DIMENSIONS OF CONVERGENCE IN BILINGUAL SPEECH AND GESTURE

Dimensions of convergence in bilingual speech and gesture

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CHAPTER I
INTRODUCTION

Introduction

Languages do not exist in isolation. They come into contact with each other both in society at large and in the individual speaker, inevitably leaving traces of contact in the process. Improving our understanding of these traces or, "the influence of a person's knowledge of one language on that person's knowledge or use of another language" (Jarvis & Pavlenko, 2008, p. 1), is central to the study of bilingualism and second language acquisition.

One of the effects suggested to play a role in bilingual production patterns is convergence, broadly defined as a change in one or both of the languages of a bilingual to the effect that the resulting bilingual varieties resemble each other more than the respective monolingual varieties (Ameel, Malt, Storms, & Van Assche, 2009). For instance, French-Dutch bilinguals and monolingual speakers of those languages differ in their naming patterns of household bottles and containers (Ameel et al., 2005). For example, the objects in the monolingual Dutch category *fles* "bottle" are divided across two categories in monolingual French, namely *bouteille* "bottle" and *flacon* "bottle." French-Dutch bilinguals maintain the two categories in French. However, they move some of the objects from the *flacon* category to the *bouteille* category, thus increasing the similarity between *bouteille* in French and *fles* in Dutch.

Whereas there seems to be a consensus about the existence of a process like convergence, there is much less agreement about the exact nature of the phenomenon. Opinions differ on what convergence entails exactly, what drives it, and where we find it (e.g., Ameel et al., 2009; Ameel et al., 2005; Brown & Gullberg, 2008, 2013; papers in Bullock & Toribio, 2004; Clyne, 2003; Müller & Hulk, 2001; Muysken 2000, 2013; Pavlenko 2011; Treffers-Daller & Tidball, 2012).

This thesis aims to further our understanding of convergence in bilingual language production. We examine patterns of convergence for a range of features in the language production of a functional bilingual population within the same broad semantic domain, namely that of (voluntary and caused) motion encoding. We take both fine-grained (e.g., lexical semantics) and coarse-grained (e.g., overall semantic density in an utterance) approaches and include multimodal analyses.

Before going into more detail about the individual studies in thesis we will discuss some of the more contentious issues around convergence, specifically, the directionality of convergence, the different types of convergence, and the relationship between convergence and other effects of crosslinguistic influence.

Directionality of convergence

A point of discussion is whether convergence is a bidirectional process or not. In other words, for a shifting pattern to be considered convergence proper do both languages need to adapt or does shift of only one of the languages suffice providing the resulting patterns shows heightened similarity. Some definitions stipulate a bidirectional shift. For example, Pavlenko (2011) insists that for convergence to take place a change needs to occur whereby both languages of a bilingual diverge from the respective monolingual patterns (see also Czechowska & Ewert, 2011). Other definitions, however, specifically state that convergence can entail shifts away from both languages, but it is not a prerequisite for convergent patterns (e.g., Bullock & Gerfen, 2004). Treffers-Daller and Tidball (2012) provide yet another criterion for convergence, namely a pattern that is not (statistically) different from either monolingual variety, a specific type of in-between pattern, thereby limiting the possible scenarios that allow convergence to occur.

One might argue that external reasons for uni-directional shifts exist, such as language dominance (see also Thomason & Kaufman, 1988), whereby the non-dominant language would shift more towards the dominant language than vice versa. However, even on those occasions it would seem unlikely for convergence to consist of an entirely uni-directional shift, considering bidirectional crosslinguistic influence is found even in

intermediate learners (see, for example, papers in Cook 2003). For example, Ameel et al. (2005) find convergence in the naming patterns of household objects by French-Dutch bilinguals. Even though the effects they find are stronger in Dutch, argued to be the dominant language in that case, some effects are also found in French.

Types of convergence

The definition of convergence stipulates a specific outcome, namely that an increase in mutual resemblance between two languages occurs. This is, however, a highly abstract notion and might be achieved in a variety of ways in different cognitive and linguistic domains.

Converging patterns originate from an initial similarity or equivalence, a point where both languages map onto each other to a certain extent, which in different domains is expressed as, for example, "congruent lexicalization" (Muysken, 2000, 2013), "a property that is initially merely similar" (Bullock & Toribio, 2004), "close in conceptual space" (Gathercole & Moawad, 2010), "highly similar elements in the L1 and L2" (Wolff & Ventura, 2009), "conceptually equivalent" (Berthele 2012), and "rough translation equivalents" (Ameel et al., 2009). Crucial to understanding convergence, then, is both what it means for two patterns to be similar enough to converge and exactly what it means for two patterns to show increased similarity.

On the first issue, Bullock and Gerfen (2004) explicitly declare that "[t]he shared structural properties across French-English that are at the locus of this change are similarities in vowel height, roundness, and position along the front-back articulatory dimension. The two languages' vocalic categories for phonetically non-back, mid, round vowels were thus congruent before the change occurred" (2004, pp. 102-103) (see Muysken 2000, pp. 56-59 for a discussion on the notion of equivalence in code-mixing and Ringbom 2007 for the role of similarity and contrast in second language acquisition). Most studies, however, assume initial similarity, but do not make the nature and degree of similarity explicit. And maybe it is not always necessary. For example, studies of colour and object naming are typically interested in how speakers carve up a particular semantic space. These studies use descriptions of a single set of colours, objects, or scenes. As the source materials are identical in both languages linguistic equivalence is inferred.

A special role in determining equivalence is set aside for translation equivalents. For example, Treffers-Daller and Tidball (2012) suggest that cognates, i.e., translation equivalents with a high degree of form and meaning overlap between the languages, play a crucial role in convergence in lexical terms, as do (perceived) structural similarities. Similarly, Athanasopoulos (2009) makes the case for translation equivalents as a

possible opening for a convergence mechanism suggesting that one of the reasons why in Greek colour naming and categorization patterns *ble* "dark blue" converges on *blue*, but not *ghalazio* "light blue," is that *ble* is the more obvious translation equivalent for the English blue and has more form overlap. Findings by Van Hell and De Groot (1998b) support the importance of translation equivalents. They find that the words associated with two translation equivalents overlapped more for bilinguals as compared to monolinguals. Moreover, this effect was even more pronounced for cognates than non-cognates. In other words, more form overlap leads to increased similarity.

On the second notion, i.e., what does it mean for two things to become more similar, there are multiple answers. Surveying the literature patterns of convergence can be roughly categorized as reduction, accumulation, or redistribution/shift. We will discuss these possibilities and illustrate them with examples from various (linguistic) domains.

Reduction

A first and perhaps the intuitively most obvious instantiation of convergence is as a reduced system, that is, a system in which the bilingual variety shows in some way less specificity in at least one of the monolingual varieties. In fact, simplification is frequently suggested as a driving force behind modified bilingual patterns (e.g., Flecken, 2011; Toribio, 2004; but see below). There are various ways in which a bilingual system can be less complex than its monolingual counterpart.

One of the possibilities is a complete drop of specificity, that is, convergence on the shared part of the meaning with one or both languages dropping any specificity beyond the shared core. For example, Bullock and Gerfen (2004) find that French-English bilinguals of Frenchville French collapse two allophones into one single version (see also Flege & MacKay, 2004). Another example would be the use of semantically light verbs in descriptions of motion events (e.g., Iakovleva, 2012).

Alternatively, reduction can be instantiated as a less diverse or complex category structure. For example, in the case of MANNER verbs in Russian the overall rate of MANNER verbs used by bilingual speakers does not differ from monolingual speakers but the type token ratio does; bilingual speakers use fewer different types of MANNER verbs (Pavlenko, 2009c; see also Berthele, 2004). Another example is the composition of categories for naming patterns of household objects by French-Dutch bilinguals, which have been found to be less complex than their monolingual counterparts. Bilinguals adopt fewer of the language-specific objects in their categories. Instead they rely more on general object similarity, as determined by (non-linguistic) grouping patterns (Ameel et al., 2009).

A third possibility for reduction is the overextension of features to include options excluded in the monolingual variety. An example of this would be extension of the progressive tense by Dutch-German bilinguals to include bounded motion events, which are not typically included by monolingual speakers of Dutch (Flecken, 2011).

Redistribution and shift

A second broad possibility for how convergence might be instantiated is redistribution or shift. Generally this means a preference for one encoding option over another equally plausible encoding option when the preferred option is also possible in the other language. These cases represent redistribution; all options are present in the monolingual varieties but are used with different frequency to the bilingual varieties. Redistribution is typically discussed as a choice between various structural options and the interface between structure and pragmatics (e.g., Clyne, 2003; Müller & Hulk, 2001; Montrul, 2004). For example, Torobio (2004) examines the use of null subjects and overt pronouns in a Spanish-English code-switched variety. The surface level options in both languages are similar even though the pragmatic implications differ. Results show that bilingual speakers use more overt Spanish pronouns in a code-switched mode than in a monolingual mode. As overt pronouns are an option in Spanish, this could be seen as a distributional shift. However, it could also be seen as a simplification, as some of the pragmatic specifics are lost. Even though the bulk of studies on redistribution are concerned with structural properties, redistribution can equally be applied to lexical choices.

Another option in this category is shift. This possibility has mostly been applied to linguistic category structure, for example for naming patterns for household items (Ameel et al., 2009; Ameel et al., 2005; Pavlenko & Malt, 2011) and colour terms (Athanasopoulos, 2009; Athanasopoulos, Damjanovic, Krajciova, & Sasaki, 2011; Ervin, 1961). For instance, Athanasopoulos (2009) describes a case of colour terms in Greek and English in which the category structure is left intact, but where convergence can be found in the category centre. Greek has two basic colour terms for blue, *ble* and *ghalazio* (comparable to dark and light blue), whereas English has only one basic term. When asked to pick out a best example for each category in Greek, advanced speakers shift their best examplar for *ble* towards the English blue examplar. However, in addition, they move their focal point for *ghalazio* in the opposite direction thus maintaining the same (perceptual) distance between *ble* and *ghalazio*.

Accumulation

A third theoretical possibility is accumulation. Instead of stripping away specificity and gravitating towards a common core, increased similarity can

also be achieved by doing the opposite, that is by adding the specificity of one language to the other in some way, resulting in a cumulative bilingual system.

An example of this can be found in the Turkish of Turkish-German bilinguals who frequently use PATH-verbs in combination with PATH-particles (Daller, Treffers-Daller, & Furman, 2011).

(17)
adam   aşağı-ya   iniyor
Man   downwards-Dat   descend-Prog
"The man descends downwards"
(speaker 1, B return, age 20)
Daller et al. (2011, p. 109)

Similar PATH-verb + PATH -particle combinations have been observed in Brussels French as a result of its contact with Dutch (Treffers-Daller, 2012). In both these cases the bilinguals use lexicalization patterns typical of verb-framed languages (PATH in the verb) and satellite-framed languages (PATH in a satellite) simultaneously (Talmy, 1991, 2000). These combinations do not necessarily add specificity, i.e., PATH of motion is already encoded in a PATH-verb, so to also encode it in a particle is redundant from the point of meaning encoding, but not from the point of typological typicality (see also Berthele, 2004; Cadierno & Ruiz, 2006; Jessen, 2013).

Clearly, examples of cumulative converged systems do occur, but they are considerably less frequent than the reduced and redistributive options.

Alternatives

Limiting patterns of convergence to three options is of course a simplification. And indeed many patterns do not easily fall into any of them. For example, Brown and Gullberg (2013) examine the occurrence of single-clause and multi-clause descriptions in the expression of motion events in English and Japanese by monolingual speakers of each language as well as L1 Japanese learners of L2 English. This study is unusual in its focus on an aspect of motion event encoding that is found not to differ between the two source languages; one might not expect any convergence to occur in this case. However, results show that in both their languages bilinguals produce fewer single-clause constructions than monolinguals. The bilinguals look more like themselves in the other language than like monolingual speakers of each of the languages. While this falls firmly within our definition of convergence, it does not fit neatly in any of these categories.

Multiple patterns can also combine to create a hybrid converged structure, or alternatively, multiple convergence types existing in parallel. For example, in the household object study mentioned above, some category

centres shift independently of the category boundaries, while simultaneously the category structure is simplified whereby bilinguals rely more on similarity than language-specific idiosyncrasies. A further example can be found in the pronoun example (Toribio, 2004), where convergence can be characterised as a shift in the distributional frequency of the available (surface) options, but as a simplification in terms of pragmatic nuances those entail.

A further example illustrates a number of competing forces at play, namely contrast maintenance (language integrity), simplification, and a change of quality. Bullock and Gerfen (2004) found that French-English bilingual speakers of Frenchville French maintain the same phonemic contrasts as monolingual speakers. However, they way they fill in the category differs. In one way they simplify, that is they merge two allophones into one single option. However, they also change the quality of the vowel, which is difficult to call a simplification (but more English-like).

Distinguishing types of crosslinguistic influence

A complex issue in the study of convergence is the relationship between convergence and other processes that lead to bilingual patterns deviating from the monolingual varieties, such as attrition, incomplete acquisition, and transfer (cf. Pavlenko, 2011). Despite the unclear relationship, studies take great pains in explicitly differentiating convergence from other types of crosslinguistic influence. Attrition and transfer, for example, have been argued to differ from convergence on grounds of language use (e.g., Brown & Gullberg, 2013), functional competence (e.g., Ameel et al., 2009), whether they are internally or externally induced (e.g., Bullock & Toribio, 2004), and outcome (e.g., Treffers-Daller & Tidball, 2012).

Convergence and attrition

Pavlenko (2011) suggests that one of the major complications in convergence research is the impossibility of differentiating between effects of convergence and effects of attrition. Yet some studies tries to do exactly that. Language attrition is typically defined as, "the non-pathological decrease in proficiency in a language that had previously been acquired by an individual, i.e., intragenerational loss" (Köpke & Schmid, 2004, p. 5). Brown and Gullberg (2013) specifically distinguish convergence from attrition focusing on the *loss*-aspect of attrition. The patterns observed in their study are not characterised by loss of an L1 feature in comparison to monolingual controls, but by a pattern that is altogether different in both the L1 and the L2.

Ameel et al. (2009) on the other hand focus on the *decrease in proficiency* in attrition specifically distinguishing convergence from attrition on a functionality principle stating that whereas attrition implies loss

"[convergence] leaves the bilingual no less expressive or proficient a language user" (pp. 271). However, as we have seen, convergence can be (though does not need to be) instantiated as a less complex system. It is unclear how that relates to the notion of loss as implied in attrition.

A further separation of attrition and convergence is attested by Bylund (2009), who sees convergence as a specific type of attrition. Note, however, that he includes any differences between monolingual speakers and bilingual speakers that cannot directly be attributed to incomplete acquisition (see below) in his definition of attrition (see also Bullock & Gerfen, 2004). Such a broad definition necessarily requires further specification and sub-division, but it is not clear whether convergence should be considered a sub-process of attrition.

Convergence and incomplete acquisition

Incomplete acquisition is a case in which bilingual speakers have not completely acquired the L1 system due to various reasons, for example speakers moving from their L1 environment not having fully acquired their L1 (e.g., Montrul, 2002; Silva-Corvalán, 1994). In other studies language use patterns might shift dramatically once children start attending school (e.g., Montrul, 2004; De Houwer, 1990). Similar to attrition the effects of incomplete acquisition can be reminiscent of convergence. Distinguishing incomplete acquisition and convergence on linguistic outcome terms is thus particularly challenging and often impossible. In fact, Montrul (2004) suggests that incomplete acquisition leads to convergence positing incomplete acquisition as a driving force in convergence.

Distinguishing attrition and incomplete acquisition from convergence

Theoretically we can distinguish attrition and incomplete acquisition from convergence. Attrition as a process can be centred on loss (Köpke & Schmid, 2004), whereas incomplete acquisition can be centred on not having fully acquired an L1 its entirety in the first place. Even though it is not always possible to distinguish between these effects on linguistic outcome, we can sometimes rule them out on circumstantial evidence, i.e., language use patterns (see also Schmid, 2013). For example, Brown and Gullberg (2013) argue that as their participants are residing in country where their L1 is the dominant and ambient language, attrition is not applicable. Similarly, Bylund (2009) discounts incomplete acquisition as an explanation for deviations from monolingual speakers for some of his participants on the grounds that they moved away from their L1 environment *after* the typical age the features investigated would have been acquired.

Convergence and transfer

In addition to distinguishing convergence from attrition and incomplete acquisition, convergence is often also overtly contrasted with transfer, also called crosslinguistic influence (CLI; Kellerman & Sharwood Smith, 1986; Odlin, 2005). Transfer can be characterized as, "the influence of a person's knowledge of one language on that person's knowledge or use of another language" (Jarvis & Pavlenko, 2008, p. 1). Whereas it is occasionally possible to distinguish attrition and incomplete acquisition from convergence, the relationship between transfer and convergence is more ambiguous. Similar issues arise in both attrition and incomplete acquisition as they necessarily coincide with the acquisition and use of an L2 and hence need to consider any transfer effects (cf. Köpke & Schmid, 2004).

In the introduction to their special issue on convergence in bilinguals, Bullock and Toribio (2004) state that convergence is, "necessarily distinguished from transfer and interference" (pp.91), the distinction being that in their framework convergence is not necessarily externally induced, whereas transfer is. They see transfer as externally induced, because it implies, "the imposition of a structural property from a foreign source language" (pp.91; see also Köpke & Schmid, 2004 for a similar argument with respect to the distinction between transfer and attrition). However, convergence does not happen in a vacuum; encompassed in any definition of convergence is a relationship between two languages. Patterns of convergence likely depend on properties of both languages involved in combination with general bilingual effects. The exact workings of this, however, remain unclear.

Ameel et al. (2009) specifically distinguish convergence from transfer on the basis of the source and outcome of the observed patterns. They argue that in convergence both languages are different from the monolingual source languages, whereas in transfer the pattern of both languages is based on one language, namely the L1. This seems odd, considering that most, though not all, of the converged patterns in Ameel et al.'s study seem to exhibit Dutch influence, but not French, and are labeled convergence. In distinguishing between transfer and convergence the literature on reverse transfer, that is, the influence of the L2 on the L1 is ignored. Bidirectional transfer and convergence seem to be the same thing.

Treffers-Daller and Tidball (2012) distinguish a convergence scenario not only from a transfer scenario, but also from restructuring and hybrid scenarios, purely on outcome. As they focus on second language learning, attrition is not included in their possibilities. Convergence in this study is a case where the learner variety is not different from monolingual versions of either language, whereas transfer is a case in which the learner variety is more similar to the L1 than the L2 target.

In sum, it is not at all clear what the exact relationship between transfer and convergence is. They have been characterized as processes that occur in parallel, but also as processes where one is in a subordinate relation to the other, or as different terms for the same occurrence.

Other effects
A last complicating factor is the occurrence of other general bilingual effects regardless of the languages involved. For example, Flecken (2011) finds patterns of overextension in the Dutch of German-Dutch bilinguals that cannot be attributed to the other language. Similarly, a certain hypersensitivity to strong target patterns has been attested (e.g., Hendriks & Hickmann, 2011). In addition, a study of French-Dutch bilingual naming patterns shows that bilinguals base their naming patterns more on object similarity (as indicated by grouping patterns) than language specific idiosyncrasies (Ameel et al., 2009). These are factors that might also influence patterns of convergence and the mechanisms driving them.

Implications for current study
Convergence between the two languages of a bilingual is an intuitive notion, but despite its intuitive appeal the exact nature of converged patterns is not straightforward. Various patterns and types of convergence have been observed, raising questions about the relation between convergence and the specific properties of the languages in question and the interaction between those properties and any general bilingual effects and/ or other effects of CLI that may play a role. This thesis seeks to further our understanding of convergence asking the overarching questions i) where do we observe convergence and where we do not and ii) how does convergence manifest itself.

These questions are approached from various angles. Firstly, we explore a case where the possibilities for shift and / or redistribution are limited due to an obligatory binary distinction in one of the languages that does not occur in the other. Secondly, we examine multimodal data exploring the question whether cumulative converged patterns are more widespread than it appears if information from multiple expressive channels is taken into account. Lastly, we investigate different patterns of convergence within one semantic / typological domain, specifically exploring the specific properties of the individual languages.

Study I French–Dutch bilinguals do not maintain obligatory semantic distinctions: Evidence from placement verbs
Studies of convergence at the lexical level have typically investigated category structure and composition with a specific focus on category centres

and category boundaries (e.g., Ameel et al., 2009; Ameel et al., 2005; Athanasopoulos, 2009; Athanasopoulos et al., 2011; Ervin, 1961). The categories in question are typically gradient and the observed convergence patterns can be described in terms of subtle shifts. For example, in the domain of colour naming it has been shown that English-Japanese bilinguals in Japanese maintain the two colour categories for blue typical of Japanese, but shift them in such a way that the category centre for one of these terms moves closer to the category centre for the single colour term for blue in English. In other words, they maintain the category structure, that is two colour categories for blue in Japanese, but change the quality of the respective categories, that is shift one category centre in order for it to resemble its English equivalent (for similar findings in bilingual phonological patterns see Bullock & Gerfen, 2004).

In study I we move away from gradient categories to a case where one language makes an obligatory distinction that the other one does not, such as in the case of placement verbs in French and Dutch. French, much like English, has a general placement verb, namely *mettre* "put," which denotes the concepts to put something somewhere and can be used in a variety of situations. In Dutch, on the other hand, speakers have to make a semi-obligatory choice between two more specific placement verbs, namely *leggen* "lay (horizontally)" and *zetten* "set (vertically)," which denote put something somewhere and end up in a specific configuration. We ask whether there is evidence of a merged system, when one language makes an obligatory distinction that the other one does not, and whether such a merged system is realised as a more general or a more specific system.

Study II Speech and gesture show similar patterns of convergence in functional bilinguals

In a linguistic context convergence can be equated with MAKE MORE SIMILAR. There are, however, often a number of different ways in which two utterances, sounds, or categories, can be made to resemble each other more. The nature of convergence is thus not uniform, but variable. Previous findings of convergence include simplified, redistributed, as well as occasionally additive bilingual patterns (see above).

Studies, however, typically focus on uni-modal, that is speech-only, language production, omitting information from other modalities, such as speech-associated gesture, i.e., the spontaneous movements we make when speaker and that can be associated with the verbal message (Kendon, 2004; McNeill, 1992). Studies in gesture have demonstrated strong links between speech and co-speech gesture and as such they are worth studying in parallel. Whereas findings typically show that speech and gesture are

semantically co-expressive, i.e., expressing aspects that are compatible with each other and one underlying idea, the two channels do not always express identical aspects (McNeill, 1992). Furthermore, in the domain of second language acquisition, gestures have been shown to suggest richer underlying representations than could be observed from speech only (e.g., Gullberg, 2009b; Stam, 2006), suggesting multi-modal analyses can provide a different perspective on convergence.

The present study examines speech and gesture jointly in order to arrive at a more complete understanding of bilingual patterns of convergence and consequently the underlying bilingual system. We ask if multimodal bilingual patterns show convergence also, and whether these patterns cause us to re-evaluate the typical redistributive or reductive nature of convergence as a more cumulative system.

Study III Patterns of convergence differ within a semantic domain: The role of within-language variation

Patterns of convergence can vary considerably between, but also within, linguistic domains. Study III focuses on where convergence does and does not manifest itself within a specific semantic domain, exploring what drives the various patterns.

In this study we consider multiple semantic elements distributed across the clause in the domain of voluntary motion events (e.g., a cyclist crossing a level crossing). Languages can be grouped based on where in an utterance the PATH of motion (i.e., the trajectory of a moving agent) is encoded (Talmy, 1991, 2000). Verb-framed languages (v-languages) typically encode PATH in the verb, whereas satellite-framed languages (s-languages) typically encode PATH outside the verb in a satellite leaving the main verb to encode other information such as MANNER of motion (i.e., how an agent moves) (Slobin, 1996b). Of the semantic elements PATH and manner of motion, which this study focuses on, v-languages typically encode only one element (typically PATH), whereas s-languages typically encode two elements (PATH + MANNER). In other words speakers of s-languages habitually produce semantically denser motion descriptions (Hickmann, 2006).

The typological distinctions, however, are based on the typical or default patterns. In reality a wider variety of contextually appropriate patterns is available (Hickmann, 2007). For example, in French, utterances describing upward voluntary motion (e.g., A bear climbing up a tree) often encode both MANNER and PATH of motion due to the existence of MANNER and PATH conflating verb grimper "climb up." The typical pattern for upward motion in French is, thus, not uniform, but consists of two frequently occurring patterns, namely one where only PATH is encoded (e.g., *L'ours*

monte dans l'arbre "the bear ascends the tree"), and one where both PATH and MANNER are encoded (e.g., *L'ours grimpe dans l'arbre* "the bear climbs up the tree").

