
<th>Lux.</th>
<th>German</th>
<th>French</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borrowing</td>
<td>43.6%</td>
<td>40.4%</td>
<td>9.8%</td>
<td>10.9%</td>
</tr>
<tr>
<td>Foreignising</td>
<td>17.0%</td>
<td>45.7%</td>
<td>11.5%</td>
<td>13.8%</td>
</tr>
<tr>
<td>Lexeme matching</td>
<td>13.3%</td>
<td>20.4%</td>
<td>9.7%</td>
<td>54.0%</td>
</tr>
<tr>
<td>Semantic extension</td>
<td>66.7%</td>
<td>0%</td>
<td>0%</td>
<td>33.3%</td>
</tr>
<tr>
<td>Direct translation</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Distribution across types of transfer by source language. Written data.**

<table>
<thead>
<tr>
<th></th>
<th>Lux.</th>
<th>German</th>
<th>French</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borrowing</td>
<td>8.7%</td>
<td>54.0%</td>
<td>18.1%</td>
<td>19.2%</td>
</tr>
<tr>
<td>Foreignising</td>
<td>5.2%</td>
<td>43.8%</td>
<td>27.6%</td>
<td>23.4%</td>
</tr>
<tr>
<td>Spelling</td>
<td>9.4%</td>
<td>56.3%</td>
<td>12.5%</td>
<td>21.9%</td>
</tr>
<tr>
<td>Lexeme matching</td>
<td>11.1%</td>
<td>22.9%</td>
<td>31.9%</td>
<td>34.0%</td>
</tr>
<tr>
<td>Semantic extension</td>
<td>20.0%</td>
<td>0%</td>
<td>0%</td>
<td>80.0%</td>
</tr>
<tr>
<td>Direct translation</td>
<td>0%</td>
<td>28.6%</td>
<td>0%</td>
<td>71.4%</td>
</tr>
</tbody>
</table>
### Appendix B: Fragebogen (original German version)

**Student Code: ___________**

<table>
<thead>
<tr>
<th>Fragebogen</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Sprachlicher Hintergrund</strong></td>
</tr>
<tr>
<td><strong>1.1</strong> Was ist deine Muttersprache? (Wenn du glaubst du hast zwei Muttersprachen, gib beide Sprachen an.) Muttersprache: ________________________________  Eventuell zweite Muttersprache: ________________________________</td>
</tr>
<tr>
<td><strong>1.2</strong> Wie gut kannst du deine (erste) Muttersprache? Wie gut kannst du deine eventuell zweite Muttersprache?</td>
</tr>
<tr>
<td>Sehr gut</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>2.1 Welche Sprache kannst du noch?</td>
</tr>
<tr>
<td>2.2 Wie alt warst du, als du angefangen hast diese Sprache zu lernen? ___________________________ Jahre alt</td>
</tr>
<tr>
<td>2.3 Wie hast du diese Sprache erlernt?</td>
</tr>
<tr>
<td>Familie</td>
</tr>
<tr>
<td>Schule</td>
</tr>
<tr>
<td>2.4 Wie gut kannst du diese Sprache?</td>
</tr>
<tr>
<td>Sehr gut</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>3.1 Welche Sprache kannst du noch?</td>
</tr>
<tr>
<td>3.2 Wie alt warst du, als du angefangen hast diese Sprache zu lernen? ___________________________ Jahre alt</td>
</tr>
<tr>
<td>3.3 Wie hast du diese Sprache erlernt?</td>
</tr>
<tr>
<td>Familie</td>
</tr>
<tr>
<td>Schule</td>
</tr>
<tr>
<td>3.4 Wie gut kannst du diese Sprache?</td>
</tr>
<tr>
<td>Sehr gut</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>4.1 Welche Sprache kannst du noch?</td>
</tr>
<tr>
<td>4.2 Wie alt warst du, als du angefangen hast diese Sprache zu lernen? ___________________________ Jahre alt</td>
</tr>
<tr>
<td>4.3 Wie hast du diese Sprache erlernt?</td>
</tr>
<tr>
<td>Familie</td>
</tr>
<tr>
<td>Schule</td>
</tr>
<tr>
<td>4.4 Wie gut kannst du diese Sprache?</td>
</tr>
<tr>
<td>Sehr gut</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>5.1 Welche Sprache kannst du noch?</td>
</tr>
<tr>
<td>5.2 Wie alt warst du, als du angefangen hast diese Sprache zu lernen? ___________________________ Jahre alt</td>
</tr>
</tbody>
</table>