This study considers convergence effects in terms of overall semantic density and in terms of specific expressive choices (e.g., main verb choice) to examine the effect of granularity. In addition, we break down the results by event type (UP, DOWN, AND ACROSS) to explore the possibility that existing fine-grained variability in the monolingual varieties can drive bilingual patterns of convergence.

CHAPTER II
FRENCH–DUTCH BILINGUALS DO NOT MAINTAIN OBLIGATORY SEMANTIC DISTINCTIONS: EVIDENCE FROM PLACEMENT VERBS

Abstract

It is often said that bilinguals are not the sum of two monolinguals but that bilingual systems represent a third pattern. This study explores the exact nature of this pattern. We ask whether there is evidence of a merged system when one language makes an obligatory distinction that the other one does not, namely in the case of placement verbs in French and Dutch, and whether such a merged system is realised as a more general or a more specific system. The results show that in elicited descriptions Belgian French-Dutch bilinguals drop one of the categories in one of the languages, resulting in a more general semantic system in comparison with the non-contact variety. They do not uphold the obligatory distinction in the verb nor elsewhere despite its communicative relevance. This raises important questions regarding how widespread these differences are and what drives these patterns.

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Introduction[1]

Grosjean (1989, p. 6) states that "the bilingual is […] an integrated whole, a unique and specific speaker-hearer, and not the sum of two monolinguals." Research has long sought to elucidate the nature of the bilingual system, often focusing on semantic representations and (mutual) crosslinguistic influence between two co-existing languages. For example, many studies have found shifts of semantic category boundaries (e.g., Ameel et al., 2005; Athanasopoulos, 2009; Athanasopoulos et al., 2011; Ervin, 1961; Pavlenko & Malt, 2011). One of the proposed principles behind these patterns is convergence (Ameel et al., 2009; Bullock & Gerfen, 2004; Bullock & Toribio, 2004; Clyne, 1987; Gathercole & Moawad, 2010; Muysken, 2000; Thomason & Kaufman, 1988; Wolff & Ventura, 2009), a process of increasing similarity supposedly driven by the existing overlap between two languages. These studies are often focused on gradient categories, such as colour categories, in naming tasks. It is much less clear what would happen in a case where there is a semi-obligatory distinction in one language that is not present in the other, in a situation where the distinction is relevant to the communicative task. This study examines such a situation in the domain of placement verbs in French and Dutch in functional Belgian French-Dutch bilinguals.

Background

Multiple languages in one mind do not exist independently of each other. A core issue in acquisition and bilingualism studies is to improve our understanding of "the influence of a person's knowledge of one language on that person's knowledge or use of another language" (Jarvis & Pavlenko, 2008, p. 1), often labelled as transfer or crosslinguistic influence (CLI; Kellerman & Sharwood Smith, 1986; Odlin, 2005). Interactions between

established and emerging languages or between multiple established languages have been examined in a range of linguistic domains such as phonology (e.g., Flege & MacKay, 2004; McAllister et al., 2002), syntax (Yip & Matthews, 2000), and the lexicon (e.g., Ringbom, 2007), looking at effects both offline and online, in production and perception, behaviourally as well as in neurocognition, (e.g., Costa, 2004; Dussias, 2001; FitzPatrick & Indefrey, 2010; Gollan & Kroll, 2001; Marian & Spivey, 2003; Roberts et al., 2008; Weber & Cutler, 2004). The directionality of the influence has also been examined. Studies have traditionally examined the effect of an established first language (L1) on a developing second language (L2), so-called forward transfer. More recently the influence from the L2 on the L1 has also been explored, so-called reverse transfer (Cook, 2003) both for highly proficient L2 users (e.g., Balcom, 2003; Dussias, 2003; Jarvis 2003; Pavlenko & Malt, 2011), and in cases where the L2 knowledge, use, and exposure has been minimal (Brown & Gullberg, 2008, 2010, 2011; Jarvis, 2003; Van Hell & Dijkstra, 2002).

Much of the work cited has focused on the potential independence of the separate languages. However, in a parallel tradition, studies have observed properties of non-separability in the bilingual system, such as co-activation (e.g., Costa, 2004; De Bot, 2004; Kroll & Sunderman, 2003; Kroll & Stewart, 1994; Marian et al., 2003; Weinreich, 1953), and degrees of overlap in representations between the language systems such that bilinguals' languages shift towards each other while at the same time maintaining some degree of language-specificity.

In an early study Ervin (1961) found that bilinguals name colours differently from their monolingual counterparts in ways that suggest an influence of the semantic categories in one language on the category boundaries in the other. This finding has been replicated in more recent studies investigating how Greek-English and Japanese-English bilinguals label colours (Athanasopoulos, 2009; Athanasopoulos et al., 2011). Intermediate and advanced Greek and Japanese L2 learners of English, who have two basic colour terms for blue in their L1 and one basic colour term for blue in their L2 English, can be observed to shift their naming patterns for focal colours in their L1s. In Greek, one of the terms for focal colours moves closer to the focal colour for the English blue. However, the focal colour for the other Greek term also shifts in order for the two distinct categories in Greek to remain separate (Athanasopoulos, 2009).

Similar results have been found in studies investigating bilingual naming and categorization of artefacts (Ameel et al., 2005; Pavlenko & Malt, 2011), emotion words (Pavlenko, 2002; Pavlenko, 2009b), lexicalisation patterns of motion (Brown & Gullberg, 2008, 2011; Filipovic, 2011), semantic categorization of nouns and verbs (Gathercole & Moawad,

2010) and aspectual encoding of events (Bylund, 2009; Bylund & Jarvis, 2010; Flecken, 2011).

In a study of artefact naming (Ameel et al., 2005) functional French-Dutch bilinguals in a Dutch-dominant environment were asked to name pictures of a set of dishes and a set of bottles/containers. The results showed that the bilinguals maintained the language-specific categories that had been found in monolingual groups. For example, two categories, *bouteille* "bottle" and *flacon* "bottle," in French were described by one category, *fles* "bottle," in Dutch. However, the bilinguals differed from the monolinguals in terms of the items that the categories consisted of. The term *bouteille* "bottle" was overextended to encompass more objects, for instance. Based on these findings the authors reject both a claim for two entirely separate systems (two-pattern hypothesis) and a claim for a completely merged system (the one-pattern hypothesis). Instead they propose a system where there is partial, but not complete, overlap between the bilingual's systems which allows the shared part to be more similar for bilinguals than the two monolingual groups, while at the same time leaving room for language-specific features (see also Hulk & Müller, 2000). The transitions appear to be affected by proficiency levels (e.g., Pavlenko & Malt, 2011), but also by the relationships between semantic categories.

In a semantic categorization study Gathercole and Moawad (2010) investigated interaction in L1 (Arabic) and L2 (English) for both early and late L2 learners. They focused on nouns and verbs that overlapped in the two languages but were not perfect translation equivalents. In half of the cases the English category had a wider application and in the other half the Arabic category did. For example, the English word *fold* has a wider application than the Arabic equivalents *yitwi* "fold [for clothes]" and *yirabie* "fold [for arms]." They found that both early and late L2 learners did not use the English categories in a native-like way when they were wider than the Arabic ones, but provided more correct answers when the English categories were narrower than the Arabic ones.

Importantly, the categories examined in the naming studies reviewed above are mostly gradient. In the case of colour terms it is the focal colour that shifts, yet the semantic category structure is maintained in a modified fashion. Similarly for artefact naming, the monolingual and bilingual patterns are established by looking at the label used most frequently for a particular object. It is not the case that no other label is ever used for that object. Rather, speakers have a collective preference for one of the labels. The category boundaries are thus somewhat fuzzy. It remains unclear, however, what happens to the functional bilingual system in cases where one language makes a semi-obligatory distinction where the other language does not, that is, when there is no category boundary to shift, but instead semi-

obligatory distinctions must be made. This is the case for placement verbs describing horizontal and vertical scenes in Dutch, where Narasimhan & Gullberg (2011) found that Dutch-speaking adults use *leggen* "lay" in over 95% of cases for horizontally placed items and *zetten* "set/stand" in 99% of cases for vertically placed items. Similarly, Malt, Gennari, Imai, Ameel, Tsuda, and Majid (2008) found that naming patterns for verbs of locomotion were based on a strict physiological distinction between walking and running gaits. Semi-obligatory contrasts have previously been examined as a learning challenge in L2 acquisition (e.g., Geeslin, 2003; Gullberg, 2009b; Viberg, 1998), but much less is known about the effect of prolonged contact of two languages with different degrees of semantic specificity on the functional bilingual system.

The current study investigates the nature of the bilingual system in the domain of placement events, a domain which is a basic part of the human experience while at the same time exhibiting great crosslinguistic variation (see, e.g., papers in Kopecka & Narasimhan, 2012). This is an excellent test bed for examining the bilingual system, because, although there is great variation in how languages carve up the semantic space of placement events, there is also basic similarity in that all events involve an agent causing an object to move to a goal.

Placement events

Placement events are acts of causative translocation, that is events where an agent causes something to move somewhere, for example, putting a cup on a table. Despite the simplicity of these concrete events they are not solely described by semantically light verbs as in English. In fact, there are semantic typological differences in how languages express these events, and semantically light verbs like the English *put* may be the exception rather than the rule in the domain (Narasimhan, Kopecka, Bowerman, Gullberg, & Majid, 2012). The languages in the present study, French and Dutch, also differ in the way they convey placement information. Note that we are considering situations in which there is simple support from below on a flat surface. Situations where the end-state is a containment-relation (e.g., putting something in drawer) are not taken into consideration, since those are very likely to elicit different verbs (e.g., *stoppen* "stuff," *steken* "stick into"). For similar reasons, situations with support from above (e.g., hanging a jacket over a chair) or point attachment (e.g., hanging a coat on a hook) are also not included (Bowerman, 1996). The domain under investigation, then, is limited to caused motion with the additional stipulation that the final resulting state of the objects being placed is with support from below.

Germanic languages, with the exception of English, have a set of caused posture verbs. These are verbs that are related to a set of intransitive locative posture verbs (e.g., *liggen* "lie"/ *leggen* "lay" and *staan* "stand"/

zetten "set" in Dutch) in these languages, but there is no one-to-one mapping (for overviews see Ameka & Levinson, 2007; Newman, 2002). These placement verbs do not only denote CAUSE AN OBJECT TO MOVE, but also specify the FINAL CONFIGURATION OF THE OBJECT IN RELATION TO THE GROUND. While Swedish, Dutch, and German all have such systems, they nevertheless differ subtly in the way they operate. Swedish makes a three-way distinction in the verbs *sätta* "set," *ställa* "stand," and *lägga* "lay" (Gullberg & Burenhult, 2012), while German makes a two-way distinction between *stellen* "set/stand" and *legen* "lay" for the same semantic space (Kutscher & Schultze-Berndt, 2007). These languages have sets of other verbs in the same domain, but these are the ones closest to default in the domain of support from below (see Gullberg & Burenhult, 2012).

Of the two target languages in the present study Dutch belongs to the West-Germanic language family. As such it has a caused posture system that distinguishes two verbs, *leggen* "lay" and *zetten* "set/stand." The choice between these verbs for an individual event is based on several properties (Lemmens, 2002, 2006; Van Oosten, 1986). The first is whether an object has a natural base to rest on and whether it rests on it, that is, whether the object is in its canonical position. If this is the case, *zetten* is used. If not, *leggen* is used. If an object does not have a natural base (e.g., a ball), *leggen* is also used. It follows that *zetten* cannot be used for every object. Conversely, *leggen* can be used for all items depending on their orientation. The second property is concerned with whether an object is extended horizontally (wider than high), which yields *leggen*, or vertically (higher than wide) which yields *zetten*. However, the *leggen/zetten* distinction is only one dimension in a wider caused motion domain. There are other verbs that denote different properties of the placement event. For example, pens can **lie** in a drawer and **sit** in a briefcase. The caused motion used for the former situation can be *leggen*, but in both cases other verbs can be used, such as *stoppen* "put into," a caused motion verb which focuses on the resulting containment relation. This illustrates exactly why in this study we are focusing on scenes in which the placement action results in simple support from below on a flat surface.

For every scene of this type a speaker of Dutch has to make a semi-obligatory choice as to which of the two verbs is appropriate. Making this choice crucially hinges on attending to the object properties and its configuration in relation to the ground. Although these verbs are frequent and semi-obligatory in the language, they cause acquisition challenges for Dutch children. Narasimhan and Gullberg (2011) found that Dutch children overextend the use of *leggen* "lay" to include vertical scenes even at the age of five. A possible explanation for the difficulty may reside in the extension patterns that can be observed in the wider language. Both verbs are also used

in non-placement contexts, for example *een fiets op slot zetten* "lock a bicycle" and *koffie zetten* "to make coffee" for *zetten*, or *uitleggen* "explain" and *vastleggen* "capture, to register" for *leggen*. Whereas *zetten* "set" is the more frequent verb overall, *leggen* is less ambiguous once we take into account the metaphorical and idiomatic extensions in the language.

Descriptions of simple manual placement actions in French are characterised by extensive use of one all-purpose placement verb, *mettre* "put" (Chenu & Jisa, 2006; Gullberg, 2011a; Hickmann, 2007; Hickmann & Hendriks, 2006). *Mettre* can be said to be semantically coarse-grained with a high degree of semantic generality (Chenu & Jisa, 2006; Gullberg, 2011a), and is appropriate in a wide range of contexts with a wide range of arguments (Chenu & Jisa, 2006). Hickmann and Hendriks (2006) found that *mettre* was used to describe a range of event categories in a wide set of stimulus materials. Gullberg (2011a) elicited descriptions of horizontally and vertically placed objects and found that *mettre* "put" accounted for 51% of all scenes covering both types of situations. Chenu and Jisa (2006) further found that *mettre* was the most frequently occurring placement verb (61% and 71%) in mothers' speech to 12- to 36-month-old children in French.

In addition to a general placement verb French also has other verbs that conflate different meaning components to various degrees (Chenu & Jisa, 2006), for example, *poser* "put (down)" or *verser* "pour" which constrains the object (liquids or small pieces) and the ground (container or flat surface). Chenu and Jisa argue that in cases of specific verbs the ground is not a compulsory element of the description, whereas it is compulsory to add a ground component for *mettre* "put" due to its unspecified nature. Similarly, Hickmann and Hendriks (2006) divide the more specific verbs into several categories, for instance, specific manner of attachment (e.g., *coller,* "stick"), and manner of causing motion (e.g., *tirer*, "pull"). Gullberg (2011a) also found that *poser* "place," accounted for a considerable portion of verb uses (18%). However, its use was limited to vertical scenes.

Semantic specificity is not limited to the verb only, but may also be represented elsewhere in the clause. In the domain of motion typology a long line of research specifically targets the question of which semantic elements are expressed where and how, so-called lexicalization patterns (Slobin, 2004; Talmy, 1985, 2000). "Distributed semantics" of spatial information has been observed in several domains (Levinson & Meira, 2003; Sinha & Kuteva, 1995). For example, there may be a division of labour between the semantic granularity of verbs and prepositions (e.g., Chenu & Jisa, 2006; Gullberg & Burenhult, 2012; Hickmann & Hendriks, 2006). Verbs with a high degree of semantic specificity are already informative about the relationship between the FIGURE (the object being handled) and the GROUND (the entity in relation to which the object is being placed) leaving little room

for variation in the preposition. Conversely, highly general verbs leave room for the preposition to specify the FIGURE-GROUND relationship. Chenu & Jisa (2006) suggest that in addition to a general placement verb *mettre,* French also has a general preposition, *à,* that "does not indicate a specific relation between figure and ground" (p.11). Hickmann and Hendriks (2006) examined the distribution of specific information across caused motion verbs and prepositions. They found that it is rare for both the verb and the preposition to be general. Rather, the typical pattern is a division of labour between the verb and the preposition in degree of granularity, although there are also occurrences where both verb and preposition are specific.

In sum, French and Dutch can be distinguished based on the semantic components they habitually express in the verb. Both languages specify the conflated semantic elements CAUSE TO MOVE AN OBJECT SOMEWHERE, but only Dutch specifies the resultative end state. The verbs in Dutch are semantically more fine-grained than the general placement verb that is habitually used in French. These crosslinguistic differences raise questions about how a bilingual system copes when languages with different degrees of granularity come into contact in one mind.

Placement, acquisition, and bilingualism
Second language acquisition poses different challenges depending on the direction of movement, going from a system of one verb to many, that is, from more general to more specific verbs, versus going from a system of many verbs to one, that is, from more specific to a more general verb. There is ample evidence to suggest that in L2 acquisition going from one to many generally is challenging (e.g., Coppieters, 1987; Ellis, 1994; Ijaz, 1986; Jarvis & Pavlenko, 2008; Jiang, 2002). In the placement domain a study of L2 Swedish by speakers of Finnish, Spanish, and Polish found that learners tended to either use avoidance strategies (such as using intransitive locative verbs, e.g *nyckel äh ligger på /.../ bord*, "key eh lies on /…/ table," Viberg, 1998, p. 192) or overgeneralising one of the possible caused posture verbs to cover a wider range of scenes than typical for the language (Viberg, 1998). The choice of verbs differed for different participants. Viberg found an interaction between the distinctions in the source language and those in the target language. Speakers of L1 Polish overextended the verb *ställa* "stand" less often than speakers of L1 Spanish or L1 Finnish. Polish has a translation equivalent of the verb *ställa* whereas Spanish and Finnish do not. Similar patterns were found in a study of placement verb use in English learners of L2 Dutch (Gullberg, 2009b). The participants employed similar strategies, either using constructions with *doen* "do" or other more general non-placement forms. In cases where they did use placement verbs learners tended to overgeneralise one placement verb *zetten* "set/stand" over *leggen* "lay" to include both types of scenes. Going from one verb to multiple verbs

thus poses a learning challenge.

Another study investigating Dutch learners of L2 French (Gullberg, 2011b) examined the reverse challenge, namely going from a system of many verbs to one, that is, from a more general to more specific system. The study revealed that although speech production was target-like, there were still traces of L1-specificity in the gesture production. The findings suggest that even learning a more general system is not entirely straightforward but requires semantic re-organisation.

Placement verbs have also been examined in functional German-Romansh bilinguals in Switzerland (Berthele, 2012). Romansh has a general placement verb whereas (Swiss) German has a caused posture system. In addition, German allows for a construction with *tun* "do" which can be used with all types of scenes. The bilinguals in this sample made frequent use of this option, which they employed with greater frequency than German monolinguals. In addition, they overgeneralised one of the caused posture verbs, in this case *legen* "lay," to cover all types of scenes.

Overall, the results from these studies suggest that bringing placement verb systems with different granularity into contact with one another leads to issues of underspecification, overuse of general verbs, and overspecification, providing additional information not present in the target language in gesture. Similarity between the languages may play an important role for both learners and functional bilinguals. However, depending on the properties of the languages involved, the direction of the learning challenge, what is measured, and the stage of acquisition, different patterns might manifest themselves in functional bilinguals and various types of L2 learners.

The current study

Previous studies investigating the semantic-conceptual domain have typically found boundary shifting in the bilingual system while, crucially, maintaining language-specific categories. Most of these studies have investigated gradient categories. In the present study we examine two established co-existing languages in the bilingual mind in a domain where there is a semi-obligatory distinction in one language that is not present in the other and in a situation where the distinction is relevant to the communicative task. We ask what the nature of the bilingual system is in a case where a subtle boundary shift does not seem possible, because there is a clear-cut semi-obligatory distinction in one language that is absent in the other. We consider both verb semantics and semantics distributed across the clause (Sinha & Kuteva, 1995; Slobin, 1996a; Talmy, 1991, 2000). We ask (1) whether there is evidence of a merged system despite the obligatory nature and the communicative relevance of the distinction, and (2) whether

such a merged system is realised as a more general or a more specific system.

There are two possible options for a merged system of French and Dutch placement verb semantics: first, a more general system, that is, a loss of specificity resulting in more general semantics, or second, a more specific system, that is, a system displaying the semantic specificity from both the bilingual's languages. There is a third possibility in which there is overlap in parts and language-specificity in other. However, this option is unlikely in the current study, since we are looking at a limited domain in which one language makes a semi-obligatory two-way distinction where the other language does not. The relevant elements in placement actions are (1) the semantically conflated elements CAUSE TO MOVE AN OBJECT SOMEWHERE, and (2) to END UP IN A SPECIFIC CONFIGURATION IN A RESULTATIVE STATE. The French monolingual system typically expresses (1) in the placement verb, and Dutch expresses (1) + (2) in the placement verb. Relevant semantic orientation information may also be expressed in other loci in the clause such as in adverbials. If we consider this additional possibility, there are four possible patterns:

a) No specificity in the verb or elsewhere
b) No specificity in the verb, but specificity expressed elsewhere
c) Specificity in the verb, but not elsewhere
d) Specificity both in the verb and elsewhere.

Option a) is the typical pattern for French (Chenu & Jisa, 2006; Gullberg, 2011a; Hickmann, 2007; Hickmann & Hendriks, 2006), while option c) is the typical pattern for Dutch (Lemmens, 2002, 2006; Van Oosten, 1986). For gradient categories it has been shown that category boundaries shift yet the language-specific categories are maintained. However, we do not know what will happen when the categories involved do not have fuzzy boundaries.

Methodology

Participants

A total of 31 adults aged between 17 and 28 years participated in this study. Participants fell into one of three groups: monolingual French speakers (N=9), monolingual Dutch speakers (N=14), and bilingual French-Dutch speakers (N=8). All participants were students at Belgian universities. Prior to taking part participants filled out an online language background questionnaire (an adapted version of Gullberg & Indefrey, 2003). Information gathered included biographical information, self-rated proficiency measures, information on language background and language

use. Table 1 summarises the background details.

Table 1. *Language background information participants (Mean, SD, range)*

	Bilingual	**Monolingual French**	**Monolingual Dutch**
Age	20 (1.7), 18-22	20 (3.6), 17-28	20 (1.5), 18-21
AoA French	0.1 (.4), 0-1	N/A	10 (1.4), 8-14
AoA Dutch	1.6 (1.9), 0-5	15 (7.6), 9-26	N/A
Usage French**	49%(19), 15-80	N/A	N/A
Usage Dutch**	49% (19), 20-85	N/A	N/A
Proficiency French***	4.4 (.55), 3.67-5	N/A	2.74 (.5), 2.2-3.5
Proficiency Dutch***	4.6 (.61), 3.67-5	2 (.9), 1.2-3	4.8 (.2), 4.5-5

AoA = Age of Acquisition.
** Estimated percentage of use. None of the French monolinguals reported currently using any Dutch. None of the Dutch monolinguals reported using French on a daily basis.
*** Self-rated proficiency on a 5-point scale. The French monolinguals did not report their proficiency for French. The Dutch proficiency score for French monolinguals is based on the four people who reported having some knowledge of Dutch. All Dutch monolinguals reported having some knowledge of French.

The Dutch-speaking monolinguals (aged 18-21 years, *M*=20) were recruited from the first year psychology student pool at the University of Leuven situated in the Dutch speaking part of Belgium (Flanders). All participants in this group were born in Flanders and reported that their native language as well as that of their parents was Dutch. The French-speaking monolinguals (aged 17-28; *M*=20) were recruited from the departments of history, French, and philosophy at the University of Namur situated in the French speaking part of Belgium (Wallonia). Eight out of nine participants were born in Wallonia. One person was born in France, but he had lived in Belgium for the last four years. His results did not differ from the rest of the group. All participants reported being native speakers of French. Only one person reported having one non-French speaking parent, but he did not have knowledge of the language in question himself.

All the participants in the monolingual groups are functional monolinguals, meaning that they only use one language on a day-to-day basis, but knowledge of other languages could not be ruled out. All

participants reported having some knowledge of English. The Dutch participants also reported having some knowledge of French, which is part of the secondary school curriculum. However, they reported that these and additional languages were not used fluently and/or frequently. While these two groups could be classed as minimally bilingual (Cook, 1992), for the sake of convenience we will refer to them as monolinguals here.

The bilingual participants (aged 18-23 years, M=20) were students in the language department at the Vrije Universiteit Brussel, which is the Dutch-speaking University in Brussels. The recruitment material contained descriptions in both languages. All participants were functional bilinguals, meaning that they used two languages (French and Dutch) fluently and proficiently on a day-to-day basis. One participant was born and raised in a French-speaking area and one person in a Dutch-speaking area; the others were all born in Brussels Capital Region, which is officially bilingual. Four of the participants are early simultaneous bilinguals who were exposed to the two languages from birth. Three participants were early bilinguals learning one of the languages (Dutch in all cases) before the age of three. One participant started learning Dutch at the age of five. Similar to the monolingual groups the bilinguals also indicated having knowledge of languages other than French and Dutch. Again, they reported that the languages were not being used frequently.