262
<table>
<thead>
<tr>
<th>5.3</th>
<th>Wie hast du diese Sprache erlernt?</th>
<th>Familie</th>
<th>Freunde</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Schule</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5.4</th>
<th>Wie gut kannst du diese Sprache?</th>
<th>Sehr gut</th>
<th>gut</th>
<th>mittel</th>
<th>schlecht</th>
<th>sehr schlecht</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>6.1</th>
<th>Welche Sprache kannst du noch?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>6.2</th>
<th>Wie alt warst du, als du angefangen hast diese Sprache zu lernen?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jahre alt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6.3</th>
<th>Wie hast du diese Sprache erlernt?</th>
<th>Familie</th>
<th>Freunde</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Schule</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6.4</th>
<th>Wie gut kannst du diese Sprache?</th>
<th>Sehr gut</th>
<th>gut</th>
<th>mittel</th>
<th>schlecht</th>
<th>sehr schlecht</th>
</tr>
</thead>
</table>

### 2. Sprachkenntnisse

<table>
<thead>
<tr>
<th>7.1</th>
<th>Ich kann mich mündlich vorstellen und einfach Fragen über mich selber beantworten.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Luxemburgisch</td>
</tr>
<tr>
<td></td>
<td>Deutsch</td>
</tr>
<tr>
<td></td>
<td>Französisch</td>
</tr>
<tr>
<td></td>
<td>Englisch</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7.2</th>
<th>Ich kann an einem Gespräch über alltägliche Dinge teilnehmen (z.B. Hobbies, Wochenendpläne).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Luxemburgisch</td>
</tr>
<tr>
<td></td>
<td>Deutsch</td>
</tr>
<tr>
<td></td>
<td>Französisch</td>
</tr>
<tr>
<td></td>
<td>Englisch</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7.3</th>
<th>Ich kann meine Meinung auf eine logische Art und Weise mündlich ausdrücken wenn ich an einer Diskussionen über Themen die mir wichtig sind teilnehme.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Luxemburgisch</td>
</tr>
<tr>
<td></td>
<td>Deutsch</td>
</tr>
<tr>
<td></td>
<td>Französisch</td>
</tr>
<tr>
<td></td>
<td>Englisch</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7.4</th>
<th>Wenn ich in einem Geschäft bin, kann ich Fragen über Dinge die ich kaufen möchte stellen und meine Wünsche erklären.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Luxemburgisch</td>
</tr>
<tr>
<td></td>
<td>Deutsch</td>
</tr>
<tr>
<td></td>
<td>Französisch</td>
</tr>
<tr>
<td></td>
<td>Englisch</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7.5</th>
<th>Wenn ich mich im Voraus vberereiten kann, kann ich eine Präsentation zu einem Thema geben das ich gut kenne.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Luxemburgisch</td>
</tr>
<tr>
<td></td>
<td>Deutsch</td>
</tr>
<tr>
<td></td>
<td>Französisch</td>
</tr>
<tr>
<td></td>
<td>Englisch</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8.1</th>
<th>Ich kann kurze Texte über bekannte Themen schreiben, wie z.B. meine Familie oder mein Dorf/meine Stadt.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Luxemburgisch</td>
</tr>
<tr>
<td></td>
<td>Deutsch</td>
</tr>
<tr>
<td></td>
<td>Französisch</td>
</tr>
<tr>
<td></td>
<td>Englisch</td>
</tr>
</tbody>
</table>
8.2 Ich kann meine Meinung schriftlich klar ausdrücken und Gründe angeben.