Self-rated proficiency scores were obtained for all known languages for speaking, writing, reading, and listening skill as well as grammar use and pronunciation. Skills were rated on a five-point scale (1=very poor, 5=very good). Scores for all six skills were summed giving a potential total of thirty. This was then divided into six levels in five-point steps. Scores in the two languages were considered the same if they fell within the same level (adapted from Langdon, Wiig, & Nielsen, 2005). All participants indicated being equally proficient in both languages. There was no significant difference in self-rated proficiency between language 1 and language 2 (t (7) =1.46, p=.187).

Stimuli

The stimulus materials consist of 35 short video clips of placement events based on Gullberg (2009b, 2011a, 2011b). The task consists of five training items, twenty target items (ten horizontally oriented, ten vertically oriented), and ten filler items (see Appendix 1). These items were piloted in picture form first to ensure they were unambiguous in their vertical/horizontal assignment (*zetten* "set/stand"/ *leggen* "lay"). Of the filler items two were used as an introductory and a concluding clip. Each of the clips consists of two parts. In the first part a girl takes something from a pile of objects. This involves a close-up in which the item, part of the pile, and the girl's hand(s) are visible. In the second part of the clip the girl puts the item (either

horizontally or vertically oriented) on a predetermined spot in the room, showing the girl's hand and enough of the environment to determine the location of the object.

Procedure
The task is a Director-Matcher task (Clark, Carpenter, & Just, 1973). One person (the Director) watches the placement clips and after each clip tells another person (the Matcher) what happens. The Matcher then draws the object into a schematic overview of the room (Gullberg, 2009, 2011a, b). Along with location, orientation information is communicatively relevant to the task. The Director is always the genuine participant, while the Matcher is a confederate for the Dutch monolingual group and bilingual group and, for practical reasons, a naïve interlocutor for the French monolingual group. The confederate is a native speaker of the relevant language. This is true both for the bilingual group, which has a French, a Dutch, and a bilingual confederate, respectively for each language session, and the monolingual control groups. The reason for this is to put/keep participants in the right "language mode" (Grosjean, 1998b).

The monolingual groups were tested once in their L1. The bilingual group was tested three times in three different language conditions: French, Dutch, and French-Dutch mixed condition. The mixed condition is not part of the current study. Not taking into account the mixed condition, three participants started with the Dutch condition and five with the French condition. Sessions were filmed. All participants were paid for their participation and consent to use the data was obtained from all participants.

Coding
For each item speech was transcribed orthographically using the video annotation software ELAN (Wittenburg, Brugman, Russel, Klassmann, & Sloetjes, 2006). The target utterance was then selected. Only the first spontaneously produced description of each item was used. This typically included the object pronoun, the placement verb, and the locative expression. Repetitions, self-corrections, answers after prompting, and elaborations were not taken into account.

A typical description mentions the picking up action and the putting down action (example 1):

(1)
The girl picks up a cup **and puts it on the table**.

Only the second part of the utterance containing the placement event is of relevance and considered to be a target description (in bold in (1)).

Each target utterance was coded for the following properties:

a) word order of the agent, object, verb, and locative expression;

b) the lexical verb choice;

c) orientation information outside the verb (in adverbials).

Analyses

The following analyses were performed. First, we examined word order to ascertain what information is generally present in French and Dutch for the monolinguals and bilinguals. This was done to ensure that similar elements were expressed in both languages such that differences in verb semantics could be isolated. Second, we examined verb choice in French for, first, the monolinguals and then the bilinguals and compared the two groups. Then, we compared the verb choices in Dutch for the monolinguals and the bilinguals, considering the horizontal and vertical scenes separately in this case. Finally, we investigated the extent to which orientation information was expressed outside the verb across the groups and languages.

For the statistical analyses we used logistic mixed effect models which calculated the extent to which the likelihood of the difference between groups was predicted by the manipulated variable. The analysis accounted for by-item and by-participant variance by including random intercepts for these variables (see Baayen, 2008; Baayen, Davidson, & Bates, 2008 for more information on mixed-effects modelling in language research).

Results

Word order

In order to ensure that the descriptions were comparable across languages in terms of information expressed we investigated word order patterns. In a typical description participants mention the picking up action and the putting away action, as in example (1). In French the target description is typically expressed as a clause with elided or zero anaphor subject, a pronominalised object, a verb, and a locative expression (2). In Dutch, descriptions typically consist of elided or a zero anaphor subject, a verb, a pronominalised object, and a locative expression (3).

(2)

[…]	et	la	met	sur la table
[…]	and	it	puts	on the table
		Object	Verb	Locative expression

"and puts it on the table"

(3)
[…]   en   zet   die   op tafel
[…]   and   puts   it   on [the] table
               Verb   Object Locative expression
               "and puts it on the table"

From a total of 768 utterances 676 show one of two patterns: a) Object – Verb – Locative expression (O-V-Loc), b) Verb – Object – Locative expression (V-O-Loc). The remaining utterances consist of cases where the location is mentioned first (Loc-V-O) and cases where not all of the elements are expressed (e.g., *Tas op de stoel* "Bag on chair").

Table 2. *Mean proportion (SD) of structure type*

	O-V-Loc	V-O-Loc	Loc-V-O
Monolingual Dutch	.08 (.12)	.81 (.29)	.11 (.24)
Monolingual French	.79 (.37)	.20 (.38)	.01 (.03)
Bilingual Dutch	.21 (.27)	.75 (.32)	.04 (.06)
Bilingual French	.98 (.06)	.02 (.06)	.00 (.00)

Table 2 shows that the typical pattern for monolingual French is O-V-Loc, while for monolingual Dutch it is V-O-Loc. The bilinguals show the same language-specific patterns in each of the languages. A mixed logistic regression analysis on the likelihood of bilinguals using the same structure as the monolinguals with participants and items as random factors shows that the bilinguals do not differ from the monolinguals in the respective languages (for French $\beta=-.4629$, Z value$=-.211$, $p=.8332$; for Dutch $\beta=-1.0309$, Z-value$=-.694$, $p=.487$).

There are language-specific patterns for word order in French and Dutch and this holds for bilinguals as well as monolinguals. However, the difference is a strict word order issue. Crucially, monolingual speakers of French and Dutch express the same content and bilinguals do not differ from the monolinguals in either of their two languages. Any differences in verb semantics are therefore not due to topicalisation or focus shift away from the placement event.

Verb choice in French
Monolinguals
In the monolingual French sample there are five verb types. Table 3 shows the mean proportion of tokens for each type for the monolinguals and bilinguals in French.

Table 3. *Mean proportion (SD) of tokens for each verb type for the monolinguals and bilinguals in French*

	Mettre	**Poser**	**Déposer**	**Coucher**	**Placer**
Overall - monolingual	.36 (.36)	.47 (.32)	.12 (.27)	.02 (.04)	.03 (.07)
Overall - bilingual	.53 (.48)	.19 (.35)	.23 (.38)	.03 (.05)	.03 (.07)
Horizontal - monolingual	.38 (.37)	.43 (.32	.13 (.27)	.03 (.07)	.03 (.1)
Horizontal - bilingual	.50 (.49)	.20 (.37)	.24 (.36)	.05 (.11)	.01 (.04)
Vertical - monolingual	.35 (.34)	.51 (.32)	.12 (.27)	NA	.02 (.04)
Vertical - bilingual	.56 (.47)	.18 (.33)	.23 (.42)	NA	.04 (.11)

The most frequent verb used by the monolinguals is *poser* "place" (4), although *mettre* "put" is also frequently used (5):

(4)

Elle	les	**pose**	sur	eh	sur	un	papier
She	them	puts	on	eh	on	a	piece.of.paper

"She puts them on a piece of paper"
(Participant FR5, item H1)

(5)

Et	elle	le	**met**	sur	eh	la	table	blanche
And	she	it	puts	on	uh	the	table	white

"And she puts it on the white table"
(Participant FR5, item H2)

As expected, orientation does not seem to play a role in determining verb choice, since the tokens are evenly divided between horizontal scenes (H-scenes) and vertical scenes (V-scenes). The obvious exception to this is *coucher* "make lie" which only occurs with H-items (see example (6)), but is rarely used. *Poser* occurs slightly more often with V-items than H-items.

(6)

Elle	les	**couche**
She	them	lays

"She lays them down"
(participant FR6, item H8)

Bilinguals
The bilingual French sample likewise consists of 5 types. Table 3 shows the mean proportion of tokens for each type. The bilinguals use *mettre* "put" for over half of the utterances (7), but *poser* "place" (8) and *déposer* "put" (9) also occur. Again, orientation does not play a role in verb choice.

(7)

Elle	les	**met**	dans	la	plat à fruit
She	them	puts	in	the	fruit bowl

"She puts them in the fruit bowl"
(participant BL8, item H3)

(8)

Et	la	**pose**	sur	une	feuille	verte
And	it	puts	on	a	sheet	green

"And puts it on the green sheet"
(participant BL6, item V3)

(9)

Et	la	**dépose**	sur	la	table	brune
And	it	puts	on	the	table	brown

"And puts it on the brown table"
(participant BL9, item V7)

There is a difference between the monolingual and the bilingual group in the use of the expected general placement verb, *mettre* "put." A mixed logistic regression analysis of the participants' likelihood to use *mettre* with participants and items as random factors shows significant effects for verb choice. Bilinguals are significantly more likely to use *mettre* ($M=.53$, $SD=.48$) than the French monolinguals are ($M=.36$, $SD=.36$; $\beta=4.362$, Z value= 2.290, $p<.05$).

Individual preferences also seem to play a role. Speakers have a strong preference for one or the other of the general placement verbs (*mettre* "put," *poser* "place," or *déposer* "put"). Each speaker has a verb that they used in 50% or more of the utterances. Monolinguals use their preferred verb 78% of the time and bilinguals use their preferred verb 88% of the time.

In sum, the results for French reveal the expected preference for a general placement verb both in monolinguals and bilinguals. Moreover, bilinguals are more likely to use *mettre* "put" than the monolinguals.

Verb choice in Dutch for horizontal scenes by monolinguals and bilinguals

Table 4 shows the verb choices for the horizontal and vertical scenes in Dutch by both mono- and bilinguals. The monolingual group provides three verb types (*leggen* "lay," *plaatsen* "place," *zetten* "set/stand"). *Leggen* (10) accounts for the vast majority of utterances.

(10)

Het	meisje	**legt**	drie	ballen	op	een	groen	blad
The	girl	lays	three	balls	on	a	green	sheet

"The girl puts three balls on a green sheet"
(participant FL12, item H1)

The bilingual group provides four verb types (*leggen* "lay," *zetten* "set/stand," *plaatsen* "place," *placeren* "place"*). Again *leggen* accounts for the majority of tokens (11):

(11)

Ze	**legt**	de	bananen	in	de	kom
She	lays	the	bananas	in	the	bowl

"She puts the bananas in the bowl"
(participant BL7, item H3)

There is a little more variation in the bilingual group than in the monolingual group due to the popularity of the verb *plaatsen* "place," but a mixed logistic regression of the likelihood of the expected verb choice, that is *leggen* "lay"

as opposed to *zetten* "set/stand," *plaatsen* "place," or *placeren* "place," with participants and items as random factors, yielded no significant differences (β=1.751, *Z* value= .738, *p*=.46).

As with the French data we also looked at how many of the tokens the participants' preferred verb accounted for. For the monolinguals the mean percentage is 95% and for the bilinguals 90%.

Table 4. *Mean proportion (SD) of tokens for each verb type for the bilinguals and monolinguals in Dutch for the horizontal and vertical scenes.*

	Leggen	**Zetten**	**Plaatsen**	**Placeren**
Horizontal – monolingual	.91 (.23)	.01 (.04)	.08 (.22)	NA
Horizontal – bilingual	.73 (.42)	.05 (.11)	.20 (.39)	.02 (.04)
Vertical – monolingual	.24 (.23)	.69 (.31)	.07 (.19)	NA
Vertical – bilingual	.66 (.42)	.12 (.08)	22 (.41)	NA

Verb choices in Dutch for vertical scenes by monolinguals and bilinguals

Table 4 also shows the verb choices in Dutch for the vertical scenes by both monolingual and bilingual participants. The monolingual group provides three verb types (*leggen* "lay," *zetten* "set/stand"*, plaatsen* "place"). *Zetten* accounts for the majority of tokens (12).

(12)
En	ze	**zet**	die	op	de	bruine	tafel
And	she	sets	it	on	the	brown	table

"and she puts it on the brown table"
(participant FL4, item V7)

The bilingual group provides the same three verb types. In this case *leggen* "lay" accounts for the majority of tokens (13).

(13)
En	**legt**	die	op	de	bruine	tafel
And	lays	it	on	the	brown	table

"and she puts it on the brown table"
(participant BL9, item V7)

A mixed logistic regression analysis on the likelihood of the expected verb choice (*zetten* "set/stand") with participants and items as

random factors showed that the bilinguals are significantly more likely to use the unexpected verb, *leggen* "lay," for vertical scenes than monolinguals are ($\beta=3.25$, *Z* value=4.083, *p*<.001). For vertical scenes the preferred verb accounted for 75% of the data for monolinguals and 88% for bilinguals.

The results from the analyses of the Dutch descriptions show that the monolinguals distinguish between horizontal and vertical scenes in their verb choice; they use *leggen* "lay" for horizontal scenes and *zetten* "set/stand" for vertical scenes. The bilinguals, in contrast, do not. They use *leggen* for horizontal scenes, but are also likely to use *leggen* for vertical scenes.

Orientation information outside the verb

The verb is not the only place where orientation information can be expressed. It is also possible to express this information outside the verb in adverbials. Examples (14), (15), and (16) show instances of orientation information expressed in adverbial adjunct phrases or additional clauses. Example (16) in particular is interesting, since in that case the information expressed in the verb (i.e., horizontal orientation) and the adverbial (i.e., vertical orientation) seemingly contradict each other unless the verb has a more general meaning — an interpretation which is supported by the overall pattern.

(14)
Elle les pose,   mais   **comme dans une bibliothèque** [donc pas couchés]
She them puts, but   like on a bookshelf   [so not lying down]
"she puts them down, but like on a bookshelf [so not lying down]"
(participant FR5, French monolingual)

(15)
En   ze   zet   die   **recht** zo   op dat blauw   papier
And   she   sets   them   upright like that on that blue   sheet
"and she puts them upright like on the that blue sheet"
(participant FL1, Dutch monolingual)

(16)
Ze   legt   vier   boeken **rechtop** op   het   blauwe schap
She   lays   four   books upright on   the   blue   shelf
"she puts four books upright on the blue shelf"
(participant BL2, bilingual in French)

Interestingly, cases of orientation information expressed outside the verb are rare. In total, there are 59 instances of orientation information expressed outside the verb. These occurrences occur only with 11 out of 20 items. Six

items (5 horizontal, 1 vertical) account for 83% of the occurrences. The horizontal items are all items with a natural base, but in a non-canonical position (e.g., a thermos flask on its side). In these cases, orientation information could be said to be highlighted, since it contrasts with the typical configuration. The only vertical item represents a set of books being put upright (see (14), (15), and (16)) on a shelf. Books are interesting in this respect, since they can equally plausibly be put upright or lying down and as such the specification of the orientation is informative. In addition to being rare and not evenly distributed across items, these occurrences are also not used equally often by each group (proportion of utterances expressing orientation information outside the verb: monolingual Dutch .094, monolinguals French .056, bilinguals Dutch .074, bilinguals French .069).

Orientation information is thus most likely to be added by the monolingual Dutch participants who are already specifying obligatory orientation in their verb choice. In cases where objects are located in a non-canonical position they may further stress orientation by mentioning it in an adverbial. It does not appear to be an alternative strategy for the bilinguals.

General discussion

This study sets out to investigate the nature of the functional bilingual system in a case where there is a semi-obligatory distinction in one language that is absent in the other, namely in the case of placement verbs in French and Dutch. We ask (1) whether there is evidence of a merged system despite the obligatory nature and the communicative relevance of the distinction, and (2) whether such a merged system is realised as a more general or a more specific system.

The results show that in French two general placement verbs are used, *mettre* "put" and *poser* "place." The bilinguals use *mettre* significantly more often than the monolinguals but both verbs are used as general placement verbs across items and orientations by both monolinguals and bilinguals. The Dutch monolinguals use different verbs to distinguish horizontal (*leggen* "lay") and vertical (*zetten* "set/stand") scenes. However, the bilinguals overextend *leggen* in Dutch to include both horizontal and vertical scenes. Moreover, information about orientation expressed outside the verb in adverbials was most likely to be provided by the monolinguals in Dutch, that is, by the speakers who are already making the distinction between horizontal and vertical scenes in their verb choice.

We posited four possible patterns for expressing the pertinent semantic components in placement events (CAUSE AN OBJECT TO MOVE SOMEWHERE and END UP IN A PARTICULAR CONFIGURATION):
   a)   No specificity in the verb or elsewhere.
   b)   No specificity in the verb, but specificity expressed

elsewhere.
c)   Specificity in the verb, but not elsewhere.
d)   Specificity both in the verb and elsewhere.

For the monolinguals the results are as expected. The monolingual French speakers largely adhere to pattern (a), although there are a limited number of occurrences for pattern (b) as well. In monolingual Dutch the prevalent pattern is pattern (c). Pattern (d) also occurred, but again in a limited number of cases. The bilingual speakers in French use pattern (a) in the majority of cases with pattern (b) occurring in some cases much like the French monolinguals. However, in Dutch the bilinguals mostly use pattern (a) *unlike* the monolingual Dutch speakers. They use a specific verb, *leggen,* but they do not attach the specific meaning to it. They also use pattern (b) on occasion, but again only in a limited number of cases.

Although the option for more specific expressions of placement events exists in both languages (patterns (b) and (d)), and although we find instances of these patterns across all the groups, they are rarely used. Furthermore, the instances of adverbial use seem motivated by the context. For example, in cases where there is no default orientation (e.g., books) the orientation specification is more informative. It therefore seems as if specific orientation information outside the verb is provided when the orientation needs to be highlighted in some way. These cases are therefore not seen as similar constructions but they are marked as atypical by the monolinguals. Importantly, bilinguals do not use this strategy to create a more specific system in both of their languages. Instead, they use more general semantics in *both* French and Dutch.

Overall, then, for semi-obligatory categories we find that one of the categories is dropped in one of the languages, resulting in a more general semantic system in comparison with the non-contact variety. One might be tempted to think of this as a unilateral crosslinguistic influence of French on Dutch. However, it may be premature to do so. In order to preclude a general bilingual effect and to determine that we are really dealing with an effect of French on Dutch, a different language pair is needed in order to triangulate (see Jarvis & Pavlenko, 2008).

It is striking that bilinguals drop one of a set of semi-obligatory categories in one of the languages rather than preserve language-specific category structure. Interestingly, the patterns closely resemble those attested in adult L2 acquisition when learners go from a single general category in their first language to two or more specific categories in the same domain in their L2 (e.g., Geeslin, 2003; Gullberg, 2009b). They too seem to opt for a general category. In the case of L2 acquisition, this is typically seen as incomplete acquisition leading to unacceptable structures, whereas in the case of the Belgian bilinguals, the speakers are considered to be fluent and

competent speakers of both their languages. Incomplete acquisition, thus, does not apply to them. This does, however, raise the question of whether the mechanisms underlying these merged systems might be the same.

Convergence

One term proposed to account for merged systems is convergence. The term is widely used in the language contact literature (see e.g., Bullock & Toribio, 2004; Thomason & Kaufman, 1988) but has been adopted by researchers investigating language contact in the bilingual mind. Crucial to all accounts of convergence is the notion of similarity or equivalence whereby two languages move closer together in some respect taking the existing overlap between the language patterns as a point to gravitate towards. It has alternately been expressed as "congruent lexicalization" (Muysken 2000), "a property that is initially merely similar" (Bullock & Toribio, 2004), "close in conceptual space" (Gathercole & Moawad, 2010), "highly similar elements in the L1 and L2" (Wolff & Ventura, 2009), "conceptually equivalent" (Berthele, 2012), or "rough translation equivalents" (Ameel et al., 2009). These are general descriptions that do not say anything specific about the degree of change (e.g., a slight shift in category boundaries vs. a complete drop of a semantic feature) or the exact type of change (e.g., a shift in distributional frequencies of use of a structure vs. merging two phonological categories into one).

　　The general description of convergence as a move towards a common point of overlap applied to a system of semantic features could lead to the following possible outcome patterns[2]:

   a) A more general system in one language as compared to its non-contact version
   b) A more specific system in one language as compared to its non-contact version
   c) A more general system in both languages as compared to their non-contact versions
   d) A more specific system in both languages as compared to their non-contact versions

　　This account of convergence works well for the current data set where a situation emerges comparable to pattern a), that is, a more general system in one language as compared to its non-contact variety. Bilinguals in Dutch do not maintain a distinction that is not present in their other language

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[2] Pavlenko (2009) also suggests convergence as possibility. However, convergence in her terminology only refers to outcomes (3) and (4), while outcomes (1) and (2) are described by the term language shift.

making the languages more similar. Again, it is striking that there is little evidence of bilinguals strategically moving object-related information into other parts of the utterance. It seems as if there is a real and global shift in focus away from object information, arguably reflecting different placement verb semantics and a different set of placement event representations in bilinguals as compared to monolinguals.

However, we should proceed with some caution. When we consider the wider context of language, this account may not hold up even for a restricted feature-based situation. That is, for two languages in use it is possible, for example, that a shift in the verb semantics of one verb might have more widespread effects in related parts of the language such as the prepositional system or in neighbouring verbs. In addition, many concrete words have metaphorical extensions or idiomatic expressions associated with them. It is unclear how this description of convergence would apply in those cases. We cannot exclude the possibility that the bilinguals express object related information in Dutch verbs and structures not captured in the current data set. Nonetheless, the shifts observed are striking.

Mechanisms of convergence

Thus far, we have considered convergence mainly as an outcome of prolonged contact. However, the question remains what the underlying mechanism may be. We discuss three options suggested in the literature: a distributional account, a functional account, and a processing economy account, two of which we consider to be applicable to the data set at hand (for further discussion of mechanisms of convergence see, for example, 2009). In structural terms convergence could be instantiated as a preference for a particular structure A over another equally acceptable structure B in a language, if the other language has a structure that is the same or equal, leading to a difference in distributional frequencies. Clyne (1987) offers changes in distributional frequencies as a possible facilitator for code-switching. In the literature on early bilingual L1 acquisition, structural convergence as a phenomenon is also widely discussed (Döpke, 1998; Gawlitzek-Maiwaild & Tracy, 1996; Hulk & Müller, 2000; Müller & Hulk, 2001). In the current data set, however, this account of convergence does not apply. It is not the case that there are two equally acceptable alternatives and therefore a change in distributional frequencies is not an option.

Berthele (2012) instead suggests an account based on functionality, whereby semantic distinctions that are not communicatively and pragmatically relevant are more prone to being dropped. That is, for German the distinction between the caused positionals has no functional purpose, since it is also acceptable to use constructions with *tun* "do," and hence the distinctions are dropped. It is an interesting suggestion that non-functional distinctions might be more susceptible to being dropped. However, this begs

the question why many of these (seemingly) useless distinctions still exist in general (e.g, grammatical gender). In the placement domain, specifically, there is no evidence that caused positionals are disappearing in other languages (see papers in Kopecka & Narasimhan, 2012).

It is also possible that bilinguals are making a functional choice. That is, the specification is part of their semantic-conceptual representation, but they are simplifying on a practical discourse level. In other words, they know and attend to the distinctions, and yet choose not to encode them in their speech. Although this is an option, it is an unlikely one, since the orientation information is actually pertinent to the task in this particular situation; it is relevant to discourse. Rather, it seems that the bilinguals are not attending to the orientation information at all as indicated by the fact that the use of orientation information elsewhere in the clause is hardly used by the bilinguals. It is the Dutch monolinguals, who are already attending to the information, who use this option.

A third account is Muysken's (2000) suggestion that "processing economy" is a possible force behind the move towards a more general system (see also Ameel et al., 2009). He suggests that "[i]t is conceivable that there is a uniformizing tendency resulting from the processing system, tending towards one superficial word order for both languages, etc." (Muysken, 2000, p. 277). While this is an attractive idea it is not clear exactly what it means to lighten the processing load especially in relation to distributed semantics. Processing studies typically focus on single lexical items, morphological complexity, or syntactic constructions, but are rarely concerned with how meaning elements spread out over an entire clause or utterance can be related to processing load.

It is possible that there is a move towards a more general system for reasons of functional economy, that is not maintaining a seemingly uninformative distinction. It is equally possible that the move toward a more general system is prompted by processing economy. The current data set does not allow us to probe these questions in detail. However, the observed patterns clearly suggest that this matter should be investigated further.