<table>
<thead>
<tr>
<th>Sprache</th>
<th>sehr richtig</th>
<th>richtig</th>
<th>falsch</th>
<th>sehr falsch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxemburgisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deutsch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Französisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Englisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8.3 Ich kann eine detaillierte Zusammenfassung von der Handlung eines Buches oder eines Filmes schreiben.

<table>
<thead>
<tr>
<th>Sprache</th>
<th>sehr richtig</th>
<th>richtig</th>
<th>falsch</th>
<th>sehr falsch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxemburgisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deutsch</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Französisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Englisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8.4 Ich kann Briefe und E-mails in einfacher und höflicher Sprache an Lehrer und andere Erwachsene schreiben.

<table>
<thead>
<tr>
<th>Sprache</th>
<th>sehr richtig</th>
<th>richtig</th>
<th>falsch</th>
<th>sehr falsch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxemburgisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deutsch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Französisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Englisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8.5 Ich kann meinen Alltag schriftlich beschreiben.

<table>
<thead>
<tr>
<th>Sprache</th>
<th>sehr richtig</th>
<th>richtig</th>
<th>falsch</th>
<th>sehr falsch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxemburgisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deutsch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Französisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Englisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Kommentar:

### 3. Täglicher Sprachgebrauch

10.1 Zu Hause mit meiner Familie spreche ich:

<table>
<thead>
<tr>
<th>Sprache</th>
<th>immer</th>
<th>meistens</th>
<th>die Hälfte der Zeit</th>
<th>manchmal</th>
<th>nie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxemburgisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deutsch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Französisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Englisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10.2 Mit meinen Freunden in der Schule spreche ich:

<table>
<thead>
<tr>
<th>Sprache</th>
<th>immer</th>
<th>meistens</th>
<th>die Hälfte der Zeit</th>
<th>manchmal</th>
<th>nie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxemburgisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deutsch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Französisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Englisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10.3 Mit meinen Freunden außerhalb der Schule, im Sportverein, Musikverein, etc. spreche ich:

<table>
<thead>
<tr>
<th>Sprache</th>
<th>immer</th>
<th>meistens</th>
<th>die Hälfte der Zeit</th>
<th>manchmal</th>
<th>nie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxemburgisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deutsch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Französisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Englisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11.1 Ich schaue Fernsehen auf:

<table>
<thead>
<tr>
<th>Sprache</th>
<th>immer</th>
<th>meistens</th>
<th>die Hälfte der Zeit</th>
<th>manchmal</th>
<th>nie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxemburgisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deutsch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Französisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Englisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11.2 Ich höre Musik auf:

<table>
<thead>
<tr>
<th>Sprache</th>
<th>immer</th>
<th>meistens</th>
<th>die Hälfte der Zeit</th>
<th>manchmal</th>
<th>nie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxemburgisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deutsch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Französisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Englisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
11.3 Wenn ich im Internet surfe, sind die meisten Webseiten auf:

<table>
<thead>
<tr>
<th>Sprache</th>
<th>immer</th>
<th>meistens</th>
<th>die Hälfte der Zeit</th>
<th>manchmal</th>
<th>nie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxemburgisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deutsch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Französisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Englisch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. Kommentar:

4. Sprachenverwandtschaft

13.1 Ich sehe wenig Verwandtschaft zwischen französischen Wörtern und englischen Wörtern.

13.2 Ich sehe wenig Verwandtschaft zwischen deutschen Wörtern und englischen Wörtern.

13.3 Ich sehe wenig Verwandtschaft zwischen luxemburgischen Wörtern und deutschen Wörtern.

14.1 Wörter auf Französisch werden oft ähnlich ausgesprochen wie auf Englisch.

14.2 Wörter auf Deutsch werden oft ähnlich ausgesprochen wie auf Englisch.

14.3 Wörter auf Luxemburgisch werden oft ähnlich ausgesprochen wie auf Englisch.

15.1 Die französische und englische Schreibweise/Rechtschreibung sind sehr ähnlich.

15.2 Die deutsche und englische Schreibweise/Rechtschreibung sind sehr ähnlich.

15.3 Die luxemburgische und englische Schreibweise/Rechtschreibung sind sehr ähnlich.

16.1 Ich glaube dass die französische Aussprache eng verwandt ist mit der englischen Aussprache.

16.2 Ich glaube dass die deutsche Aussprache eng verwandt ist mit der englischen Aussprache.

16.3 Ich glaube dass die luxemburgische Aussprache eng verwandt ist mit der englischen Aussprache.

17.1 Französische und englische Wörter sehen nicht gleich aus.

17.2 Deutsche und englische Wörter sehen nicht gleich aus.

17.3 Luxemburgische und englische Wörter sehen nicht gleich aus.

18.1 Ich glaube dass es nicht viel Ähnlichkeit zwischen der Aussprache von Französisch und Englisch gibt.

18.2 Ich glaube dass es nicht viel Ähnlichkeit zwischen der Aussprache von Deutsch und Englisch gibt.

18.3 Ich glaube dass es nicht viel Ähnlichkeit zwischen der Aussprache von Luxemburgisch und Englisch gibt.

19.1 Allgemein, finde ich dass Englisch überhaupt nicht wie Französisch klingt.

19.2 Allgemein, finde ich dass Englisch überhaupt nicht wie Deutsch klingt.

19.3 Allgemein, finde ich dass Englisch überhaupt nicht wie Luxemburgisch klingt.

20. Kommentar:

Vielen Dank für deine Teilnahme!
# Appendix C: Questionnaire (English translation)

## Linguistic background

1.1 What is your mother tongue? (If you think you have two native languages, include both languages.)

Mother tongue: ____________________________

Potential second mother tongue: ____________________________

1.2 How well do you know your mother tongue?

<table>
<thead>
<tr>
<th>Very well</th>
<th>well</th>
<th>average</th>
<th>badly</th>
<th>very badly</th>
</tr>
</thead>
</table>

1.3 How well do you know your second mother tongue?

<table>
<thead>
<tr>
<th>Very well</th>
<th>well</th>
<th>average</th>
<th>badly</th>
<th>very badly</th>
</tr>
</thead>
</table>

2.1 What other language do you know?

2.2 How old were you when you started learning this language? ________ years old

2.3 How did you learn this language?

- [ ] family
- [ ] school
- [ ] or my own

2.4 How well do you know this language?

<table>
<thead>
<tr>
<th>Very well</th>
<th>well</th>
<th>average</th>
<th>badly</th>
<th>very badly</th>
</tr>
</thead>
</table>

3.1 What other language do you know?

3.2 How old were you when you started learning this language? ________ years old

3.3 How did you learn this language?

- [ ] family
- [ ] school
- [ ] or my own

3.4 How well do you know this language?

<table>
<thead>
<tr>
<th>Very well</th>
<th>well</th>
<th>average</th>
<th>badly</th>
<th>very badly</th>
</tr>
</thead>
</table>

4.1 What other language do you know?

4.2 How old were you when you started learning this language? ________ years old

4.3 How did you learn this language?

- [ ] family
- [ ] school
- [ ] or my own

4.4 How well do you know this language?

<table>
<thead>
<tr>
<th>Very well</th>
<th>well</th>
<th>average</th>
<th>badly</th>
<th>very badly</th>
</tr>
</thead>
</table>

5.1 What other language do you know?

5.2 How old were you when you started learning this language? ________ years old

5.3 How did you learn this language?

- [ ] family
- [ ] school
- [ ] or my own

5.4 How well do you know this language?
| 6.1 | What other language do you know? |  |
| 6.2 | How old were you when you started learning this language? | ________ years old |
| 6.3 | How did you learn this language? | ☐ family ☐ friends ☐ school ☐ on my own |
| 6.4 | How well do you know this language? | Very well ☐ well ☐ average ☐ badly ☐ very badly |