In conclusion, this study shows that the bilingual system can be surprisingly and quite dramatically different from its monolingual counterparts. Bilinguals may not maintain one of a set of semi-obligatory categories in one of the languages rather than preserve language-specific category structure. Although such patterns would be seen as unacceptable in L2 acquisition, they seem to be a natural result of functional bilingualism. These results appear to support Grosjean's notion of the bilingual as a specific speaker-hearer and suggest that within a limited domain the bilingual third pattern can look quite markedly different. This raises questions regarding exactly how pervasive these differences are and opens

for further explorations of the bilingual system beyond the individual word at broader levels of language.

CHAPTER III
SPEECH AND GESTURE SHOW SIMILAR PATTERNS OF CONVERGENCE IN FUNCTIONAL BILINGUALS

Abstract

It has been suggested that a bilingual's two languages may move closer together, a phenomenon known as convergence. The present study examines speech and gesture jointly to illuminate the nature of bilingual patterns of convergence. We investigate whether bilingual patterns show semantic convergence multimodally, and, critically, whether gestures encode additional information relative to speech, potentially leading to a cumulative multimodal converged system rather than a reduced or redistributed one. Analyses of functional French–Dutch bilinguals talking about voluntary motion show evidence of multimodal convergence in speech and gesture, but, importantly, not of a cumulative system. Rather, results show converged speech–gesture patterns that run parallel to the uni–modal (speech) pattern, reinforcing a view of convergence in this semantic domain as being redistributive.

Alferink, I. & Gullberg, M. (submitted). Speech and gesture show similar patterns of convergence in functional bilinguals.

Introduction[3]

A common observation in bilingualism studies is that a bilingual's two languages often show degrees of resemblance greater than that between the monolingual versions of the languages in question. For example, in the semantic domain Ameel, Storms, Malt, and Sloman (2005), found that French-Dutch bilinguals and monolingual speakers of those languages named bottles and containers differently. For instance, the objects named *fles* "bottle" in the monolingual Dutch category were divided across two categories in monolingual French, namely *bouteille* "bottle" and *flacon* "bottle." Bilingual speakers retained the two categories in French, but moved some of the objects from the *flacon* category to the *bouteille* category increasing the similarity between *bouteille* in French and *fles* in Dutch. This phenomenon is known as convergence.

Convergence might manifest itself in different ways. Earlier studies point towards the possibility of a reduced bilingual semantic system (e.g., more general lexical semantics, Alferink & Gullberg, 2014), or a redistributed system (e.g., changes in distributional frequencies of available lexical elements, Hohenstein, Eisenberg, & Naigles, 2006). These seem likelier than a cumulative system where semantic distinctions from both languages are maintained in both languages (but see Berthele 2004; Daller et al., 2011). However, so far studies of convergence have focused solely on speech. Yet, language does not happen in speech only, but multimodally, in speech and gesture. Gestures generally express slightly different information than speech due to their format. In studies of multimodal bilingualism gestures have therefore been shown to sometimes reveal richer underlying representations than apparent in speech only (e.g., Gullberg, 2009a; Stam, 2006). This study investigates speech and gesture jointly to explore the nature of convergence, and specifically, to probe whether converged systems are mainly reduced, redistributed, or whether gesture information provides

evidence for a richer, more cumulative system where more distinctions and information are expressed in the bilingual system than in its monolingual counterpart.

Patterns of convergence

A substantial body of work now indicates that knowledge and use of more than one language leads to changes in the linguistic system of a bilingual as compared to that of a monolingual speaker (papers in Cook, 2003; Grosjean, 1998a). One of the suggested mechanisms at play is convergence, that is, the shift of a bilingual's two languages towards each other, thereby increasing their similarity wherever possible (e.g., Ameel et al., 2009; Bullock & Toribio, 2004; Clyne, 2003; Pavlenko, 2009a; Thomason & Kaufman, 1988; see also Clyne, 2003, for examples of divergence). Convergence can be instantiated in different ways, for example as a reduced system, as a redistributed system, or as a richer, cumulative system.

Several studies find patterns of convergence that result in a **reduced** system in one or both of the bilingual's languages as compared to monolingual controls. We use the term reduced rather than the more ubiquitous term "simplified," because the latter suggests a motivation for the observed pattern, whereas "reduced" merely describes the observed pattern. For example, in the domain of lexical semantics Alferink and Gullberg (2014) found that French-Dutch bilinguals do not uphold a semi-obligatory semantic distinction in monolingual Dutch in the domain of placement verbs between *zetten* "set" and *leggen* "lay." The bilingual Dutch system thus has a more general semantic system than monolingual Dutch, matching the French semantic system which operates with one general placement verb (e.g., *mettre* "put"). The Dutch bilingual system is "reduced" relative to the monolingual system, making it converge with and be more similar to French. Pavlenko (2009c), probing the bilingual verbal inventory, showed that Russian-English bilinguals use a less varied verbal repertoire (fewer different verbs) in Russian than monolingual Russian speakers (see also Volynsky, 2012). Flecken (2011) examined the use of grammatical features and found that highly proficient Dutch-German bilinguals in Dutch overextend their use of a present continuous construction (e.g., *Zij zijn aan het spelen* "they are playing") to include a wider variety of situations than Dutch monolinguals do. In all these cases the patterns of convergence suggest a reduced bilingual system compared to a monolingual counterpart.

Another set of studies describe convergence patterns that result in a **redistributed** system, that is a system where the same semantic or structural elements are used by bilingual and monolingual speakers, but where the frequency of occurrence of the elements differs for the groups. For example, Müller and Hulk (2001) described a case where two possible syntactic

constructions exist in one language, only one of which is matched in the other language. They observed that bilingual children prefer the matching construction (see also Clyne, 2003; Toribio, 2004). Similarly, French-Dutch bilinguals describing a variety of crossing events (e.g., swimming across a river) decrease the frequency of the verb *traverser* "to cross" in French in favour of (Dutch-like) MANNER-verbs (e.g., *nager* "swim"), and also increase the use of (French-like) PATH-verb *oversteken* "to cross" in Dutch, making their languages more similar (see chapter 4).

A different illustration of a redistributed system can be found in studies of bilingual categorisation and naming patterns in cases where the two languages do not match (e.g., Ameel et al., 2009; Ameel et al., 2005; Athanasopoulos, 2009; Athanasopoulos et al., 2011; Ervin, 1961). For example, Japanese has two colour terms for blue, whereas English only has one. Japanese-English bilinguals asked to name coloured chips in Japanese maintain two categories for blue just as monolingual speakers. However, they shift the category core of one category such that it is closer to the English translation equivalent. In other words, the category structure is maintained, but embedded patterns of convergence can be found in the category construction.

A third possible pattern of convergence is a **cumulative** bilingual system, that is a system which, rather than reducing the system to only existing overlap, includes all available distinctions across the two languages, leading to an overall richer system in both languages. Daller et al. (2011), discussing the description of motion, described the use of PATH-verbs in combination with (redundant) PATH expressions outside the verb by Turkish-German bilingual speakers (see (18)). The resulting system thus uses the typical loci for PATH encoding of both languages (see also Berthele, 2004; Treffers-Daller, 2012).

(17)
adam   *aşağı-ya*   *iniyor*
Man   downwards-Dat   descend-Prog
"The man descends downwards"
(speaker 1, B return, age 20)
Daller et al. (2011, p. 109)

In sum, convergence can manifest itself as a reduced system reflected in patterns of reduction and overextension, and convergence on shared semantics; as a redistributed system reflected in different frequency distributions and shifting category boundaries and/or centres; and as an additive system as reflected in cumulative specificity. The literature suggests that these types are not equally common; in particular the cumulative system

is less well attested. However, a commonality in all these studies is that they only take into account information expressed through the spoken modality thus excluding any multimodal, additional information. Other studies, however, suggest that examination of speech and gesture jointly can reveal (semantically) richer underlying representations. It is therefore important to examine the multimodal expression of language to gain a more complete grasp of convergence and the workings of the bilingual system (e.g., Gullberg, 2009a; Stam, 2006).

Speech-associated gesture

Gestures are the spontaneous movements people produce when they speak that can be interpreted as part of the utterance (Kendon, 1972, 2004; McNeill, 1985, 1992). There is a close link between speech and gesture (Clark, 1996; McNeill, 1992; Kendon, 1980; Kelly, Özyürek, & Maris, 2010). For example, speakers tend to gesture mostly when they talk, not when they are silent or listening; gestures stop and start with speech in cases of speech production difficulties (Graziano & Gullberg, 2013; Mayberry & Jaques, 2000; Seyfeddinipur, 2006) and speech and gesture develop in parallel in children (e.g., Capirci, Contaldo, Caselli, & Volterra, 2005). In addition, for representational gestures, that is "gestures that represent some aspect of the content of speech" (Alibali, Heath, & Myers, 2001, p. 172; McNeill, 1992), speech and gesture are typically (semantically) co-expressive. They express compatible, though not always identical, information. This coordination has been interpreted as reflecting a shared underlying representation (e.g., McNeill, 1985, 1992).

The link is also highlighted by the fact that linguistic structure seems to be reflected in gesture production such that crosslinguistic differences in speech may result in crosslinguistic differences in gesture (for an overview of crosslinguistic differences in gesture production see Kita, 2009). For example, speakers of different languages gesture differently about motion partly depending on how (spoken) information is expressed in clauses (Kita & Özyürek, 2003). Two semantic elements such as MANNER (how an entity moves) and PATH (the trajectory of a moving entity) may be expressed in one or two gestures depending on how the information is morphosyntactically organised in speech in a particular language. For example, they are typically expressed in one clause and one gesture in English and typically in two clauses and two gestures in Turkish and Japanese (Kita & Özyürek, 2003).

Crosslinguistic differences in lexical semantics can also be reflected in differences in gesture production. For example, Gullberg (2011a) found that speakers of French, whose language has a default, all-purpose placement verb *mettre* "put," gesture about the PATH of the placement movement with relaxed, undefined hand shapes. In contrast, speakers of Dutch, whose language has no default placement verb, but offers a semi-obligatory choice

between two more specific verbs *leggen* "lay (horizontally)" and *zetten* "set (vertically)," gesture about the object being placed using defined, object-incorporating hand shapes. In order to choose between the two verbs in Dutch one needs to attend to the properties of the object being put, knowledge reflected in the object-incorporating gestures accompanying the utterance.

An interesting situation arises when two diverging systems come into contact in a multilingual speaker. Studies showed that L1 English learners of L2 Dutch for the most part retain the relaxed PATH gestures typical of placement events in English, which like French has a default verb, *put* (2009b). Similarly, Dutch learners of L2 French maintain the specificity of their L1 in object-incorporating gestures with defined hand shapes in their L2 French. Crucially, the Dutch speakers in this study learn to use the general placement verb *mettre* "put" correctly in speech, yet they retain traces of their L1 specificity and object-focus in gesture (2009a). Gestures can thus provide valuable additional information about the multilingual system in second language learners. Yet, for functional bilinguals this area remains largely unexplored (for exceptions see Efron, 1941; Nicoladis, 2007; Von Raffler-Engel, 1975), and no study has examined convergence multimodally.

Voluntary motion in speech and gesture
Monolinguals

A suitable test domain for examining convergence is that of the expression of voluntary motion. Voluntary motion simply means agents moving by themselves, such as someone running across the street. Talmy (1991, 2000) classified languages into two broad types based on whether they express the PATH of motion in the main verb root (e.g., *traverser* "cross"), so-called verb-framed or v-languages, or outside the main verb root in satellites (e.g., *across*), so-called satellite-framed or s-languages. Since s-languages express PATH elsewhere, they are free to encode MANNER of motion in the main verb (e.g., *run*; Slobin, 2006). V-languages must express MANNER in peripheral constructions, adverbials, etc., (e.g., *en nageant* "by swimming") and often leave it unexpressed. The languages in the current study differ along this dimension. French, a v-language, typically expresses only PATH of motion and does this in the main verb root (Fibigerová, Guidetti, & Sulova, 2012; Hickmann & Hendriks, 2006; Kopecka, 2006; Kopecka & Colin, 2009; Ochsenbauer, 2010; Pourcel & Kopecka, 2005). In contrast, Dutch, an s-language, typically expresses MANNER in the main verb and PATH elsewhere in the utterance (Haeseryn, Romijn, Geerts, de Rooij, & van den Toorn, 1997; Van Staden, Bowerman, & Verhelst, 2006). For the motion domain Dutch thus typically encodes more semantic elements than French, that is, Dutch is semantically denser than French. It is worth noting that whereas

these are the typical patterns for French and Dutch, both languages also allow other constructions (for more on motion typology and critiques thereof, see Beavers, Levin, & Wei Tham, 2009; Croft, Barðdal, Hollmann, Sotirova, & Taoka, 2010; Talmy, 1985, 2000; Slobin 2004; Zlatev, Blomberg, & David, 2012).

Multimodal studies, taking both speech and gesture into account, have shown crosslinguistic differences in how speakers of different languages express motion gesturally in terms of the semantic information encoded, the structural organization, and temporal alignment of speech and gesture. Differences can be found in whether certain semantic information is expressed or not (e.g., McNeill, 2000a). Further differences are attested in terms of how this information is expressed, such as depending on how information is expressed in clauses (Kita & Özyürek, 2003). Lastly, differences have been found in terms of how the modalities are semantically and temporally coordinated, such as alignment of PATH gestures with PATH expressions in speech (Hickmann, Hendriks, & Gullberg, 2011; Stam, 2006).

These studies are crucially concerned with speech and gesture as a single package (de Ruiter, 2007; Kendon, 2004; Kita & Özyürek, 2003; McNeill, 1992, 2005). Kendon (2004) has characterized the relationship as a coordination of the semantic nucleus of the speech and the gestural nucleus, that is the gesture stroke (i.e., the most effortful and meaningful part of the movement) and optional post-stroke holds, in order to achieve what he calls semantic coherence. Simply put, exact alignment shows us what belongs together. McNeill (2000b, 2005) uses the term co-expressivity of speech and gesture to convey a similar idea.

Crosslinguistic variation in encoding patterns are not always apparent unless both speech and gesture production is taken into account. For example, French monolingual adults gesture mainly about PATH of motion. When speech and gesture are considered together we find that French speakers typically express the same information in both modalities (talk about PATH, *traverser* "cross," and gesture about PATH; Gullberg, Hendriks, & Hickmann, 2008; Hickmann et al., 2011). In other words, speech and gesture are completely semantically co-expressive. Monolingual English-speaking adults also mostly gesture about PATH. However, whereas in French the spoken and gestured semantic components completely overlap, in English speech typically encodes more information than gesture at the clause level (i.e., talk about MANNER and PATH, e.g., *swim across*, gesture about PATH). Yet when the exact temporal alignment between semantic element(s) in speech and gestures is considered, speech and gesture are more co-expressive also in English (PATH gestures aligned with PATH in speech, e.g., *across*), suggesting considerable co-expressivity across modalities, and very little evidence of gestures expressing additional or at least radically

different information from speech in monolingual speakers. The question is whether the same holds for bilingual speakers.

Bilinguals

Uni-modal studies of voluntary motion in second language acquisition and bilingualism have examined the challenges posed for learners and bilinguals who need to accommodate two or more languages that select and organise motion information differently. Studies show a variety of acquisition and convergence patterns (e.g., Berthele, 2004; Brown & Gullberg, 2013; Cadierno, 2008, 2010; Daller et al., 2011; Filipovic & Vidakovic, 2010; Hohenstein et al., 2006; Treffers-Daller & Tidball, 2012). In studies specifically addressing functional bilinguals rather than L2 learners, most findings suggest that bilinguals use the same constructions and elements as monolingual comparison groups. However, there is also evidence of convergence in that bilinguals use some elements to a greater extent than monolingual speakers do. For example, Spanish-English bilinguals use more PATH verbs in English than English monolinguals (what we are calling redistributive convergence; Hohenstein et al., 2006). Other convergence patterns include simplification, or reductive convergence, for example in the form of a less diversified lexicon (Pavlenko 2009c; Volynsky 2012). We also find evidence of accumulation of features, what we are calling cumulative convergence, such as stacking redundant PATH particles in a clause (Berthele, 2004; Daller et al., 2011).

A number of studies have also investigated speech and gesture jointly in multilingual speakers (Brown & Gullberg, 2008; Choi & Lantolf, 2008; Kellerman & van Hoof, 2003; Lewis, 2012; Negueruela, Lantolf, Rhen Jordan, & Gelabert, 2004; Stam, 2006; Özyürek, 2002; for an overview of gesture in second language acquisition and bilingualism in other domains see Gullberg, 2008, 2012 respectively). Multimodal multilingual studies typically focus on second language learners and the role of the L1 in the speech-gesture patterns of the L2. Findings are variable, showing patterns interpreted as L1 patterns in the L2 (e.g., Negueruela et al., 2004), patterns in-between L1 and L2 (e.g., Stam, 2006), as well as L2 target-like patterns (e.g., Lewis, 2012). A second line of research focuses on the effect of language learning and / or knowing a second language on speech and gesture production in both the L1 and L2 (Brown & Gullberg, 2008). Findings here suggest that L2 speakers show effects of their L2 in their L1 in their gesture production patterns such that the languages move closer to each other, hinting at convergence patterns even in intermediate learners.

In sum, monolinguals' speech and gesture in the voluntary motion domain show crosslinguistic typological differences. A survey of previous bilingual studies in this domain show convergence effects in speech production typically of the reductive or redistributive type. Multimodal

multilingual patterns fluctuate with evidence of complete language-specific speech–gesture patterns as well as evidence of semantic interaction from L2 studies suggesting a potentially valuable source of additional information for functional bilingual speakers. The question remains whether convergence occurs multimodally in functional bilingual speakers and whether information encoded in gesture suggests anything other than a redistributed or reduced type of convergence.

The current study

L2 studies show that taking a multimodal (speech and gesture) perspective can reveal patterns that differ from uni-modal (speech-only) patterns providing insight into the underlying multilingual system. Studies of bilingual speech in the motion domain typically show convergence as a reductive or redistributed system and not a cumulative system, but these do no take gesture into account. Considering speech and gesture jointly can therefore potentially give us a more accurate and complete view of patterns of convergence in bilingual language production.

In this study, we therefore ask:

1) What semantic elements do monolingual and bilingual adults speakers of Belgian Dutch and Belgian French encode in speech and gesture when talking about voluntary motion?

2) What is the co-expressive relationship between speech and gesture at the clause level and in terms of exact alignment for monolingual and bilingual adult speakers of Belgian Dutch and Belgian French?

3) Do bilinguals show cross-modal patterns of convergence and if so, do they differ from uni-modal patterns?

Dutch typically expresses more semantic elements per clause than French in the motion domain. We therefore consider semantic density in speech and gesture combined with speech-gesture co-expressivity, i.e., the degree to which the modalities overlap, to explore the role of gesture in convergence patterns. Gesture patterns might be a way to encode the semantic richness of the two languages combined. For example, MANNER gestures might be used with a greater frequency in bilingual French, for example, which could shift Dutch and French closer together in terms of overall semantic density.

Methodology

Participants

The participants in this study are a subset of a larger group participating in a study of the expression of voluntary motion by functional French-Dutch bilinguals. A total of 37 adults between 17 and 31 years of age were selected from the larger pool (N=62) on the basis of their gesture production.

Participants who used one or more gestures with at least five target stimulus items (out of a possible 18) were included in the analyses. Participants fell into one of three groups: monolingual French speakers (N=11, excluded: 7), monolingual Dutch speakers (N=16, excluded: 9), and bilingual French-Dutch speakers (N=10, excluded: 5). We also excluded one person from the gesture subset for occupying his hands, and three for video malfunction.

All participants were students at Belgian universities. Prior to or after taking part participants filled out a language background questionnaire (an adapted version of Gullberg & Indefrey, 2003). Information gathered included biographical information, self-rated proficiency measures, and information on language background and language use.

The Dutch-speaking monolinguals (aged 18-24 years, *M*=20) were recruited from the first year psychology student pool at the University of Leuven situated in the Dutch speaking part of Belgium (Flanders). All participants in this group were born in Flanders and reported that their native language as well as that of their parents' was (Belgian) Dutch. The French-speaking monolinguals (aged 17-30; *M*=22) were recruited from the University of Namur situated in the French speaking part of Belgium (Wallonia). Ten out of 11 participants were born in Wallonia. One person was born in France, but he had lived in Belgium for the last four years. All participants reported being native speakers of French.

All participants in the monolingual groups are functional monolinguals meaning that they only use one language on a day-to-day basis. Knowledge of other languages could not be ruled out. For example, all participants reported having some knowledge of English. In addition, since both Dutch and French are part of the school curriculum, all Dutch and a few French participants also reported having some knowledge of the other language. We ensured, however, that these and additional languages were not used fluently and frequently. While these two groups could be classed as minimally bilingual (Cook, 1992), for the sake of convenience we will refer to them as monolinguals here.

The bilingual participants (*N*=10, aged 18-31 years, *M*=22) were students at the Dutch-speaking university in Brussels, the Vrije Universiteit Brussel (VUB), who answered a call for bilingual participants sent out in both languages. All participants were functional bilinguals, meaning they used two languages (French and Dutch) fluently and proficiently on a day-to-day basis. Eight of participants were born in Brussels Capital Region, which is officially bilingual. The two remaining participants were born in the Dutch speaking part of Belgium. Similarly to the monolingual groups, the bilinguals also indicated having knowledge of other languages than French and Dutch. Again, we ensured that the languages were not being used frequently.

Self-rated proficiency scores were obtained for all known languages for speaking, writing, reading, and listening skills as well as grammar use and pronunciation. Skills were rated on a 5-point scale (1=very poor, 5=very good). A two-tailed t-test showed that the bilingual participants did not differ in their self-rated proficiency score for French and Dutch ($t(9)$= 0.572, p= 0.581).

Stimuli

In this study a set of 13 short cartoon clips was used as stimulus material, which was developed for a project investigating the description of motion events crosslinguistically as well as in L1 and L2 acquisition (e.g., Hickmann & Hendriks, 2010; Hickmann, Bonnet, & Taranne, 2009). The set of clips begins with a practice item, and the remaining 12 clips are experimental clips in which the MANNER and the PATH of motion (horizontal or vertical) are equally salient (e.g., a boy swimming across a river). The horizontal scenes each contained one target motion event (ACROSS) whereas the vertical items each contained two target motion events (UP and DOWN) resulting in a total of 18 target motion events. For a complete list of descriptions of the stimuli see Appendix 2.

Procedure

The task was a Director-Matcher task[4] (Clark et al., 1973) in which a speaker (the Director) describes a short video to an interlocutor (the Matcher) who then finds the corresponding picture among a series of illustrations. The Director was always the "real" participant while the Matcher was, for practical reasons, in some cases a confederate and in some cases a naïve participant. The Directors were instructed to watch the video clip on a laptop computer and at the end of each clip to describe to the Matcher what happened giving a description that was a complete as possible. The Matcher was instructed to find the picture that corresponded best to the description. Both participants were informed that the Matcher was allowed (and encouraged) to ask questions if necessary. The reason for this was to stimulate interaction and thus gesture production. Once the participants were

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[4] The set-up in this study differs from, for example, Hendriks and Hickmann (2011). In order to elicit (more) gestures, we substituted a simple description task for an interactive Director-Matcher task.

finished with one clip, the Director pressed a button to proceed to the next video. The first item was a training item to make sure all parties were clear on the procedure. Participants were recorded on audio and video.

Coding
Speech coding
Participants were asked to give a complete description of what they observed in the short clips. Typical descriptions contain more information than that related to the motion event. Sometimes, more than one main clause pertains to the motion event. In those cases all clauses were included in the analyses. Target clauses were coded for semantic density (SD) with respect to the semantic elements PATH and MANNER of motion. This coding scheme yields two possibilities:

1) One semantic element is encoded (SD1), i.e., MANNER-only (e.g., "He climbs") or PATH-only (e.g., "He goes up")
2) Two semantic elements are encoded (SD2), i.e., both MANNER and PATH (e.g., "He climbs up")

It is possible for a semantic element to be expressed multiple times within one target clause (e.g., *de muis klimt via de tafelpoot naar boven* "the mouse climbs up via the table leg"), but here we are not concerned with how often an element gets expressed, but rather with whether it is encoded or not. Therefore, the maximum semantic density in this study is 2.

Gesture coding
With the sound turned off all the gestures included in and overlapping with the target clauses were selected. Focusing on representational gestures that express some aspect of the content of speech, we included strokes, the most effortful and meaningful part of the movement (Kendon, 1980; McNeill, 1992), and post-stroke holds, when hands are temporarily suspended before moving on or retracting (Kita, 1993). Each selected gesture was then coded for semantic content with respect to the semantic elements MANNER of motion and PATH of motion. To determine MANNER of motion, we used Duncan's (2005) criterion of repeated, agitated movement. This includes, for example, wriggly fingers, and a hand repeatedly moving up and down. In the MANNER category we also included those gestures where a part of the character's body is mapped onto the body of the speaker (known as character viewpoint (McNeill, 1992) in the gesture literature). To determine the PATH element we relied on Kendon's definition of a single spatial excursion of a forelimb (Kendon, 1980). This overall scheme yielded two possible categories for semantic density (SD) in gesture:

1) One semantic element is encoded in the gesture (SD1), i.e., MANNER-only or PATH-only
2) Two semantic elements are encoded in the gesture (SD2), i.e., both MANNER and PATH

In those rare cases where it was unclear which semantic elements a gesture expressed, we excluded the gesture from analysis. We also excluded:

1) Gestures occurring with disfluencies. Gestures are affected by speech disfluencies, but the mechanisms for gesture generation during such episodes remain unclear and may differ from those that generate gestures during fluent speech. Given this uncertainty, we excluded such gestures (e.g., Graziano & Gullberg, 2013; Mayberry & Jaques, 2000; Seyfeddinipur, 2006).
2) Gestures referring to semantic elements other than MANNER or PATH of motion (e.g., FIGURE or GROUND expressions).

Note that it is possible for gestures to relate to multiple elements simultaneously. For example, it might not always be possible to distinguish between GROUND information and PATH information. In these cases the gesture was assumed to include both elements and was as such included in the analyses.

Co-expressivity
With the sound turned back on the speech occurring in synchrony with the gesture was noted. We subsequently considered the relationship between speech and gesture, investigating co-expressivity both at the clause level (henceforth called broad co-expressivity) and at the level of exactly aligned elements (henceforth called narrow co-expressivity).

Note that gestures hardly ever start and end in precise synchrony with words. Gestures cover multiple words as well as partial words. The criterion for whether or not a particular element co-occurs with a gesture is whether the gesture covers the syllable peak, the vowel of the syllable (following McNeill, 1992; Stam, 2006). For example, in *die kl**imt in die boom*** "which climbs in the tree" (speech-gesture overlap in bold), the gesture aligns with the verb *klimt* even if it does not cover the entire word.

Having determined the alignment between speech and gesture, we then coded the ensemble for co-expressivity. There were two possible co-expressivity categories:

1) MATCH, that is, speech and gesture matched exactly in the elements they expressed;

2) NON-MATCH, that is, gesture encoded information that added to the information encoded in speech (G-ADD) or speech expressed information that added to the information expressed in gesture (S-ADD).

The literature in this field has examined co-expressivity at very different levels of granularity. Following Gullberg et al. (2008), we applied the co-expressivity coding at two different levels. Broad co-expressivity compares the information that is expressed in the entire finite clause with the information expressed in a gesture. Narrow co-expressivity instead compares the information encoded in a gesture with the information that is expressed in the speech that exactly aligns with it, as exemplified in example (18) (speech aligned with the gesture in bold):

(18)
TARGET: UP

	en	*die*	*kruipt*	*de verlichtingsp**aal***	***omhoo**g*
Gloss	and	who	climbs	the lamppost	up
Semantics			MANNER		PATH
Gesture					PATH
Translation			"and he climbs up the lamppost"		

(PP ID:FL13; Item: XCHT-UP)

In speech the target main clause contains both semantic elements. MANNER of motion is encoded in the verb (*kruipen* "to climb/to crawl") and PATH of motion is encoded in a particle (*omhoog* "up"). The gesture only encodes PATH of motion. Thus, at the utterance level, speech adds information in relation to the gesture (i.e., NON-MATCH). At the level of exact alignment, however, both speech and gesture express PATH of motion, which means there is complete overlap (i.e., MATCH).

As a practical result of the fact that only two semantic elements are considered here, the narrow co-expressivity focused on a subset of the gestures. It is obviously possible for a gesture to co-occur with an element in speech that does not encode either MANNER or PATH information or both, but instead, for example, with a GROUND expression, such as *elle traverse **les voies*** "she crosses the tracks" (speech-gesture overlap in bold).

Interrater reliability
For each participant the gestures for the target utterances in two out of 12 items were coded by a second independent coder. The items were taken from the middle of the session in order to include the gestures that were most

representative. Cohen's kappa was used to establish inter coder reliability. Agreement for the number of gestures identified by the two coders in each target main clause was κ=.67 (substantial agreement). In addition, agreement for the semantic categorisation of gestures was κ=.65 (substantial agreement). In case of disagreement the judgment of the first coder was retained.

Analyses
We performed the following analyses:

(i) Semantic density of speech (SD1 and SD2)

The speech was analysed for semantic density, that is, whether a clause expressed one semantic element only (MANNER or PATH) or two semantic elements (MANNER and PATH). We tested the likelihood of SD2.

(ii) Semantic density in gesture (SD1 and SD2)

Gestures were analysed for semantic density, that is, whether a gesture expressed one semantic element only (MANNER or PATH) or two semantic elements (MANNER and PATH). We tested the likelihood of SD2.

(iii) Broad co-expressivity (MATCH and NON-MATCH)

We examined the relationship between speech and gesture at the level of the main clause. We analysed the likelihood of speech and gesture expressing the same semantic elements broadly distributed across the clause (i.e., MATCH).

(iv) Narrow co-expressivity (MATCH and NON-MATCH)

Finally, we examined the relationship between speech and gesture narrowed down to the elements that are exactly time-aligned. We analysed the likelihood of speech and gesture expressing exactly the same semantic elements (i.e., MATCH).

(v) A post-hoc analysis of the differences between a broad and a narrow perspective.

We used the R package lme4 (Bates, Maechler, Bolker, & Walker, 2014) to perform multilevel logistic regression analyses, and multcomp (Hothorn, Bretz, & Westfall, 2008) to extract additional contrasts not included in the model output and to correct for multiple comparisons. Elicited speech and especially gesture production data are variable in nature. One advantage of multilevel modelling is the possibility to include random

factors in the analysis allowing slopes and/or intercepts to vary for, in this case, each person or item, thereby accounting for part of the variance in the data (Baayen, 2008; Baayen et al., 2008; Jaeger, 2008). Note that although analyses are performed on long data throughout this paper, figures show mean proportions for ease of exposition.

Results

Semantic density in speech
First, we considered how many of the semantic elements MANNER and PATH of motion were encoded in speech. Utterances could encode one semantic element only (SD1), namely MANNER or PATH of motion (e.g., *the squirrel climbs* or *the squirrel goes up*), or they could encode two semantic elements (SD2), namely both MANNER and PATH of motion (e.g., *the squirrel climbs up*). We tested the likelihood of SD2 utterances with language (French or Dutch) and group (monolingual or bilingual) as fixed effects and participant and item as random factors. Figure (1) summarises the results. Both the monolinguals and bilinguals in French produce fewer SD2 than SD1 utterances, whereas both monolinguals and bilinguals in Dutch produce more SD2 than SD1 utterances. The results show that the bilinguals in French do not differ from the monolinguals in French (β=-0.09485, *SE*=0.42492, *p*=n.s.). The monolinguals in Dutch are significantly more likely than the bilinguals in Dutch to encode two semantic elements (β=1.10518, *SE*=0.39508, *p*=0.0188). The bilinguals also differ significantly from themselves; they are less likely to encode two semantic elements in French than in Dutch (β=-1.65747, *SE*=0.26081, *p*<0.001).

Overall, there are thus distinct patterns for French and Dutch. The bilinguals in French adhere to the language-specific pattern. In Dutch, however, the bilinguals produce a pattern that is similar but not identical to the monolingual Dutch pattern.

SEMANTIC DENSITY SPEECH

Figure 1. *Overall mean proportion of responses expressing semantic density (SD) 2 (PATH and MANNER) per group. Error bars = SE.*

Semantic density in gesture

Secondly, we considered semantic density in gesture, that is, whether one or both of the semantic elements MANNER and PATH of motion are encoded in gesture. Figure (2) shows the results. Although all possibilities occur, there is an overwhelming preference for gestures encoding only one element and, typically, this element is PATH of motion. We tested the probability of two elements being encoded with language (French or Dutch) and group (monolingual or bilingual) as fixed effects and participant and item as random factors. The monolinguals and bilinguals in French do not differ from each other (β=0.5442, *SE*=0.6624, *p*=n.s.), nor do the monolinguals and bilinguals in Dutch (β=-0.4917, *SE*=0.6006, *p*=n.s.). The bilinguals also do not differ in French and in Dutch (β=-0.4674, *SE*=0.3568, *p*=n.s.).
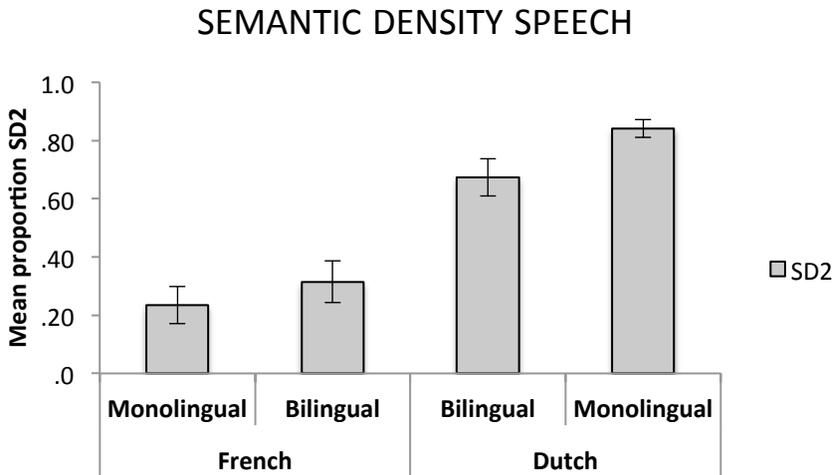
SEMANTIC DENSITY GESTURE
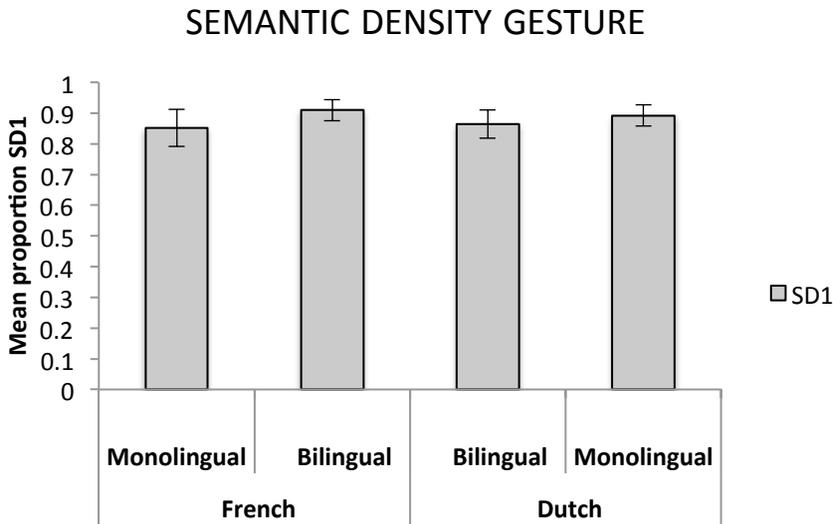
Figure 2. *Overall Mean Proportion of Responses Expressing Semantic Density (SD) 1 (PATH or MANNER) in Gesture per Group. Error bars =SE*

Co-expressivity (broad)

Thirdly, we considered speech and gesture co-expressivity at the broad level, that is, to what extent speech and gesture express the same information when we compare gestures to speech in the clause they are aligned with. We tested the likelihood of a MATCH (i.e., speech and gesture express exactly the same information) with language (French or Dutch) and group (bilingual or monolingual) as fixed effects and participant and item as random factors. Figure (3) shows the results. Both monolinguals and bilinguals in French produce more matches than non-matches, whereas both the monolinguals and bilinguals in Dutch produce more non-matches than matches. The results show that the bilinguals do not differ from monolinguals in either language (French β=-0.05995, *SE*=0.38581, *p*=n.s.; Dutch β=-0.80858, *SE*=0.35614, *p*=n.s.). The bilinguals do, however, produce significantly more matches in French than they do in Dutch (β=1.08567, *SE*=0.25009, *p*=n.s.). For broad co-expressivity, then, the monolingual speakers produce language-specific patterns that are also apparent in the bilingual sample.

CO-EXPRESSIVITY (BROAD)

Figure 3. *Overall mean proportion of responses per group showing exact matches in speech and gesture. Error bars = SE.*

Co-expressivity (narrow)

Next, we examined speech and gesture co-expressivity at the narrow level, that is, to what extent speech and gesture express the same information when we compare gestures to the elements of speech they are exactly aligned with. We tested the likelihood of a MATCH (i.e., speech and gesture express exactly the same information) with language (French or Dutch) and group (bilingual or monolingual) as fixed effects and participant and item as random factors. Figure (4) shows the results. Again, the results show that monolinguals and bilinguals do not differ from each other in either language (French β=-0.37045, *SE*=0.3344, *p*=n.s.; Dutch β=-0.4672, *SE*=0.2728, *p*=n.s.). The bilinguals in French also do not differ from themselves in Dutch (β=0.6064, *SE*=0.2837, *p*=n.s.). Both monolinguals and bilinguals in French as well as bilinguals in Dutch produce more matches than non-matches. Monolinguals in Dutch, however, produce roughly the same amount of matches and non-matches. The patterns for narrow co-expressivity thus show language-specific patterns in the sense that the monolinguals in Dutch produce significantly fewer matches than the monolinguals in French. The bilinguals, however, do not uphold these patterns. They do not differ in French and Dutch.
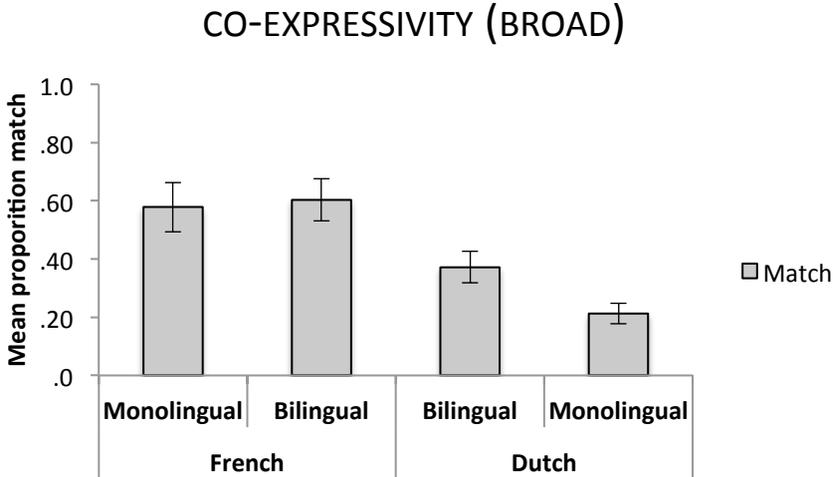
CO-EXPRESSIVITY (NARROW)
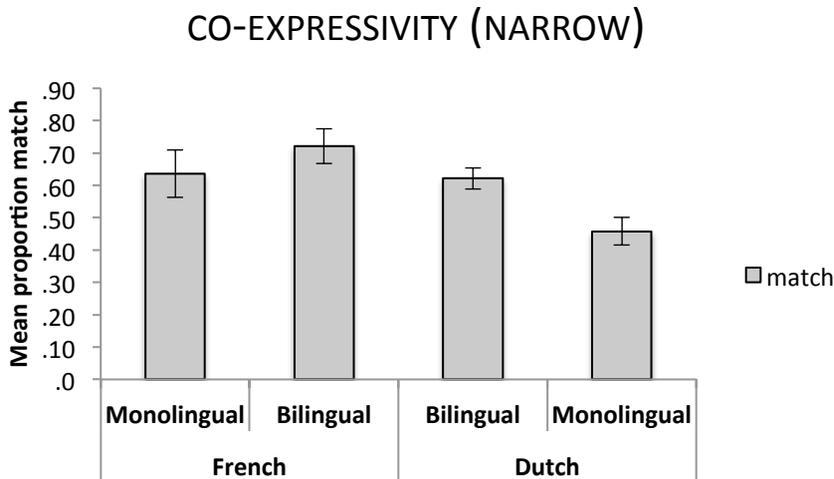
Figure 4. *Overall mean proportion of responses per group showing exact matches in speech and gesture. Error bars = SE.*

A post-hoc analysis of the differences between a broad and a narrow perspective

In order to shed more light on the differences between the broad and narrow co-expressivity analyses, we examined the speech-gesture combinations that changed status between the broad and narrow analyses in more detail.

The largest change in status are those gesture-speech combinations that constitute a speech-add in the broad sense and a match in the narrow sense, meaning cases where speakers align their gesture with a speech element expressing the same information. This happens to a greater extent with the bilinguals in Dutch. They are producing a pattern that exists in the monolingual sample. But they seem to extend it, producing a pattern that is closer to the French pattern and closer to themselves in the other language in the process. Examples (19) and (20) show the same bilingual describing a motion event in French and in Dutch. In both cases she produces a PATH-only gesture. In French this results in a match for broad co-expressivity since the only motion element she uses is a PATH verb, namely *redescendre*. In Dutch, however, this results in a speech-add for broad co-expressivity as she produces both a MANNER element, i.e., the verb *kruipen* "to crawl," and a PATH element, i.e., the prepositional phrase *naar beneden* "down," in speech. For the narrow co-expressivity nothing changes in French, although note that the gesture is exactly aligned with the content verb. In Dutch,

however, the narrow analysis produces a speech-gesture match since the gesture is exactly aligned with *naar beneden,* that is, with the part of speech the expresses the PATH of motion. In terms of semantic content, then, the exactly aligned speech-gesture pairings look very similar in French and Dutch for the bilinguals, i.e., they show the same narrow co-expressivity in both languages.

(19)

PREPARATION	PRE-STROKE HOLD	STROKE	POST-STROKE HOLD
et ensuite el	*le*	*va redesc*	*endre*
and then sh	e	goes redesc	end

'and then she redescends'

(20)

	PREPARATION	PRE-STROKE HOLD	STROKE
en	*dan k*	*ruipt ie*	*terug naar bene[den]*
and	then c	rawls he	back down

'and then he crawls back down'

Discussion

This study explored how monolingual and bilingual speakers of Dutch and French speak and gesture about voluntary motion events. Specifically, we asked whether bilinguals show cross–modal evidence of convergence or not, and if so, whether it modifies the nature of the patterns of convergence as compared to uni–modal, that is speech–only, findings.

The speech results show that monolinguals and bilinguals in French mostly, though not exclusively, encode one semantic element in their spoken utterances. Typically this is path of motion and this is expressed in the main verb. Both monolingual and bilingual speakers of Dutch typically express two semantic elements, that is, both manner and path of motion, in their semantically denser spoken descriptions, encoding manner in the main verb

and path outside the verb. Whereas in French the monolingual and bilingual patterns look identical, in Dutch they are merely similar. The bilinguals in Dutch produce more semantically lean utterances encoding only one semantic element (path) than the monolinguals, similar to the French pattern. The bilinguals thus show convergence with a shift of one of the languages (Dutch), but not the other (French). The uni–modal data show convergence instantiated as a redistributive type of convergence. That is, the overall patterns are the same for monolinguals and bilinguals, but there is an asymmetrical change in the relative frequency with which certain elements are encoded in one of the languages (see also, e.g., Hohenstein et al. 2006).

When we consider the multimodal patterns of semantic density and examine what elements are expressed in gesture, the results show that the gestures that co–occur with the spoken descriptions do not differ between French and Dutch, nor between the monolinguals and bilinguals. All groups produce a vast majority of path–only gestures even though manner–only and manner + path gestures do also occur. For Dutch this might sound surprising given the focus in the gesture literature on the conflated expression of both manner and path in gesture (e.g., Kita & Özyürek, 2003). However, the result is in line with studies of English and other languages using similar stimulus materials (e.g., Gullberg et al., 2008; Hickmann et al., 2011).

The analyses of co–expressivity, that is, the extent to which speech and gesture express exactly the same information, reveal different patterns depending on the level of granularity. Results of co–expressivity in a broad sense (i.e., at the clause level) show language specific patterns. Monolinguals in French produce more matches than non–matches, whereas monolinguals in Dutch produce more non–matches than matches. These patterns change in analyses of co–expressivity in a narrow sense (i.e., of gestures and exactly aligned speech) although language–specific patterns can still be observed. The monolinguals in French produce mostly matches, whereas the monolinguals in Dutch differ from monolinguals in French in that they produce roughly the same amount of matches and non–matches.

The monolingual results in French match previous studies (Gullberg et al., 2008; Hickmann et al., 2011). Results for Dutch are in line with earlier findings in the sense that, like English (another satellite–framed, Germanic language) Dutch speakers match more in the narrow sense than in the broad sense (Hickmann et al., 2011), but not to the same extent as English speakers. This finding might be explained by the fact that in Dutch (path) particles are less fixed to a certain position in the clause, leaving speakers more options for path gesture alignment (see Kellerman & van Hoof, 2003 for a similar argument).

The broad co–expressivity patterns for bilinguals show identical patterns in the monolinguals and bilinguals in French. However, in Dutch

the bilinguals produce fewer matches than the monolinguals. This is not surprising given the speech results. For narrow co–expressivity the monolinguals and bilinguals in French still do not differ. The bilinguals in Dutch produce a pattern that looks more French–like, producing more matches than non–matches, even if they do not differ statistically from monolinguals in Dutch. They also do not differ from themselves in French. Overall, the results indicate that speakers typically align their gestures with the elements in speech that express the same information whether they are mono– or bilingual, but that bilinguals in Dutch do this to a greater extent than monolinguals in Dutch.

Convergence

This study examined whether there is evidence of convergence when patterns in speech and gesture are considered jointly. The results show that there is. Convergence patterns of co–expressivity at the clause level closely follow the convergence patterns observed in speech–only. That is, in French no convergence occurs, whereas in Dutch the bilinguals exhibit a pattern in between the monolingual Dutch speakers and themselves in French.

We also examined the nature of the convergence patterns. Recall that for the uni–modal, speech–only, patterns, convergence manifested itself as a redistributed convergence pattern, in line with other voluntary motion studies. Bilinguals in Dutch used more path–only expressions than monolinguals in Dutch, creating a pattern that is closer to the typical pattern in French in which the fast majority of utterances encode only path. By also examining gestures, we explored whether multi–modal patterns would give cause to reassess the type of convergence observed. The patterns we observe for the bilinguals are not indicative of gesture being used as a compensatory device nor as a reflection of a richer underlying representation as the result of a cumulative bilingual system. Instead, in cases where speech and gesture do not match, *speech* is typically semantically denser than gesture. In other words, gesture is not used to express additional distinctions or information, but speech and gesture maintain the same narrow co–expressivity.

Gesture is also not used to address the asymmetry found in speech–only patterns. In chapter IV we argue that convergence occurs when there is a viable option in one or both of the languages and a clear target to move towards. In spoken French there are few opportunities to shift easily, whereas in Dutch possibilities abound resulting in convergence achieved by shifts in Dutch only. For example, for descriptions of downward movement (e.g., A squirrel climbing down a tree) Dutch speakers use two options frequently, a manner verb + path satellite (e.g., *hij klimt naar beneden* 'he climbs down') and a semantically light verb + path satellite (e.g., *hij gaat naar beneden* 'he goes down'), whereas French speakers typically only use a

path verb (e.g., *Il descend* 'he descends'). Dutch thus provides more possibilities for shift. However, it has on occasion been argued that convergence is by necessity a bidirectional process (e.g., Czechowska & Ewert, 2010; Pavlenko, 2009a). Conceivably, gesture patterns might be the ideal loci to redress the balance and multimodally also show a shift in French. For example, an increased use of manner gestures in French would shift the languages closer together in terms of overall semantic density. However, this does not happen. This suggests that, whereas the nature of convergence may be inherently bidirectional, for a specific feature it might be expressed by a shift in only one of the languages.

The practical implications of convergence

The current study discusses convergence as a natural occurrence in bilingual language use. It is worth re–emphasizing that in line with other studies the observed patterns are not considered instances of incomplete acquisition or attrition. The language history and use of the participants in this study make these implausible explanations for the observed patterns. Given the prevalence of convergence in bilingual speech we should be concerned with its implications beyond the individual's linguistic system.