### Language knowledge

| 7.1 | I can introduce myself and answer simple questions about myself. |
| Luxemburgish | very true ☐ true ☐ false ☐ very false ☐ |
| German | very true ☐ true ☐ false ☐ very false ☐ |
| French | very true ☐ true ☐ false ☐ very false ☐ |
| English | very true ☐ true ☐ false ☐ very false ☐ |

| 7.2 | I can join in conversations on familiar everyday topics (e.g. hobbies, weekend plans, etc.). |
| Luxemburgish | very true ☐ true ☐ false ☐ very false ☐ |
| German | very true ☐ true ☐ false ☐ very false ☐ |
| French | very true ☐ true ☐ false ☐ very false ☐ |
| English | very true ☐ true ☐ false ☐ very false ☐ |

| 7.3 | I can express my opinion in a logical manner when I join in discussions and debates on topics I care about. |
| Luxemburgish | very true ☐ true ☐ false ☐ very false ☐ |
| German | very true ☐ true ☐ false ☐ very false ☐ |
| French | very true ☐ true ☐ false ☐ very false ☐ |
| English | very true ☐ true ☐ false ☐ very false ☐ |

| 7.4 | I can ask questions about things I want to buy and explain my wishes and conditions. |
| Luxemburgish | very true ☐ true ☐ false ☐ very false ☐ |
| German | very true ☐ true ☐ false ☐ very false ☐ |
| French | very true ☐ true ☐ false ☐ very false ☐ |
| English | very true ☐ true ☐ false ☐ very false ☐ |

| 7.5 | If I prepare in advance, I can give a presentation on a subject I specialize in or I know well. |
| Luxemburgish | very true ☐ true ☐ false ☐ very false ☐ |
| German | very true ☐ true ☐ false ☐ very false ☐ |
| French | very true ☐ true ☐ false ☐ very false ☐ |
| English | very true ☐ true ☐ false ☐ very false ☐ |

| 8.1 | I can briefly write about familiar topics such as my family and town. |
| Luxemburgish | very true ☐ true ☐ false ☐ very false ☐ |
| German | very true ☐ true ☐ false ☐ very false ☐ |
| French | very true ☐ true ☐ false ☐ very false ☐ |
| English | very true ☐ true ☐ false ☐ very false ☐ |

<p>| 8.2 | I can express my opinions in writing, giving reasons. |
| Luxemburgish | very true ☐ true ☐ false ☐ very false ☐ |</p>
<table>
<thead>
<tr>
<th></th>
<th>German</th>
<th>French</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.3</td>
<td>I can give a detailed summary of the story line of a book I have read or a movie I have seen recently.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>very true</td>
<td>true</td>
<td>false</td>
</tr>
<tr>
<td>Luxemburgish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>German</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>French</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.4</td>
<td>I can write letters and e-mails using basic polite English to my teacher or other adults.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>very true</td>
<td>true</td>
<td>false</td>
</tr>
<tr>
<td>Luxemburgish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>German</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>French</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.5</td>
<td>I can describe my day-to-day life in writing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>very true</td>
<td>true</td>
<td>false</td>
</tr>
<tr>
<td>Luxemburgish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>German</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>French</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Comment:

### Daily language use

<table>
<thead>
<tr>
<th></th>
<th>At home with my family I speak:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>always</td>
</tr>
<tr>
<td>Luxemburgish</td>
<td></td>
</tr>
<tr>
<td>German</td>
<td></td>
</tr>
<tr>
<td>French</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>With my friends at school I speak:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>always</td>
</tr>
<tr>
<td>Luxemburgish</td>
<td></td>
</tr>
<tr>
<td>German</td>
<td></td>
</tr>
<tr>
<td>French</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>With my friends outside school, at my sports club, music club, etc. I speak:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>always</td>
</tr>
<tr>
<td>Luxemburgish</td>
<td></td>
</tr>
<tr>
<td>German</td>
<td></td>
</tr>
<tr>
<td>French</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>I watch TV in:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>always</td>
</tr>
<tr>
<td>Luxemburgish</td>
<td></td>
</tr>
<tr>
<td>German</td>
<td></td>
</tr>
<tr>
<td>French</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>I listen to music in:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>always</td>
</tr>
<tr>
<td>Luxemburgish</td>
<td></td>
</tr>
<tr>
<td>German</td>
<td></td>
</tr>
</tbody>
</table>
11.3 When I surf the internet, the websites are in:

<table>
<thead>
<tr>
<th>Language</th>
<th>always</th>
<th>most of the time</th>
<th>half the time</th>
<th>sometimes</th>
<th>never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxembourgish</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>German</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>French</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. Comment:

---

Language relatedness

13.1 I see little similarity between French words and English words.

13.2 I see little similarity between German words and English words.

13.3 I see little similarity between Luxembourgish words and English words.

14.1 Words in French are often pronounced in a similar way to words in English.

14.2 Words in German are often pronounced in a similar way to words in English.

14.3 Words in Lux. are often pronounced in a similar way to words in English.

15.1 French and English spelling is similar.

15.2 German and English spelling is similar.

15.3 Luxembourgish and English spelling is similar.

16.1 I generally believe that the pronunciation of French is closely related to the pronunciation of English.

16.2 I generally believe that the pronunciation of German is closely related to the pronunciation of English.

16.3 I generally believe that the pronunciation of Luxembourgish is closely related to the pronunciation of English.

17.1 French and English words don’t look the same.

17.2 German and English words don’t look the same.

17.3 Luxembourgish and English words don’t look the same.

18.1 I generally believe that there is not much resemblance between the pronunciation system of French and that of English.

18.2 I generally believe that there is not much resemblance between the pronunciation system of German and that of English.

18.3 I generally believe that there is not much resemblance between the pronunciation system of Luxembourgish and that of English.

19.1 I generally believe that English doesn’t sound like French.

19.2 I generally believe that English doesn’t sound like German.

19.3 I generally believe that English doesn’t sound like Luxembourgish.

20. Comment:

Thank you very much for your participation!
### Appendix D: Variable coding sheet

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Values</th>
<th>Mean</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td>Prof_L</td>
<td>Proficiency in Luxembourgish</td>
<td>1=very bad 2=bad 3=medium 4=good 5=very good</td>
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<td>.69325</td>
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<tr>
<td>Prof_G</td>
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<td>Prof_F</td>
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<td>.77532</td>
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<td>-------------------------------------------------------</td>
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<th>%</th>
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<td>StatMode_L</td>
<td>L2 status of Luxembourgish, as defined by mode of learning</td>
<td>0=through family/friends and at school 1=through family/friends 2=at school</td>
<td>0: 12.7% (10) 1: 82.3% (65) 2: 3.8% (3)</td>
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<td>StatMode_G</td>
<td>L2 status of German, as defined by mode of learning</td>
<td>0=through family/friends and at school 1=through family/friends 2=at school</td>
<td>0: 35.4% (28) 1: 10.1% (8) 2: 54.4% (43)</td>
</tr>
<tr>
<td>StatMode_F</td>
<td>L2 status of French, as defined by mode of learning</td>
<td>0=through family/friends and at school 1=through family/friends 2=at school</td>
<td>0: 24.1% (19) 1: 17.7% (14) 2: 58.2% (46)</td>
</tr>
<tr>
<td>Level</td>
<td>School level</td>
<td>1=&quot;classique&quot; 2=&quot;technique&quot;</td>
<td>1: 58% (51) 2: 42% (37)</td>
</tr>
<tr>
<td>Sex</td>
<td>Sex</td>
<td>1=female 2=male</td>
<td>1: 53% (47) 2: 47% (41)</td>
</tr>
<tr>
<td>Learn_Dis</td>
<td>Learning disability</td>
<td>1=no 2=yes 3=physical disability impeding learning, e.g. visual or hearing impairment</td>
<td>1: 91% (80) 2: 6% (5) 3: 3% (3)</td>
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Appendix E: Likelihood ratio tests

Likelihood ratio tests of individual variables. Spoken data.