An observation in studies of the bilingual system is that convergence is a natural occurrence which '[…] makes a bilingual's two languages different from both as spoken by monolinguals, but it leaves the bilingual no less expressive or proficient a language user' (Ameel et al., 2009, pp. 271). This observation does not, however, preclude convergence from having consequences beyond the bilingual individual's production such as in an interactional setting or in a formal educational (classroom) setting. These issues have rarely been addressed in the literature. For example, given that the types of effects observed here are subtle and of a redistributive nature, it is not clear whether from a point of view of formal accuracy (e.g., a language teacher) these patterns are a) perceived at all or b) perceived as being problematic. Redistributive converged patterns could conceivably be too subtle to be noticed. Further studies are needed to assess the perception and conversational implications of converged production patterns before we can say anything tangible about the consequences of convergence in the classroom.

However, it should be noted that different types of convergence might lead to different conclusions in this regard. For example, convergence of grammatical gender in which the use of one of the determiners is overgeneralized to include the other could more easily be classified as violating the grammatical rules of the language. These might therefore be more marked than subtle shifts in frequency of use of particular elements (see also changes in verb semantics, e.g., Alferink & Gullberg, 2014).

Cornips (2008) suggests that social motivations are partly driving grammatical gender overgeneralisations, implying that at least some patterns are intended to be noticed.

The present study shows that convergence not only occurs in speech, but also in gesture. The observed patterns of bimodal convergence suggest that gestures are not a not a cheap window onto the mind, a peek at what is really going on. Instead, they are an expressive channel encoding patterns compatible with patterns in speech. The consequences of converged gesture patterns for classroom teaching remain an open question. A limited number of studies have examined second language acquisition and gesture in a classroom setting (e.g., see papers in McCaffery & Stam, 2008), but bilinguals have so far not been studied and the question whether gesture makes a difference in formal contexts therefore remains wide open to exploration.

Conclusions

This paper has examined multi–modal convergence applying both a broad and a narrow perspective on the relationship between speech and gesture and between the bilingual's languages. Broad co–expressivity analyses show multi–modal convergence that is largely driven by changes in the speech pattern. Narrow co–expressivity analyses, however, show us that patterns of convergence are truly multimodal. Evidence of multimodal convergence suggests that we should not think of gestures simply as loci for compensation or facilitation in multilingual language use and L2 acquisition. The bilingual speech and gesture system is a complex system exhibiting a degree of internal, within–speaker consistency. Parallel to discussions about the bilingual native speaker we can examine the bilingual multimodal native speaker and consider their native variety as a natural result of bilingualism and not as a compensable deficiency. Speech and gesture are an integrated system and thus exhibit parallel patterns of convergence across modalities.

CHAPTER IV

PATTERNS OF CONVERGENCE DIFFER WITHIN A SEMANTIC DOMAIN: THE ROLE OF WITHIN-LANGUAGE VARIATION

Abstract

Speakers' use of more than one language on a regular basis has an effect on the way in which each of those languages is used and stored. A frequent observation is that convergence occurs, that is, languages in contact in society or in an individual move closer to each other in areas where enough similarity (and contact) is established. This study seeks to deepen our understanding of convergence and asks where we observe instances of convergence and where we do not within the semantic domain of voluntary motion. Specifically, we investigate the role of monolingual within-language variability as a driving force for observed patterns of convergence in the French and Dutch of Belgian bilinguals across different types of events. Results show that patterns of convergence vary by event type, location in the utterance, and language. For example, for ACROSS-events there is a shift in the use of a particular verb in both languages, namely traverser / oversteken "cross," whereas for DOWN-events shifts can only be observed in Dutch. We argue that the existing fine-grained variability in the monolingual varieties can help explain the observed bilingual patterns.

Introduction[5]

The use of more than one language by a single person inevitably results in changes in one or both languages as compared to monolingual versions of those languages. Some studies suggest that the languages of a bilingual move closer to each other, in other words they converge (e.g., Ameel et al., 2005; Bullock & Toribio, 2004). Exact definitions of convergence vary, for example, in terms of directionality of shift(s) and the nature of the pattern. Some argue that in order for convergence proper to occur, both languages need to shift (e.g., Czechowska & Ewert, 2011; Pavlenko, 2009a), whereas others include both bidirectional and unidirectional shifts providing the resulting patterns are more similar (e.g., Ameel et al., 2009; Bullock & Gerfen, 2004). Similarly, the nature of converging patterns is subject to discussion, with some studies considering convergence as truly in-between the monolingual patterns (e.g., Treffers-Daller & Tidball, 2012), where others consider them to be different from both monolingual patterns (e.g., Pavlenko, 2009a). The current study uses an inclusive definition, considering both bi- and unidirectional shifts to be potential instances of convergence. It also leaves the nature of the patterns unspecified to include both in-between type patterns and patterns that are different altogether.

Muysken (2013) suggests a possible mechanism underlying convergence formulated as, "match between the L1 and L2 where possible" (pp.709). Previous studies of convergence have focused, for example, on category structure for objects (e.g., Ameel et al., 2005, syntactic constructions (e.g., Müller & Hulk, 2001), and lexical semantics (e.g., Alferink & Gullberg, 2014) with results showing revised category structure, changes in frequency distribution, and more general semantics, respectively, in bilinguals relative to monolinguals. However, despite the literature on convergence, we still have a poor understanding of where convergence

manifests itself in bilingual systems, and of the mechanisms that drive it. Therefore, this study aims to examine these issues, taking the expression of multiple semantic elements across a clause in the domain of voluntary motion as its sample domain.

We examine *where* functional French-Dutch bilinguals show evidence of convergence and where they do not, and whether this differs depending on whether we take a coarse-grained approach, examining overall patterns of semantic density (the number of semantic elements expressed), or a fine-grained approach, investigating particular semantic properties of individual expressive devices (e.g., the main verb). In addition, we examine the role of within-language variability in monolingual samples to investigate the hypothesis that loci of variation in one of the languages is a prerequisite for convergence.

Voluntary motion

Expressions of voluntary motion describe an entity moving of its own accord, such as a cat jumping onto a ledge or a cyclist biking. There is well-described variation across languages and within languages in how these events are encoded. Motion descriptions typically encode multiple semantic elements distributed across the entire description, namely PATH of motion, FIGURE, GROUND, and the fact of motion (Talmy, 1985, 1991, 2000). This complexity and variability allows for many possibilities when it comes to systems in contact.

Talmy (1991, 2000) categorises languages based on where they lexicalise PATH of motion and proposes two types of languages: 1) verb-framed languages (v-languages), and 2) satellite framed languages (s-languages) (see also Slobin, 2004; for alternative approaches to this typology, see, e.g., Beavers et al., 2009; Berthele, 2004; Croft et al., 2010; Zlatev et al., 2012). V-languages typically lexicalize the PATH-element in the verb root, as can be seen in an example from French in (21), whereas s-languages typically lexicalize it in a satellite, as can be seen in an example from English in (22).

(21)
L'écureuil   **monte** dans l'arbre.
The squirrel   **ascends** in the tree
                    PATH
(22)
The squirrel climbs **up** the tree
                    PATH

Importantly, the typological classifications are based on the typical or default pattern in a language, and are not an exhaustive description of the possible patterns in a given language.

There are optional elements in a motion event, such as MANNER of motion. Slobin (1996b) suggests that MANNER of motion is more easily lexicalised in s-languages, because the (obligatory) element PATH is encoded in a satellite, thereby enabling the verb to easily encode additional information. This prediction is supported by the large collections of MANNER-verbs available in s-languages (Slobin, 2006, p. 71). However, to account for differences in MANNER encoding *within* typological categories, Slobin (2006) suggests a "cline of MANNER salience" (pp.66) whereby, for example, MANNER is more central to motion expressions in Slavic languages than in Germanic languages, even though both families belong to the category of s-languages (cf. Filipovic & Vidakovic, 2010; Pavlenko, 2009c).

The two languages in the current study, French and Dutch, differ in their typological classification, with French being a v-language and Dutch being an s-language.

French

French is a v-language (Fibigerová et al., 2012; Hickmann & Hendriks, 2006; Kopecka & Colin, 2009; Ochsenbauer, 2010; Pourcel & Kopecka, 2005), which typically encodes the PATH of motion in the verb and has a large collection of PATH verbs available (e.g., *monter* "go up," *traverser* "cross"). MANNER verbs do exist in French, but their use is constrained to non-boundary-crossing events, as in example (23), and certain fixed expressions (Pourcel & Kopecka, 2005).

(23)
Il marche   le long   de la route
he walks   along of   the road
"he is walking along the road"
 (example from Pourcel & Kopecka, 2005, p. 35)

Although French exhibits many characteristics of v-languages, it has been suggested that its status is more complicated (Kopecka, 2006). The notion of *the typical pattern* is less straightforward when a variety of event types are considered (Hickmann 2006), such as upward, downward, and horizontal movement. For example, for descriptions of DOWN-events the typical pattern in French is PATH expressed in the verb and MANNER absent (e.g., *L'ours descend de l'arbre* "the bear comes down the tree"). However, for UP-events two frequent patterns co-exist: one where only PATH is encoded (e.g., *L'ours monte dans l'arbre* "the bear goes up in the tree"), and one where both MANNER and PATH are expressed (e.g., *L'ours grimpe dans*

l'arbre "the bear climbs up in the tree"). The latter pattern is due to the fact that besides the typical PATH-verbs there is a lexical verb, *grimper* "climb up," which denotes both MANNER and upward PATH.

To summarise, French conforms to the typical patterns of a v-language to a certain extent, but there is a wider variety of contextually appropriate patterns.

Dutch
Dutch is an s-language (Talmy, 1991) and although it is on the lower of end of Slobin's cline of MANNER salience (Slobin, 2006, p. 67), it has a rich vocabulary of MANNER verbs, such as *klimmen* "to climb" and *klauteren* "to clamber." In addition, Dutch has a limited number of particle verbs with inherent PATH, such as *(af)dalen* "to descend," *oversteken* "to cross," (Haeseryn et al., 1997; Van Staden et al., 2006), and a number of verbs that express the fact of motion without explicitly encoding its MANNER or PATH, such as *(zich) bewegen* "to move (oneself)" and *gaan* "to go." Dutch typically encodes MANNER in the verb root and PATH in a satellite, that is the typical pattern of s-languages, although the use of a general motion verb can modulate this.

French and Dutch thus differ in their broad patterning. French is reported to be a v-language albeit with considerable within-language variation. Dutch, although less well described, is reported to be a typical s-language, but one where the patterns of variation remain unclear.

Voluntary motion in more than one language
Typological variation provides interesting challenges for languages in contact. A small number of studies have investigated the expression of voluntary motion in functional bilinguals from the perspectives of language dominance (typically operationalised as age of acquisition, Hohenstein et al., 2006; Volynsky, 2012; or as language use and ambient language, Daller et al., 2011). Others have examined the functional bilingual expression of motion from the perspective of non-linguistic conceptualisation (Filipovic, 2011), and the characteristics of a contact variety (Berthele, 2004) (for studies of voluntary motion in second language acquisition see, for example, Cadierno & Ruiz, 2006; Cadierno, 2010; Filipovic & Vidakovic, 2010; Hendriks & Hickmann, 2011; Jessen, 2014). Results show that overall bilingual patterns do not differ widely from monolingual patterns, but that there are shifts in the frequency with which certain verbs or constructions are used. For example, Hohenstein et al. (2006), find that both monolinguals and bilinguals use PATH verbs as well as MANNER verbs in Spanish and in English, but bilinguals use more PATH verbs in English and fewer PATH verbs in Spanish compared to the monolinguals (see Daller et al., 2011 and Berthele 2004 for similar findings in different language pairs).

In addition, Hohenstein et al. (2006) find that more MANNER verbs than other verbs are produced both in Spanish and in English (tokens), but the number of different MANNER verbs (types) is much higher in English. Similarly, a lower token frequency of MANNER verbs has been found for bilinguals in English compared to English monolinguals as well as a reduced number of verb types for English bilinguals (Filipovic, 2011). Volynsky (2012) finds that Russian-English bilinguals had a lower lexical diversity score than L1 Russian speakers. They also encoded MANNER of motion less frequently using fewer types. However, in their encoding of PATH they did not differ from the L1 Russian speakers. Additionally, no differences were found between the L1 English speakers and Russian–English bilinguals in English (see also Pavlenko, 2009c).

All studies also examine what is encoded outside the verb. Treffers-Daller (2012) finds combinations of PATH verbs and PATH satellites in Brussels French, such as *tomber en bas* "fall downward" (see also Berthele, 2004 and Daller et al., 2011, for redundant path verb + path satellite combinations in a Swiss German dialect and by German-Turkish bilinguals in Turkish respectively).

With respect to MANNER of motion outside the verb, Daller et al. (2011) allude to MANNER being expressed in an adverbial expression by Turkish-German bilinguals but provide no statistical analysis. Hohenstein et al. (2006) do investigate MANNER modifiers (prepositional phrases, adverbs, and gerunds) and find that they are used less often in English than in Spanish, but more interestingly, also less often by bilinguals than monolinguals in both languages.

Overall, the bilingual studies show patterns for the bilinguals that are similar to the monolingual patterns, that is, they show language-specificity. Bilinguals use the same encoding options as monolinguals, but the frequency distribution of these encoding options may differ. Furthermore, more detailed approaches show evidence of subtle differences in production, patterns hinting at a system that is simultaneously simplified, for example with regard to the diminished diversity in the verb use (Pavlenko, 2009c; Volynsky, 2012), and more ornate, for example with regard to the use of redundant PATH particles (Berthele, 2004; Daller et al., 2011). These results highlight the various possible patterns of convergence, whereby one pattern shows convergence on existing overlap leading to a leaner system, and another shows convergence as a cumulative system in which features in one language also occur in some form in the other language.

The current study

The emergent picture from studies of how bilinguals handle voluntary motion is one of both similar and dissimilar patterns to monolinguals, suggesting that we need a view of the bilingual system that allows for more variability. In the current study we ask whether the semantic encoding patterns concerning MANNER and PATH of motion in French-Dutch bilinguals vary depending on whether we apply a coarse-grained or fine-grained perspective. First, we consider patterns in overall semantic density, that is, how many of the semantic elements PATH and MANNER of motion are encoded overall (coarse-grained). We then look at the various expressive devices (the main verb and periphery) in more detail (fine-grained).

A second point that emerges from motion studies is that the typical patterns of description differ depending on the type of motion event being described. Therefore, we also investigate the role of variation, and ask whether the presence of convergence in functional bilinguals depends on the type of event being described.

Methods

Participants

A total of 59 students between the ages of 17 and 51 years enrolled at Belgian universities participated in this study. Participants came from one of three groups: monolingual (Belgian) French speakers (*N*=19), monolingual (Belgian) Dutch speakers (*N*=26), and bilingual French-Dutch speakers (*N*=14). Participants filled out a language background questionnaire (adapted from Gullberg & Indefrey, 2003) providing biographical information, self-rated proficiency measures, information on language background, and language use.

The Dutch-speaking monolinguals (*N*=26, age 18-24 years, *M*=20) were psychology students at the University of Leuven situated in the Dutch speaking part of Belgium (Flanders). All were born in Flanders and had (Belgian) Dutch as their native language. The French-speaking monolinguals (*N*=19, age 17-51; *M*=24) were students the University of Namur situated in the French speaking part of Belgium (Wallonia). Seventeen out of 19 participants were born in Wallonia. One person was born in France, but had lived in Belgium for the last four years. Another was born in Germany to French-speaking parents and reported not knowing any German. All participants reported being native speakers of (Belgian) French.

All participants in the monolingual groups are functional monolinguals, that is they only use one language on a daily basis. However, all participants reported having some knowledge of English. In addition, all of the Dutch and some of the French participants reported having some knowledge of the other language, since both Dutch and French are part of

the school curriculum. We ensured, however, that these and additional languages were not used fluently and frequently. Following Cook (1992) these two groups could be called minimally bilingual, but for the sake of convenience we refer to them as monolinguals in this paper.

The bilingual participants (*N*=14, aged 18-31 years, *M*=21) were recruited at the Vrije Universiteit Brussel (VUB), the Dutch-speaking university in Brussels. Participants in this group can be described as functional bilinguals since they use two languages (French and Dutch) fluently and proficiently on a daily basis.

Self-rated proficiency scores were obtained for all known languages for speaking, writing, reading, and listening skills as well as grammar use and pronunciation. Skills were rated on a 5-point scale (1=very poor, 5=very good). A two-tailed paired samples t-test of the average score showed that the bilingual participants did not differ in their self-rated proficiency score for French and Dutch (t (13)= 1,52875, p= 0.15).

Stimuli

In this study a set of 13 short cartoon clips was used as stimulus material. These clips were originally designed for a large project investigating motion event descriptions crosslinguistically as well as in L1 and L2 acquisition (e.g., Hendriks & Hickmann, 2011; Hickmann et al., 2009). The set of clips begins with a practice item, and the remaining 12 clips are experimental clips in which the MANNER and the PATH of motion are equally salient (e.g., a woman on a bike crossing a level crossing). The clips contain 18 target events of which six express horizontal motion ACROSS, six express vertical motion UP, and six vertical motion DOWN. For a complete list of descriptions of the stimuli see Appendix 2.

Procedure

In order to obtain semi-spontaneous descriptions of motion events a Director-Matcher task[6] (Clark et al., 1973) was used in which a speaker (the Director) describes the short stimulus video to an interlocutor (the Matcher) who then finds a corresponding picture of the event among a series of illustrations. The Director was always the "real" participant while the Matcher was, for practical reasons, in some cases a confederate and in some cases a naïve participant. The Directors were instructed to watch the video clips on a laptop computer at the end of which they had to describe to the

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[6] The set-up in this study differs from, for example, Hendriks and Hickmann (2011) in order to elicit co-speech gestures as an additional part of the study. We substituted an interactive Director-Matcher for a simple description task.

Matcher what happened with as complete a description as possible. The Matcher then looked for the picture that corresponded best to the description. The Matcher was allowed (and encouraged) to ask questions if necessary in order to ensure interaction between the participants. Once the Matcher was finished and ready to move on to the next video, the Director pressed a button to proceed. The first item was a practice item. Participants were recorded on audio and video.

Coding

Since participants were asked to describe the short clips as completely as possible, the resulting descriptions typically contained more than just the voluntary motion information. A typical complete description of an item by a monolingual Dutch-speaking participant is given in example (24). The clauses in bold are the target parts of the description:

(24)

FIGURE	d'r is een muisje
	"there's a little mouse"
ENTER	dat komt aangetrippeld
	"that comes tiptoeing in"
ENTER	naar een tafel loopt ie toe
	"it walks towards a table"
TAR:UP	**dan kruipt ie langs de linker tafelpoot omhoog**
	"then it climbs up along the left table leg"
IRR	om een stukje kaas te pakken
	"in order to grab a block of cheese"
IRR	pakt het stukje kaas op
	"picks up the cheese"
TAR:DOWN	**en kruipt terug naar beneden langs dezelfde tafelpoot**
	"and climbs back down along the same table leg"
EXIT	en trippelt weer weg
	"and tiptoes away again."

For each item a (finite) target clause has to be selected for analysis following Hickman et al. (2009). Often only one target clause is relevant, but in cases where there are several, the following criteria are used:

1) Semantic richness (the semantically richest clause is used)
2) If two (or more) clauses are equally rich, the clause expressing the core schema, i.e., PATH of motion, is used.

The target parts of the descriptions were annotated for encoding of the semantic elements PATH and MANNER. See Table 5 for an overview of the encoding options for MANNER of motion and Table 6 for an overview of the

encoding option for PATH of motion in French and Dutch. This yields three possibilities for a complete clause:

      1) MANNER only (e.g., "The mouse is climbing")

      2) PATH only (e.g., "The mouse goes up")

      3) both MANNER and PATH (e.g., "The mouse climbs up")

Since we are only considering the semantic elements MANNER and PATH of motion, a description can have a semantic density score of SD1 (either PATH or MANNER is encoded), or SD2 (both MANNER and PATH are encoded).

For the main verb there are four possibilities: motion in a light verb (0), MANNER in a MANNER verb (M), PATH in a PATH verb (P), or MANNER + PATH in a conflated verb (MP).

Table 5. *Encoding options for* **MANNER** *of motion in Dutch and French.*

MANNER elements	Verb	Periphery		
		Gerund	Nominal	Adverb
French	*Grimper* "climb up"	*En courant* "running"	*La cycliste* "the cyclist"	*En vèlo* "by bike"
Dutch	*Klimmen* "climb"	*Zwemmende* "swimming"	*De zwemmer* "the swimmer"	*Op the fiets* "by bike"

Table 6. *Encoding options for* **PATH** *of motion in French and Dutch.*

PATH elements	Verb	Periphery	
		Satellite	Prepositional phrase
French	*Monter* "ascend"	*en traversant* "crossing"	*le long de la patte de la table* "along the table leg"
Dutch	*Oversteken* "cross"	*omhoog* "up"	*in de boom* "in the tree"

Analyses

We performed the following quantitative analyses:

    I   What semantic information is encoded?

         1. Overall semantic density

> II.   Where are the semantic elements encoded?
>   1. What is encoded in the main verb?
>   2. What is encoded in the periphery?

We performed analyses over all items, and broken down by item type (UP, DOWN, and ACROSS). We analyzed the data using multilevel logistic regression using the R package lme4 (Bates, Maechler, & Bolker, 2011) and the multcomp package (Hothorn, Bretz, & Westfall, 2008) to extract contrasts that were not included in the model output and to correct for multiple comparisons. One advantage of multilevel modelling is the possibility of entering terms into the analysis that are not the primary interest but that do account for part of the variance in the data, such as in this case the variation accounted for by participants or items. Free production data shows a considerable amount of variation depending on who is talking and what is being talked about. It is possible to include this as random factors in the analysis allowing slopes and/ or intercepts to vary for each person or item (Baayen, 2008; Baayen, Davidson & Bates, 2008; Cook et al., 2012; Jaeger, 2008).

Results

Overall semantic density
First, we analysed overall semantic density (SD), that is, how many semantic elements of the elements MANNER and PATH of motion were encoded. A description can in theory have a semantic density score of SD0 (neither PATH nor MANNER is encoded), SD1 (either PATH or MANNER is encoded), or SD2 (both PATH and MANNER are encoded). Since SD0 does not occur, we compare SD1 to SD2 with the expectation that Dutch, as an s-language, will be semantically more dense than French, a v-language.

We tested the likelihood of SD2 utterances with language (French or Dutch) and group (monolingual or bilingual) as fixed effects and participant and item as random factors. Figure (5) summarises the results. Both the monolinguals and bilinguals in French produce fewer SD2 than SD1 utterances, whereas both monolinguals and bilinguals in Dutch produce more SD2 than SD1 utterances. The analyses show that the bilinguals in French do not differ from the monolinguals in French (β=-0.2169, *SE*=0.3306, *p*=n.s.). The monolinguals in Dutch are significantly more likely than the bilinguals in Dutch to encode two semantic elements (β=1.0466, *SE*=0.3449, *p*=0.00939). The bilinguals also differ significantly from themselves; they are less likely to encode two semantic elements in French than in Dutch (β=-1.8172, *SE*=0.2544, *p*<0.001).

Overall, then, there are distinct patterns for French and Dutch. The bilinguals in French adhere to the language-specific pattern. In Dutch, however, the bilinguals produce a pattern that is similar yet not identical to the monolingual Dutch pattern.