<table>
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<th>Effect</th>
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<th>Likelihood Ratio Tests</th>
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<td>-2 Log Likelihood of Reduced Model</td>
<td>Chi-Square</td>
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<td>Intercept</td>
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**Likelihood ratio tests of individual variables. Written data.**

<table>
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<th>Likelihood Ratio Tests</th>
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Appendix F: PCA – Proficiency factor

Rotated Component Matrix\textsuperscript{29}. Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

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\textsuperscript{29} Any loadings below 0.5 were suppressed from the table for easier visualization.
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</table>
Flerspråkighet är ett mycket vanligt fenomen i världen idag, både på samhälls- lelig och på individuell nivå. Den här avhandlingen undersöker flerspråkiga elever som lär sig engelska i Luxemburg. Eftersom elever ofta lär sig ett tredje eller fjärde snarare än ett andra språk (De Angelis, 2007a; Szubko-Sitarek, 2015), är det viktigt att undersöka språkinlärningen ur ett flerspråkigt perspektiv. Medan det finns omfattande forskning som undersöker effekterna av tvåspråkighet på de kognitiva och språkliga utvecklingen har det varit väldigt lite fokus på effekterna av tvåspråkighet på inlärningen av ytterligare språk (Cenoz et al., 2003).

En viktig process som är specifik för två- och flerspråkighet är hur olika språk aktiveras och interagerar i den enskilda individen, något som blir observerbart genom förekomsten av transfer, eller tvärspråkligt inflytande, som fenomenet också kallas. I början av 1920-talet, betraktades transfer ofta som ett resultat av slav och brist på klart tänkande (Jarvis & Pavlenko, 2008, s. 2). Senare, tack vare språkvetare som Uriel Weinreich (1953) och Robert Lado (1957), kom transfer att ses som en oundviklig del av inlärarspråket och man började undersöka det som ett språkligt, psykologvistiskt och sociolinguistiskt fenomen (Jarvis & Pavlenko, 2008, s. 3). Forskning om transfer i andraspråksinläring (second language acquisition, SLA) har kommit långt sedan dess och har lett till ovärderliga insikter om de kognitiva processer som ligger bakom språklig produktion. Att erkänna flerspråkighet som norm, snarare än undantag, har lett till att mängden forskning inriktad på de specifika egenskaper som gäller för tredjespråksinläring (third language acquisition, TLA) ökat. I synnerhet transfer anses vara ett fenomen vårt att studera, eftersom det kan öka förståelsen av den fulla kapaciteten att lära sig språk som människan har (Wang, 2016). Föreliggande studie syftar till att bidra till detta forskningsfält genom att utforska mönster av tvärspråkligt inflytande i flerspråkiga elever.

Medan transfer kan förekomma på olika språkliga nivåer (t ex syntax och fonologi), är det särskilt intressant när det gäller ordförrådet, som är den viktigaste bäraren av betydelse och centrat för språkinlärning. Lexikal transfer är
ett lämpligt fenomen att studera för att undersöka det flerspråkiga mentala lexikonets organization. Avhandlingen antar därför ett psykolingvistiskt perspektiv på transfer.