Figure 5 *Overall mean proportion of responses (SE) expressing semantic density (SD) 2 (PATH AND MANNER) per group.*

Semantic density across event types

Earlier studies suggest that languages are not as typologically homogenous as might be expected (Hickmann, 2006). Therefore, we also compared the patterns in the voluntary motion domain at large to the patterns that can be observed in event subtypes. With regard to overall semantic density different patterns are observed for different event types. Table 7 provides illustrations of each of the patterns. We will discuss UP-, DOWN-, and ACROSS-events separately. For each event type we tested the likelihood of SD2 utterances with language (French or Dutch) and group (monolingual or bilingual) as fixed effects and participant and item as random factors.
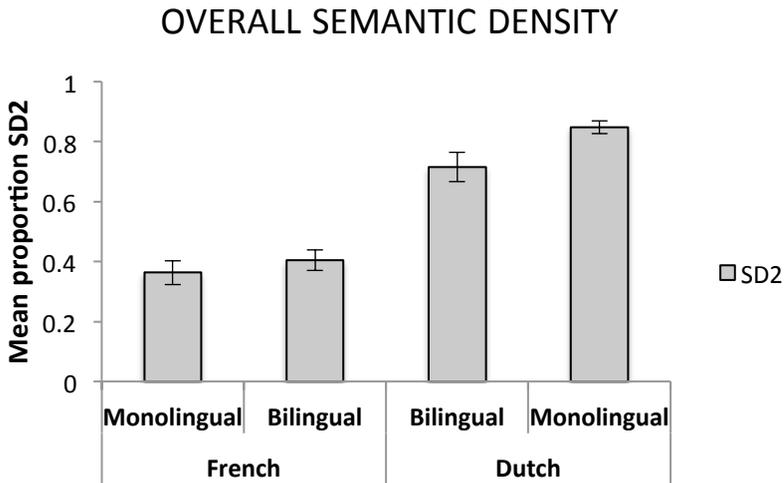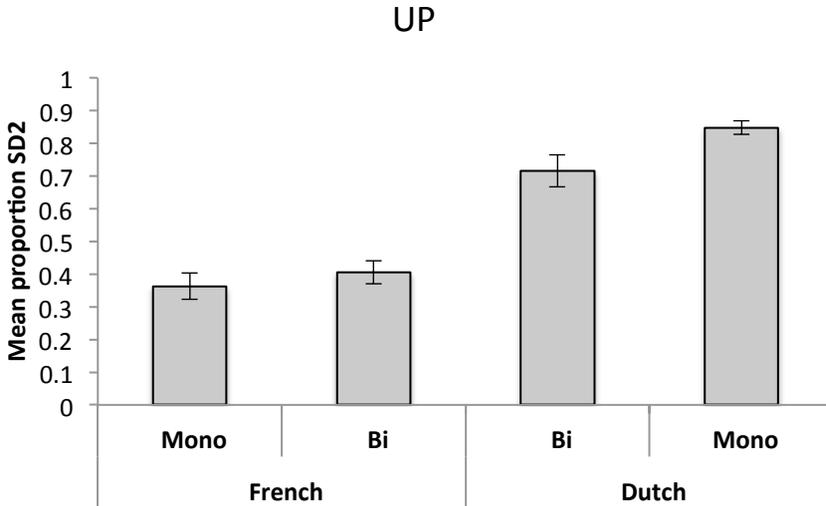
Figure 6. *Overall mean proportion of responses (SE) expressing semantic density (SD) 2 (PATH and MANNER) per group for UP-events.*

Figure (6) summarises the results for UP-events. The analyses show that for UP-events both the monolinguals and bilinguals in French produce fewer SD1 than SD2 utterances, whereas both the monolinguals and bilinguals in Dutch produce more SD2 than SD1 utterances. The bilinguals in French do not differ from the monolinguals in French (β=-0.5391, *SE*=0.7311, *p*=n.s.). The bilinguals in Dutch also do not differ from the monolinguals in Dutch (β=1.0057, *SE*=.3449, *p*=n.s.). The bilinguals, however, differ significantly from themselves; they are less likely to encode two semantic elements in French than in Dutch (β=-3.0871 , *SE*= .5125, *p*<.000). For the UP-events we thus observe clear language-specific patterns between French and Dutch. The bilinguals do not differ from the monolinguals in either of their languages.

Figure (7) summarises the results for DOWN-events. The analyses show that both the monolinguals and bilinguals in French produce more SD1 utterances than SD2 utterances and that they do not differ significantly from each other (β=1.0480, *SE*=1.3715, *p*=n.s.). The bilinguals in Dutch, however, do differ from the monolinguals in Dutch. Whereas the monolinguals in Dutch produce an almost equal amount of SD2 and SD1 utterances, the bilinguals in Dutch produce more SD1 than SD2 utterances. The monolinguals are significantly more likely to encode two

Table 7*. Examples of SD1 (one semantic element) and SD2 (two semantic elements) utterances in Dutch and French for the event types UP, DOWN, and ACROSS.*

Event type	Language	SD	Example	ID
UP	French	1	*il monte dans l'arbre* "he goes up in the tree"	BL5 XSIN
		2	*il grimpe dans l'arbre* "he climbs up in the tree"	BL4 XORS
	Dutch	1	*die langs een poot van een tafel naar boven gaat* "who goes up along a leg of the table"	2BL4 XSOU
		2	*en die klimt die boom omhoog* "and who climbs up the tree"	2FL1 XORS
DOWN	French	1	*elle redescend par le même pied* "she goes down by the same leg"	2FR1 XSOU
		2	*qui redescend complètement en glissant* "who goes down entirely sliding"	FR7 XSOU
	Dutch	1	*en gaat langs dezelfde poot terug naar beneden* "and goes back down along the same leg"	FL12 XSOU

		2	*en klimt terug naar beneden* "and climbs back down"	2FL7 XCHE
ACROSS	French	1	*elle traverse un passage à niveau* "she crosses a level crossing"	2FR2 XVEL
		1	*il nage un peu dans la rivière* "he swims in the river a bit"	2FR10 XNAG
		2	*il traverse la rivière en nageant* "he crosses the river swimming"	2FR9 XNAG
	Dutch	1	*die zwemt daarin* "who swims in it"	FL5 XNAG
		1	*hij kruist die weg* "he crosses that road"	BL2 XCOU
		2	*en die zwemt naar de overkant* "and who swims towards the other side"	2FL14 XNAG
		2	*en die steekt ook een rivier over al zwemmend* "and who also crosses a river while swimming"	FL6 XNAG

DOWN

Figure 7. *Overall mean proportion of responses (SE) expressing semantic density (SD) 2 (PATH and MANNER) per group for DOWN-events.*

elements than the bilinguals (β=2.0468, *SE*=.6344, *p*=.0047). The bilinguals in French do not differ significantly from themselves in Dutch (β=-2.9253, *SE*=1.1981, *p*=n.s.). The bilinguals produce a language-specific pattern in French. However, in Dutch they do not. They move closer to the French pattern to the extent that they do not differ from themselves in their two languages.

Figure (8) summarises the results for ACROSS-events. The monolinguals and bilinguals in both French and Dutch produce more SD2 utterances than SD1 utterances. The results show that the bilinguals in French do not differ from the monolinguals in French (β=-.3087, *SE*=0.3424, *p*=n.s.). The bilinguals in Dutch also do not differ from the monolinguals in Dutch (β=.4923, *SE*=.4208, *p*=n.s.). The bilinguals, however, differ significantly from themselves; they are less likely to encode two semantic elements in French than in Dutch (β=-1.9986, *SE*=.3552, *p*<.001). Even though the crosslinguistic patterns are more similar, the bilinguals are similar to the monolinguals.
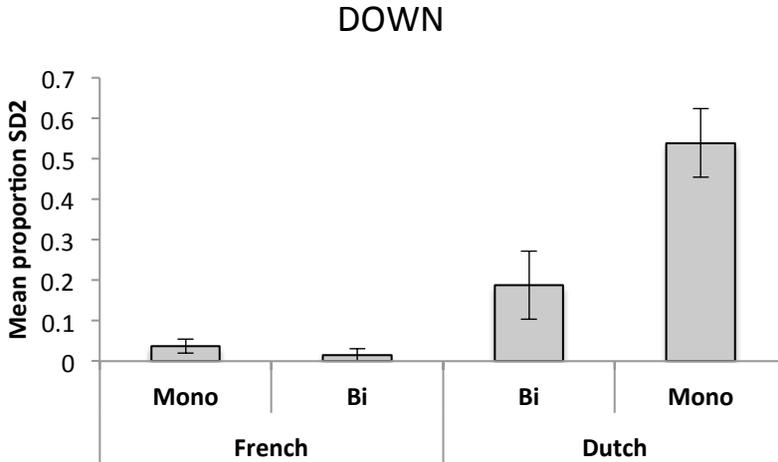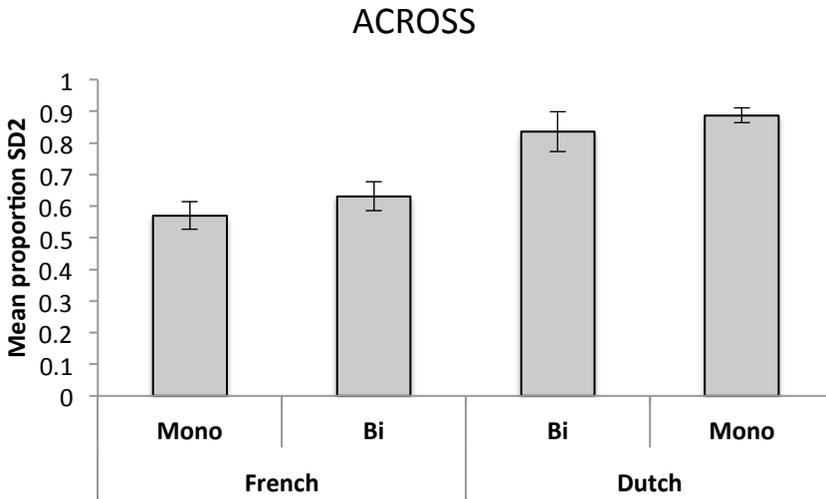
ACROSS

Figure 8. *Overall mean proportion of responses (SE) expressing semantic density (SD) 2 (PATH and MANNER) per group for ACROSS-events.*

Information in the main verb

Next, we considered what is encoded in the main verb. There are four possibilities: motion in a light verb (0), MANNER in a MANNER verb (M), PATH in a PATH verb (P), or MANNER + PATH in a conflated verb (MP). In this analysis we consider the likelihood of MANNER of motion being encoded with language (French or Dutch) and group (monolingual or bilingual) as fixed effects and participant and item as random factors.

Figure (9) shows the overall results. The bilinguals and monolinguals in French typically do not encode MANNER in the main verb, whereas bilinguals and monolinguals in Dutch do. The analyses show that the bilinguals in French do not differ from the monolinguals in French (β=-.6916, *SE*=0.3309, *p*=n.s.). The monolinguals in Dutch, however, are significantly more likely than the bilinguals in Dutch to encode MANNER in the main verb (β=1.7486, *SE*=0.3584, *p*<.001). The bilinguals also differ significantly from themselves; they are less likely to encode MANNER in the main verb in French than in Dutch (β=-2.1059, *SE*=0.2683, *p*<0.001). The information encoded in the main verb shows language-specific patterns. In the French the bilinguals adhere to it, but in Dutch the bilinguals produce a pattern that is less extreme than the monolingual Dutch pattern.

MANNER IN THE MAIN VERB
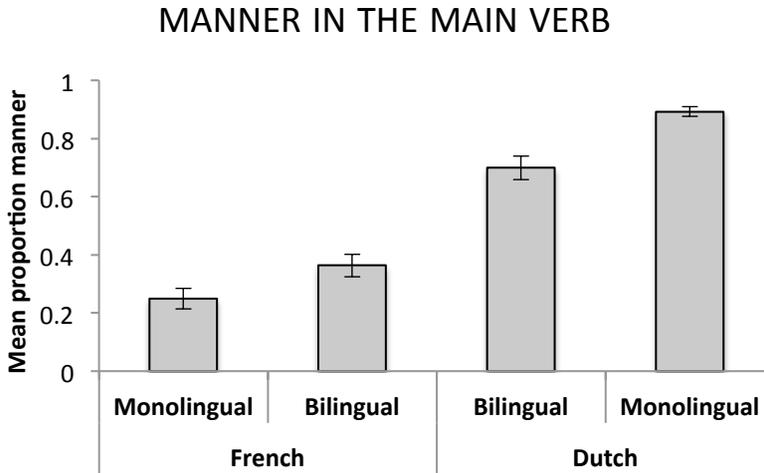
Figure 9. *Overall mean proportion (SE) of responses encoding* MANNER *of motion in the main verb per group.*

They move closer to the French pattern, but not to the extent that they are indistinguishable from themselves in both languages.

Information in the main verb across event types
For the semantic content of the main verb we also considered the different event types separately.

UP

Figure 10. *Mean proportion (SE) of responses encoding* MANNER *of motion in the main verb for* UP-*events per group.*

Figure (10) summarises the results for UP-events. The results show that for the UP-events in French the monolinguals and bilinguals more often than not do not encode MANNER in the main verb. The bilinguals and monolinguals in Dutch, however, typically do encode MANNER in the main verb. We tested the likelihood of MANNER encoded in the main verb with language (French or Dutch) and group (monolingual or bilingual) as fixed effects and participant and item as random factors. The results show the bilinguals in French do not differ from the monolinguals in French (β=-0.5991, *SE*=0.7785, *p*=n.s.). The bilinguals in Dutch also do not differ from the monolinguals in Dutch (β=1.4007, *SE*=1.0432, *p*=n.s.). The bilinguals, however, differ significantly from themselves; they are less likely to encode MANNER in the main verb in French than in Dutch (β=-3.4524, *SE*=.5725, *p*<.001).

In the French sample two verbs are used by both the monolinguals and the bilinguals, namely *monter* "ascend" (monolingual *M* 64%, bilingual *M* 57%), a PATH verb, and *grimper* "climb up" (monolingual *M* 24%, bilingual *M* 43%), a MANNER + PATH verb. In addition, some of the monolinguals also use *escalader* "climb up" (monolingual *M* 12%), a MANNER + PATH verb.

In the Dutch sample three verbs, which are used by both groups, account for 95% and 96% of the monolingual and bilingual data respectively, namely *gaan* "to go" (monolingual *M* 4%, bilingual *M* 10%), a light verb, *klimmen* "to climb" (monolingual *M* 42%, bilingual *M* 47%), and

kruipen "to crawl" (monolingual *M* 50%, bilingual *M* 40%), both M verbs. In addition, two other verbs are used, *springen* "to jump" and *lopen* "to walk" also both M verbs.

　　For verb use in descriptions of UP-events there are language-specific patterns, which in both languages the bilinguals also adhere to, both with respect to content and verb choice.
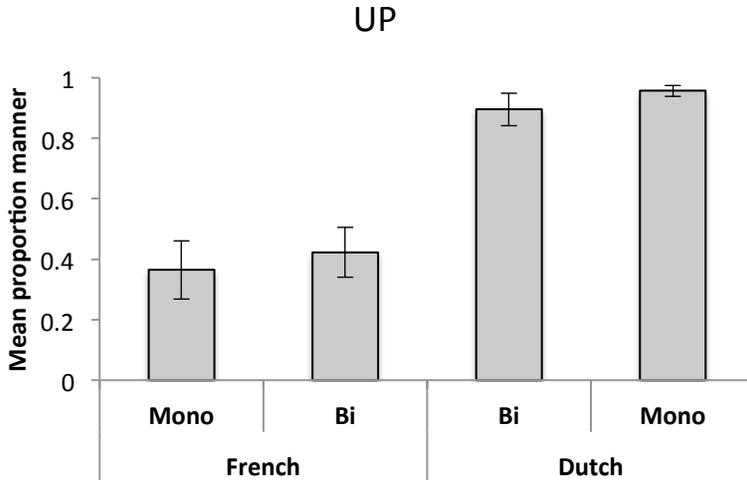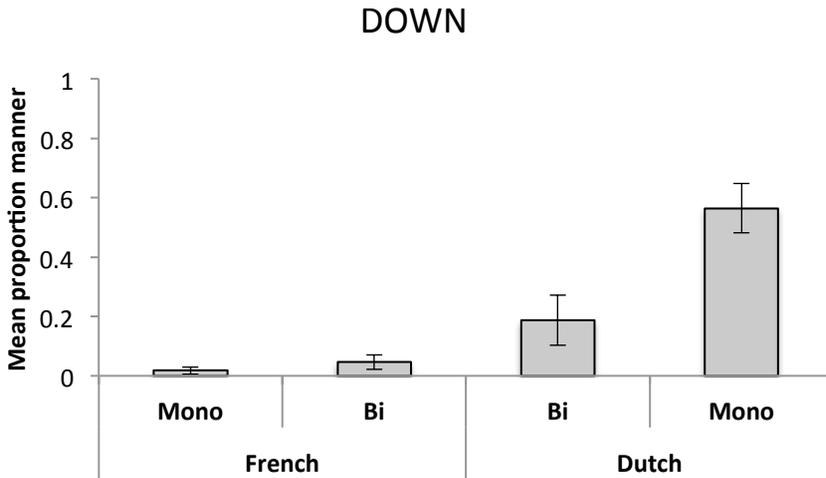
DOWN

Figure 11. *Mean proportion (SE) of responses encoding MANNER of motion in the main verb for DOWN-events per group.*

　　Figure (11) summarises the results for the DOWN-events. For the DOWN-events the results show that the monolinguals and bilinguals in French hardly ever produce verbs that encode MANNER of motion. In Dutch, however, the monolinguals produce more verbs that encode MANNER than verbs that do not. The bilinguals in this case produce more verbs that do not than do encode MANNER, displaying a pattern more similar to French. We tested the likelihood of MANNER encoded in the main verb with language (French or Dutch) and group (monolingual or bilingual) as fixed effects and participant and item as random factors. The results show the bilinguals in French do not differ from the monolinguals in French (β=-.9283, *SE*=1.1738, *p*=n.s.). The bilinguals in Dutch do differ from the monolinguals in Dutch; the monolinguals are significantly more likely to encode MANNER in the main verb (β=2.0790, *SE*=.6177, *p*=.00273). The bilinguals in French do not differ significantly from themselves in Dutch (β=—1.7761, *SE*=.7497, *p*=n.s.).

　　The French data show little variability; two verbs account for 97% and 95% of the data for monolinguals and bilinguals respectively: *descendre* "to

descend" (monolingual *M* 8%, bilingual *M* 14%) and *redescendre* "to descend" (monolingual *M* 89%, bilingual *M* 81%), both PATH verbs.

A closer inspection of the verbs used in Dutch shows that five verbs account for 90% and 93% of the data monolinguals and bilingual respectively: *gaan* "go" (light verb; monolingual *M* 28%, bilingual *M* 62%) *glijden* "to slide" (MANNER verb; monolingual *M* 3%, bilingual *M* 10%), *klimmen* "climb" (MANNER verb; monolingual *M* 16%, bilingual *M* 2%), *komen* "come" (PATH verb; monolingual *M* 11%, bilingual *M* 13%), and *kruipen* "crawl (for babies and animals)" (MANNER verb; monolingual *M* 32%, bilingual *M* 6%). Note that *kruipen* and *klimmen* only account for 6% and 2% of the bilingual sample, whereas they make up 32% and 16% of the monolingual sample. It is possible that there is some influence on the lexical categories boundaries from the French *grimper*, which means "to climb," but is used exclusively for upwards movement. Another noteworthy thing is the idiosyncratic use of *afdalen* "to descend" by one of the bilingual speakers. She uses this verb in all her DOWN-descriptions whereas none of the other participants do.

In sum then, we find different patterns for French and Dutch. In French MANNER of motion is hardly ever encoded, whereas in Dutch it often is. In terms of content the bilinguals in French do not differ from the monolinguals, whereas in Dutch they do. In terms of verb choice we see that there is much more variation in Dutch than in French and that bilinguals in Dutch use the semantically light verb *gaan* "go" to a much greater extent than the monolinguals in Dutch.

Figure (12) summarises the results for the ACROSS-events. The results for the ACROSS-events show that in French the monolinguals and bilinguals produce fewer verbs that encode no MANNER than verbs that do. Conversely, the bilinguals and monolinguals in Dutch produce more verbs that encode MANNER than verbs that do not. Furthermore, the results show that the monolinguals in French are less likely to encode MANNER in the main verb than the bilinguals in French (β=-1.1801, *SE*=0.4561, *p*=.0353). The bilinguals in Dutch also differ from the monolinguals in Dutch; the monolinguals in Dutch are significantly more likely than the bilinguals in Dutch to encode MANNER in the main verb (β=2.1946, *SE*=.5753, *p*<.001). The bilinguals also differ significantly from themselves; they are less likely to encode MANNER in the main verb in French than in Dutch (β=-1.7609, *SE*=.4135, *p*<.001). For the ACROSS-events the bilinguals show different and distinguishable patterns for both their languages. However, they behave like the monolinguals in neither language, that is they show evidence of convergence in both French and Dutch.
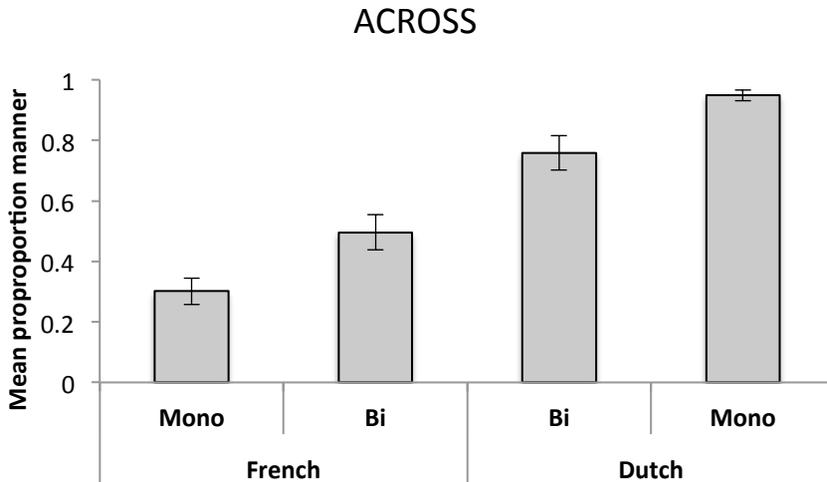
ACROSS

Figure 12. *Mean proportion (SE) of responses encoding* MANNER *of motion in the main verb for* ACROSS-*events per group.*

A closer inspection of the verbs shows a wide variety of MANNER verbs being used, both in French and in Dutch, which is to be expected given the stimulus items. The only verb that accounts for a large portion of the data is *traverser* "to cross" (PATH-verb; monolingual *M* 60%, bilingual *M* 35%), and more so for the monolinguals than the bilinguals. Conversely, its translation equivalent, *oversteken*, is more popular with bilinguals than monolinguals in Dutch (monolinguals *M* 4%, bilinguals *M* 20%).

In sum, bilinguals differ from monolinguals in both languages in terms of semantic content. However, they also differ from themselves in French and Dutch, and are thus keeping the languages separate. A more detailed investigation of verb use shows that this is driven by an overuse of the PATH -verb *oversteken* "to cross" as compared to the monolinguals in Dutch, and underuse of its translation equivalent *traverser* "to cross" as compared to the monolinguals in French.

Semantic density in the periphery

Lastly, we analysed the semantic density (SD) in the periphery, that is how many semantic elements of MANNER and PATH of motion are encoded in the periphery. Figure (13) summarises the results. As above, a description can have a semantic density score of SD0 (neither PATH nor MANNER is encoded), SD1 (either PATH or MANNER is encoded), or SD2 (both MANNER and PATH are encoded). Here we include the SD1 and SD2 occurrences. We tested the likelihood of SD2 occurrences with language (French or Dutch)

and group (monolingual or bilingual) as fixed effects and participant and item as random factors. The results show the bilinguals in French differ significantly from the monolinguals in French (β=-1.3389, SE=0.5317, p=.0425); the monolinguals produce fewer SD2 utterances than the bilinguals in French. The monolinguals and bilinguals in Dutch do not differ (β=-0.4051, SE=0..4506, p=n.s.). The bilinguals also do not differ from themselves (β=.4530, SE=.4163, p=n.s.)

SEMANTIC DENSITY PERIPHERY
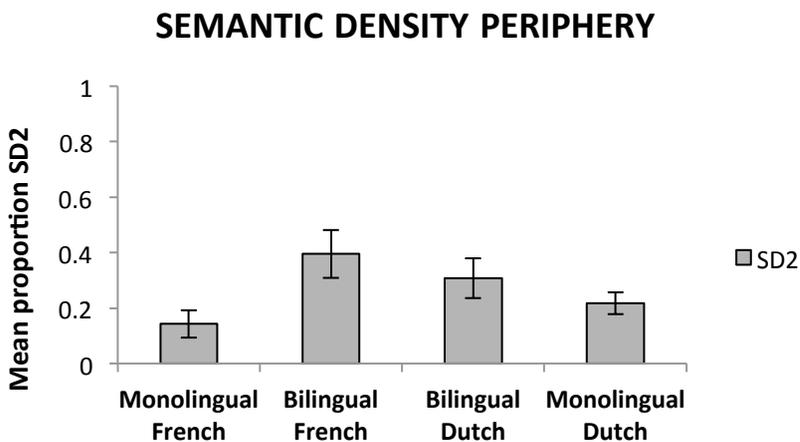
Figure 13. *Overall mean proportion of responses (SE) expressing semantic density (SD) 2 (*PATH AND MANNER*) per group in the periphery.*

Discussion

The goal of this study was to investigate where the semantic encoding patterns concerning MANNER and PATH of motion in French-Dutch bilinguals show evidence of convergence and where they do not. Specifically, we asked whether the patterns vary depending on whether we consider overall semantic density (a coarse-grained perspective), or the specifics of the main verb and the periphery (a fine-grained perspective). Secondly, we asked whether patterns also differ depending on the event type considered (UP, DOWN, ACROSS).