Den mest centrala skillnaden mellan transfer i SLA och transfer i TLA är att eleverna i det senare fallet kan falla tillbaka på flera bakgrundsspråk när de stöter på en lucka i målspråket. Denna avhandling adresserar därför vad De Angelis (2007a) kallar den mest utmanande frågan av alla, dvs hur man kan förutsäga flerspråkiga individers språkliga beteende (s. 28). Tredjespråksinlärning är ett mycket kompletta fenomen på grund av det omfattande antalet variabler och deras potentiella interaktion (Sanz, 2000). Även om det är svårt att helt förutsäga beteenden och mönster kring valet av källspråk (source language, SL) när det gäller transfer, har tidigare forskning etablerat ett antal faktorer som verkar bidra till att avgöra vilket SL som aktiveras. De fyra mest framträdande faktorerna är färdighetsnivå i bakgrundsspråket, aktualitet (hur pass nyligen bakgrundsspråket använts), s k psykotypologi (uppfattning om språks likhet) och L2-status (t ex Bohnacker 2006; Cenoz, 2003a; De Angelis & Selinker, 2001; Williams & Hammarberg, 1998). Dessa faktorer har främst blivit kända tack vare kvalitativa studier och fallstudier. En annan viktig faktor som har föreslagits leda till transfer är ordspecifik överförbarhet (Jarvis & Pavlenko, 2008; Kellerman, 1977, 1986). Denna faktor har främst undersöks i samband med andra språksinlärning (t ex Bouvy, 2000), men det har ännu inte utforskats empiriskt om den kan predicera källspråket för transfer i tredjespråksinlärning. Denna avhandling syftar därför till att undersöka vilken prognosförmåga följande fem faktorer har i TLA:

- färdighetsnivå i bakgrundsspråket
- aktualitet
- psykotypologi
- L2-status
- ordspecifik överförbarhet

Eftersom de fyra första faktorerna huvudsakligen har undersöks med kvalitativ metod, undersöker den här studien huruvida en trendanalys (multinomial logistisk regression i detta fall) kan utgöra en användbar strategi för att utforska fenomenet. Ordspecifik överförbarhet ingår dock inte i den statistiska modellen. Med tanke på svårigheten att kvantifiera ordspecifik överförbarhet och den allmänna bristen på tidigare studier som direkt undersöker dess effekter på källspråket för transfer, antas här i stället en kvalitativ metod för att undersöka dess relevans i tredjespråksinlärning. Ett tillvägagångssätt
baserat på olika metoder (mixed-methods) används sålunda för att anpassa studien till särdragen i var och en av de fem faktorerna som undersöks i denna avhandling.

Traditionellt anses transfer vara en omedveten och automatisk process och fenomenet har främst undersömts i samband med muntlig produktion. På senare tid har dock synen på intentionalitet i transfer förändrats och det är nu allmänt accepterat att transfer kan ske både spontant och strategiskt. Denna utveckling väcker intressanta frågor om betydelsen av transfer i skriftlig produktion. När eleven skriver har han eller hon mer tid att processa uppgiften. Då kan de faktorer som visat sig påverka vilket källspråk som transfereras i muntlig produktion ha en annan effekt. Medan ett antal studier har undersökt källspråket i skriftlig produktion enbart, finns det ingen tidigare studie som har granskat jämförbarheten av transfermönster i muntlig kontra skriftlig produktion. I denna avhandling görs en jämförelse av de två texttyperna och skillnaderna i den förutsägbarheten hos de fem faktorer som anges ovan diskuteras.


Dessutom har ordspecifik överförbarhet visat sig vara en viktig faktor. För närvarande studier fokuserar på språkallmänna faktorer, det vill säga faktorer som påverkar aktiveringena av ett bakgrundsspråk som helhet. Analysen av ordspecifik överförbarhet i denna studie tillför en ny dimension till frågan om förutsägbarheten hos ett visst källspråk, vad gäller dess aktivering i TLA. Avgörande för ordspecifik överförbarhet tycks vara hur pass markerat ett ord ur ett bakgrundsspråk uppfattas av eleverna i förhållande till målspråkets normer.

Vad gäller jämförelsen mellan transfer i muntlig och skriftlig produktion, har studien lett till nya insikter. De fyra första faktorerna kunde bättre förutsäga
källspråket i muntlig produktion än i skriftlig produktion. Dessa skillnader är ett tecken på skillnader i kognitiva processer. Att tala är en mer automatiskt process medan att skriva utgör en mer medveten uppgift som är mindre begränsat av de automatiska effekterna av psykolingvistiska faktorer. Dessa specifika resultat bidrar till utvecklingen av psykolingvistiska modeller av språklig organization, tillgång och aktivering hos flerspråkiga elever.


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