As expected, at the coarsest level of analysis (overall semantic density or how many semantic elements are expressed), the results show language-specific different patterns for Dutch and French. Overall, Dutch speakers produce utterances with a higher semantic density than French speakers, meaning that they tend to express both PATH and MANNER in one

utterance, whereas French speakers only encode one semantic element, namely PATH. This is true both for the monolingual and the bilingual speakers. That is, the bilingual speakers show the same broad language-specific patterns as the monolingual speakers. However, the patterns are not identical across the languages. In French, monolinguals and bilinguals do not differ from each other, but in Dutch they do. The bilinguals and monolinguals show the same preference for encoding two semantic elements rather than one, but the bilinguals prefer this to a lesser extent in Dutch, suggesting a shift towards a more French-like pattern. That is, the bilinguals show evidence of convergence (the languages are more similar to each other) in Dutch but not in French.

Examining whence these differences originate analyses at a more fine-grained level (i.e., in the main verb or in the periphery) show that there is evidence of convergence in the main verb. Whereas, both monolingual and bilingual speakers prefer to encode PATH in French and MANNER in Dutch as expected, there are slight differences as well. Bilinguals use more MANNER verbs in French and more PATH verbs and semantically light verbs in Dutch than the monolinguals.

In the periphery, both monolinguals and bilinguals in French and Dutch prefer to encode only one semantic element if anything, typically PATH in Dutch. However, bilinguals are more likely to encode two semantic elements in the periphery than the monolinguals in Dutch, and more likely to encode PATH in the periphery in French than monolinguals, and less likely to do so than monolinguals in Dutch.

As expected, we thus find evidence both for language-specificity and for convergence in the bilingual encoding patterns. There is language-specificity in the sense that bilinguals typically show the same broad patterns as the monolinguals. Furthermore, these patterns are also typical for the typological type the languages belong to. In verb-framed French, both monolinguals and bilinguals produce mainly expressions encoding PATH of motion in the main verb, whereas in satellite-framed Dutch, both monolinguals and bilinguals produce mainly expressions encoding both MANNER and PATH of motion, expressing MANNER in the main verb and PATH in a satellite. Moreover, we also find evidence for language-specific patterns in the sense that the bilinguals typically differ from themselves in the other language. That is, they show patterns that are significantly different in their two languages suggesting that they are kept separate to a certain degree (in contrast to, e.g., Brown & Gullberg, 2013).

However, we also find evidence for convergence in the sense that, although the bilingual patterns are broadly similar to the monolingual ones, they are not identical. Moreover, the differences are particularly pronounced in Dutch.

Overall, these results are in line with other studies of bilingual voluntary motion descriptions that show changes in distributional frequencies of elements that are used. That is, the bilinguals do not use radically different patterns, but rather they use the same elements as the monolinguals but with a different frequency (Berthele, 2004; Hohenstein et al., 2006). Moreover, these findings can be related to earlier studies such as studies of colour and object naming in bilinguals, which have similarly found evidence of both language-specificity in terms of maintenance of categories, and convergence in terms of adjusting the boundaries and/or centres of those language-specific categories (see, for example, Ameel et al., 2009; Athanasopoulos 2009). Importantly, however, the findings of overall language-specificity and embedded patterns of convergence are not uniform across languages. We find more evidence for convergence in Dutch than in French, although there is some evidence for convergence in French as well.

Post-hoc analyses: the role of variation

Muysken (2013) has recently proposed four bilingual optimisation strategies for languages in contact in history, society, or the individual. One of these strategies, namely, "match between L1 and L2 patterns where possible" (p.709), is of particular interest here, because it suggests that there should always be convergence between a bilingual's two languages if possible (for other accounts see, for example, Brown & Gullberg, 2013; Bullock & Toribio, 2004; Treffers-Daller & Tidball, 2012). Although all patterns of convergence in this study are of the redistributive types, the results show differences in convergence patterns across event types in terms of directionality of shift. For UP-events we find no evidence of convergence in either language, whereas for DOWN-events we find evidence of convergence in Dutch, but not in French. Lastly, for ACROSS-events we find evidence for convergence in both languages. Using these different patterns across languages and event types we will further examine what "where possible" might mean for convergence patterns. We will explore the possibility that variation in one language is a prerequisite for convergence, and more specifically, that viable opportunities for convergence arise when an existing (lexical) option allows one language to easily move closer to the other language (see also Toribio, 2004).

UP

In Dutch we would expect speakers to describe UP events using MANNER verbs and potentially a light verb in combination with a PATH expression outside the verb (e.g., *De eekhoorn klimt omhoog* "the squirrel climbs up"; *de eekhoorn gaat omhoog* "the squirrel goes up"). This is roughly what we find. Most of the monolingual utterances use one of two MANNER verbs (*kruipen* "crawl" and *klimmen* "climb"). A light verb, *gaan* "go," is

occasionally used, but in the monolingual sample its frequency is negligible. Although we might expect the bilinguals to use *gaan* + satellite to a greater extent to match the French overall pattern, they show the same patterns as the monolinguals. There are two possible explanations for the observed patterns, one based on the properties of Dutch and one on the properties of French. First, *gaan* might not be prevalent enough in the monolingual sample to be a valid option in this case (4% of the Dutch monolingual sample). Second, French does not typically encode only one semantic element for UP-events. Instead, in about a third of the cases French monolingual speakers use *grimper* "climb up" or *escalader* "climb up," that is, verbs that encode both MANNER and path. Thus, there is little space for the bilingual pattern in Dutch to shift as *gaan* is infrequent and the French speakers use a considerable amount of MANNER + PATH expressions.

However, we also need to consider how the patterns in French might shift. There seems to be a situation in which there are viable candidates in French that encode two semantic elements, i.e., *grimper* and *escalader*. One might reasonably expect bilinguals in French to use these two verbs to a greater extent to match the typical pattern in Dutch (in terms of overall semantic density). However, this did not happen.

DOWN

In Dutch we would expect speakers to describe DOWN events using MANNER verbs and potentially the light verb *gaan* "go" in combination with a PATH expression outside the verb (e.g., *de eekhoorn klimt naar beneden* "the squirrel climbs down"; *de eekhoorn gaat naar beneden* "the squirrel goes down"). This is what we find in the monolingual Dutch sample. In addition, we find use of a deictic PATH verb (*komen* "come"). In French the pattern is straightforward with overall utterances encoding only one semantic element, namely PATH in the main verb. We might expect the bilinguals to use *gaan* + satellite to a greater extent to match the semantic density of the typical French pattern. This is exactly what we find in bilingual Dutch, which has overall lower semantic density than the monolinguals in Dutch. The deictic PATH verb (*komen*) might also be used to a greater extent, but the results reveal no differences between monolinguals and bilinguals in Dutch. This might be because although *komen* is PATH verb, it is typically used in constructions with *naar beneden* "down," meaning a construction in which PATH is encoded twice (but see Berthele, 2004). In addition, the properties of deictic verbs such as *komen* might be different (Treffers-Daller & Tidball, 2012). In contrast to the variability in Dutch, there is very little variation in the monolingual sample in French, and the bilingual and monolingual patterns are virtually identical.

ACROSS
In Dutch we would expect speakers to describe ACROSS events using MANNER verbs with PATH outside the verb and potentially a specific PATH-verb, namely *oversteken* "cross," (e.g., *De vrouw fietst de spoorweg over* "the woman cycles across the level crossing," *de vrouw steekt de spoorweg over* "the woman crosses the level crossing"). This is what we find in the monolingual Dutch sample, albeit with minimal use of *oversteken*. In French we expect more variability both in terms of overall semantic density and content of the main verb (Hickmann, 2006) and is this what we find. Given the monolingual Dutch pattern, we might then expect the bilinguals' and monolinguals' Dutch to be identical if the presence of a viable convergence option is a driving force. However, we find that bilingual speakers do not differ from monolingual speakers in terms of overall semantic density, but they do differ in terms of what is encoded in the main verb. Bilingual speakers use *oversteken* "cross" to a larger extent than monolinguals. However, they are using different constructions resulting in a similar overall semantic density as the monolinguals.

In French we find that both monolinguals and bilinguals use more utterances that encode two semantic elements than one element and that the two groups do not differ in this respect. The bilinguals, however, do differ from the monolinguals in terms of what is encoded in the main verb. The bilinguals use the main PATH verb traverser "cross" to a lesser extent than the monolingual speakers.

For ACROSS-items, then, we see the clearest pattern of convergence in verb use. There are different patterns between bilinguals and monolinguals in both languages. Specifically, we observe an increase in the use of a specific PATH-verb in Dutch, *oversteken*, and a decrease in the use of its translation equivalent in French, *traverser*, resulting in a pattern in which the bilinguals are closer to themselves than the two monolingual varieties.

We suggested that *gaan* "go" for UP-events might not have been a viable candidate for convergence, because it was not used sufficiently often in the monolingual sample (unlike for the DOWN-items), implying a sensitivity to frequency effects specific to certain event types. The same should then apply to *oversteken* "cross," which is used with the same frequency for ACROSS-items as *gaan* is for UP-items. However, in this case *oversteken* is used to a greater extent by the bilinguals in Dutch. A potential factor in this might be that *gaan* does not have a direct translation equivalent that is used in this context, but *oversteken* does, namely *traverser* "cross" (Athanasopoulos, 2009; Treffers-Daller & Tidball, 2012; Van Hell & De Groot, 1998a). Moreover, it seems to be greater use of this translation equivalent that also drives convergence in French. The existence of

translation equivalents with a high degree of meaning overlap might thus modulate the viability of the low-frequency lexical alternatives.

In sum, it seems that variation in a domain in one language is a prerequisite for patterns of convergence. Convergence occurs when an existing (lexical) option allows one language to easily move closer to the other language, such as the frequent use of the semantically light verb *gaan* "go" in Dutch for DOWN-events, or both languages to move closer to each other, such as the more frequent use of *oversteken* "cross" and less frequent use of *traverser* "cross" in Dutch and French, respectively, for ACROSS-events. This also supports the notion of convergence as an inherently bidirectional process globally (e.g., Toribio 2004), yet at the same time optionally a unidirectional shift locally. For a particular feature, convergence might therefore be achieved by a shift in only one of the languages due to the availability of viable lexical alternatives in the shifting language that are absent in the other.

To return to Muysken's (2013) optimization strategy "match between L1 and L2 where possible," we suggest that "where possible" is determined by a complex interaction between properties of each of the individual languages (e.g., availability of viable lexical alternatives), and the nature of the links between the languages within a domain and event type (e.g., the existence of options in both languages with a large degree of overlap). Convergence patterns such as these suggest a complex and connected bilingual system underlining a need for this to be reflected in models of bilingual semantic-conceptual organization.

CHAPTER V
CONVERGENCE: WHERE WE ARE AND WHERE TO GO NEXT

This thesis sought to further our understanding of convergence in the bilingual mind, that is, increased similarity in a bilingual's two languages as compared to monolingual varieties of the same languages, by approaching the topic from various angles, namely lexical semantics, multimodal encoding patterns, and variation within a semantic domain. Specifically, it asked where and how we find patterns of convergence and where we do not. "Where" in this case might take on various meanings such as, in which language, where in a clause, for which types of distinction, and in which types of events. In addition, it asked which form convergence takes when we encounter it (*how*). There is more than one way in which two languages can become more similar and these can be subdivided into three types: reduced (e.g., reducing specificity), redistributed/shift (e.g., change of frequency of use of lexical options), and cumulative (e.g., duplicating specificity in one language in the other language). The results inform us about how convergence works and what the consequences are for the organisation of a bilingual speaker's linguistic system.

We investigated convergence patterns in the speech production data of functional French-Dutch bilinguals, speakers who use two languages fluently and proficiently on a day-to-day basis. In particular, we used data from narrative retellings of events in the motion domain. The first study examined placement events (a subset of caused motion) and two subsequent studies examined voluntary motion.

Study I French–Dutch bilinguals do not maintain obligatory semantic distinctions: Evidence from placement verbs

Study I was concerned with placements events, a semantic domain which is linguistically encoded differently in French and Dutch. This study was specifically concerned with placement events in which the placement action results in simple support from below, such as putting a cup on a table. In French, these events are typically described by a general placement verb denoting PUT SOMETHING SOMEWHERE (*mettre* "put" or *poser* "put"). In Dutch, on the other hand, describing the same events entails a semi-obligatory choice between two verbs, *leggen* "lay" and *zetten* "set." These verbs do not only denote PUT SOMETHING SOMEWHERE, but also RESTING ON A BASE IN A CANONICAL POSITION, which for *leggen* is horizontal or unspecified and for *zetten* is vertical.

Not only is the *leggen/zetten* choice semi-obligatory, but it is, crucially, also a binary distinction and intermediate options are hard to imagine. This is in contrast with previous studies of convergence which have typically focused on category structure and choices with gradient, or more flexible category cores and boundaries (e.g., Ameel et al., 2009; Ameel et al., 2005; Athanasopoulos, 2009; Pavlenko & Malt, 2011). These studies typically show convergence instantiated as subtle shifts of category centres and/or boundaries whilst maintaining the broader category structure. The current study asked whether convergence would still occur in the case of an obligatory distinction with fewer possibilities for a subtle shift, and if so, what form convergence would take.

The examination of elicited descriptions of placement events showed that, as expected, French monolingual speakers typically produced descriptions using generic placement verbs (either *mettre* or *poser*), whereas Dutch monolingual speakers distinguished between horizontal placement (*leggen*) and vertical placement (*zetten*). Bilinguals in French showed the same patterns as the monolingual French speakers, that is, they also used an all-purpose placement verb. In Dutch, however, the bilinguals did not resemble their monolingual counterparts. They did not distinguish between *leggen* and *zetten*, but overextended *leggen* to include both orientations.

This study showed that convergence does not only occur in lexical choices with boundaries of a gradient nature, but also in cases where the choice is binary and semi-obligatory. Convergence, therefore, does not have

to be limited to subtle shifts of category boundaries and cores, but can occasionally include dramatic semantic changes in this case of the reductive type.

Study II Speech and gesture show similar patterns of convergence in functional bilinguals

Study II examined the global nature of convergence from a multi-modal perspective, that is, including co-speech gesture in our analyses and examining speech and gesture jointly. Speech and gesture are closely linked and are believed to be modality specific representations of a common underlying idea (e.g., Kendon, 2004; McNeill, 1992). As such, speech and gesture typically encode compatible, though not necessarily identical, information. Studies with L2 speakers have shown that examining gesture output jointly with speech output can reveal richer underlying representations than can be gleaned from speech data alone (e.g., Gullberg, 2009a; Stam, 2006). Convergence in the voluntary motion domain is typically of the reduced (e.g., Pavlenko, 2009c) and redistributed types (e.g., Hohenstein et al., 2006), although some examples of cumulative convergence can also be observed (e.g., Daller et al., 2011). We hypothesized that considering multi-modal output could reveal more convergence patterns of the cumulative type rather than the reduced or the redistributed type.

The typical patterns for French and Dutch for voluntary motion differ. French is a so-called verb-framed language and typically encodes mainly PATH of motion, and does so in the verb. Dutch, on the other hand, is a satellite-framed language and typically encodes both MANNER and PATH of motion; MANNER in the verb, and PATH of motion elsewhere in the clause. First we investigated the speech pattern of monolinguals and bilinguals in French and Dutch. Then we examined to what extent speech and gesture encode the same information (co-expressivity) both at the clause level (broad) and at the level of exactly aligned elements (narrow) to pinpoint exactly where patterns deviate.

Results showed that both monolingual and bilingual French speakers typically encoded only one semantic element (PATH) in speech. Monolingual speakers of Dutch, on the other hand, typically encoded both semantic elements (MANNER and PATH). In Dutch, bilingual speakers also preferred to encode two elements, but not to the same extent as the monolingual speakers. In other words, bilinguals used the same options as the monolinguals, but they changed the frequency distribution producing fewer clauses that encode both semantic elements. In speech, thus, we find evidence for convergence of the redistributed type, albeit only in Dutch.

The cross-modal results showed very similar patterns. At the broad co-expressivity level both monolinguals and bilinguals in French had a strong

preference for encoding the same information in speech and gesture, namely PATH only. In contrast, monolinguals and bilinguals in Dutch preferred to encode MANNER and PATH in speech, but only PATH in gesture. In line with the speech results bilinguals in Dutch produced more cases of speech and gesture both encoding PATH of motion showing a parallel pattern of convergence uni- and multi-modally apparently driven by speech.

Narrow co-expressivity patterns showed that in French monolinguals and bilinguals still preferred to encode PATH-only in both speech and gesture. In Dutch, however, the patterns shifted, showing more complete matches in narrow than in broad co-expressivity, in other words aligning gesture with speech that encoded the same semantic information. However, whereas monolinguals produced exact matches and non-matches at an equal rate, the bilinguals produced mostly exact matches looking similar to monolingual French speakers and to themselves in French. Convergence can thus be observed multi-modally as well as uni-modally, but there is no evidence in the gesture data that suggests that specificity accumulates crosslinguistically. Multi-modal analyses thus do not give cause to re-evaluate the redistributed nature of convergence in speech. However, the bilinguals do show crosslinguistic consistency in terms of semantic coherence between speech and gesture. They emphasise the elements that are crucial in French also in Dutch, potentially suggesting a strong cross-modal semantic unit which crosses language boundaries.

Study III Patterns of convergence differ within a semantic domain: the role of within-language variation

Study III was concerned with diverging patterns of convergence. Specifically, this study investigated patterns of convergence for different types of events within one semantic domain, namely voluntary motion. French (v-framed) and Dutch (s-framed) differ in their typical or default patterns, but there are contextually appropriate alternatives in each language. Typical descriptions for subtypes of voluntary motion events, such as upward or downward motion, can differ from the overall typical pattern in the language. For example, in French upward motion is typically described in one of two ways. Either only PATH is encoded in the verb, in line with the language default, or PATH and MANNER are both encoded in the verb. In this case the alternative occurs due to a specific lexical option, namely the verb *grimper* "climb up," which conflates MANNER and PATH of motion. This study investigated to what extent the typical encoding patterns differ for three subtypes of voluntary motion events: UP, DOWN, and ACROSS. We also examined what effect different encoding patterns might have on convergence. We considered both global patterns (i.e., semantic density, or how many of the elements MANNER and PATH of motion were encoded in the main clause) and the specifics of the main verb and the periphery.

Results showed different typical patterns for different sub-types of events. In French, UP-events were described using one of two options; a PATH-verb, or a MANNER + PATH conflated verb. The PATH-only option is the preferred one. DOWN-events are described by using PATH-verbs only and ACROSS-events were described in a variety of ways. In Dutch, UP-events were typically described by MANNER in the main verb and PATH in the periphery. DOWN-events were described by a combination of a MANNER verb or a semantically light verb (denoting the fact of motion, but not a specific MANNER or PATH), plus a PATH expression outside the verb. ACROSS events were described by either a PATH-verb or a combination of a MANNER-verb plus PATH expression outside the verb.

The various event subtypes also showed different patterns of convergence, both in terms of where convergence takes place and in terms of what it looks like. For UP-events we found no evidence of convergence in either language. For DOWN-events we found evidence of convergence in Dutch, but not in French. For ACROSS-events, however, we found evidence of convergence in both French and Dutch. The convergence patterns seem to be driven by a different frequency of use of certain lexical verbs: a semantically light verb in the case of DOWN-events in Dutch, an increased use of a PATH-verb for ACROSS-events in Dutch, and a decrease in use of its translation equivalent in French. We can, thus, consider all of these to be instances of redistributed convergence. However, in some cases redistribution leads to semantic reduction (e.g., DOWN-events in Dutch) and in some case to semantic addition (e.g., ACROSS-events in French).

Patterns of convergence do indeed differ by event subtype and by language. These results inform us about how convergence works within a particular semantic domain. Our findings suggest that there is a pivotal role for translation equivalents with a high degree of semantic overlap. A clear illustration of this is the translation pair *oversteken* and *traverse*r "to cross." In Dutch the bilinguals' use of this phrase increased, whereas in French their use decreased, moving the respective languages closer together in terms of frequency of use. In both languages this signals a move away from the default pattern of the language. However, it is a licensed move in both cases; *oversteken* occurs in the monolingual sample as well (though not as frequently) and alternatives for *traverser* are also employed in the French monolingual sample. This is similar to the notion in contact linguistics that convergence might expedite a change that is already set in motion (e.g., Toribio, 2004).

Combined, the three studies show various degrees of convergence and various patterns of convergence. In the next sections we will discuss the two overarching questions, namely a) where do we observe convergence and b) what forms do patterns of convergence take.

Where do we observe convergence and where do we not?

Muysken (2013) suggests that one of the optimization strategies bilinguals use is, "match between L1 and L2 patterns where possible" (2013, p. 709), which can be interpreted as "wherever convergence is possible, it should occur." Consequently, the first central question in this thesis is where convergence is possible and where it is not.

Study I addressed "where" in terms of gradient categories versus binary categories. In gradient categories (e.g., colour naming patterns) we often observe subtle shifts in bilingual language varieties as compared to monolingual varieties, for example the focal colour might change in such a way that it is more compatible with the patterns observed in the other language (Athanasopoulos, 2009). The current study explored what happens in a case where there is a clear-cut binary choice without straightforward options for a subtle shift (i.e., placement verbs in Dutch). Results showed that in this case the two categories merge into one. Even though there is a binary choice, convergence still occurred.

Study II examined "where" in terms of modality. We explored whether convergence could be looked at as a cross-modal phenomenon and whether the form of convergence patterns differs depending on whether a uni- or multi-modal perspective is applied. The results showed that patterns of convergence do extend to include gesture. In other words, convergence can be observed cross-modally. Moreover, cross-modal convergence patterns run parallel to speech.

Study III discussed "where" as where in a clause, but also in which types of motion event. Convergence can be observed in overall semantic density patterns, but it can be seen most clearly in the choice of main verb. The convergence patterns in the overall density seem to hinge on main verb choices. However, the patterns vary between different motion event subtypes. We find convergence patterns in DOWN-events in which only one language shifts, convergence patterns in ACROSS-events in which both languages shift, and no convergence patterns in UP-events. For this study then, "where" is mainly in the main verb and due to the properties of the main verb but subject to specific conditions. In other words, in this study convergence happens when both languages in a particular semantic domain satisfy the criteria, i.e., lexical variation in one language and a clear target to move towards in the other language.

Finally, "where" could also be considered to mean "in which language." Our definition of convergence, i.e., a change in one or both of the languages to the effect that the resulting patterns are closer together than a comparison of monolingual varieties of the same two languages, does not specify

whether the nature of convergence patterns is uni- or bidirectional (see also Ameel et al., 2009). Nevertheless, convergence is in essence a shift of both languages if we consider the system as a whole. However, for a particular feature, phenomenon, or even domain, a convergent pattern might very well consist of only a uni-directional shift due to internal and/or external constraints. For example, convergence might be accelerating a change in one of the languages that was already under way, or one language might offer more possibilities for shift than the other (Bullock & Toribio, 2004; Pavlenko & Malt, 2011).

Our findings illustrate the difference between a specific feature and the language as a whole. Most of the shifts we observe occur in Dutch (e.g., loss of specificity for placement verbs and increased use of semantically light verbs in description of DOWN-events), but in one specific motion event subtype we also observe a shift in French (i.e., decreased use of *traverser* in ACROSS-events). Overall, Dutch provides more possibilities for movement, and consequently does most of the heavy lifting of convergence, yet the small shifts in French confirm the inherently bidirectional nature of convergence.

Types of convergence
In addition to asking where convergence occurs, this thesis also examined what form convergence takes. Convergence patterns can be divided into three subtypes: reduced, redistributed, and cumulative, albeit with the caveat that patterns might not always fall squarely into one or the other as there are occasionally parallel or interacting processes.

Lexical semantics of placement verbs: reduction
The convergence patterns in study I (placement verbs) show a fairly straightforward case of reduction. An obligatory distinction between two verb choices in language A that does not exist in language B is dropped, resulting in a more general semantic system in language A which now resembles languages B more closely. In the bilingual variety both languages use a single generic placement verb for placement events resulting in simple support from below. Moreover, they seem to converge on the shared part of the meaning, PUT SOMETHING SOMEWHERE. One question that arises is why *leggen* "lay" is extended and not *zetten* "set." A reason for this might be that even though overall *leggen* is less frequent than *zetten*, it has fewer metaphorical extensions and is therefore more clearly delineated as a placement verb (Narasimhan & Gullberg, 2011). Another reason may be that, in theory, *leggen* can be used for all objects, both objects with a functional base that are in a non-standard position and objects without a functional base, whereas *zetten* can only be used for objects that have a functional base AND are in their typical position (Lemmens, 2002). We also

considered orientation information encoded outside the verb as a potential locus for transferring specificity, but results show that this option a) is not used frequently, and b) when it is used, it is used by monolingual Dutch speakers who are already marking the distinction. Encoding specificity outside the verb is not a serious option for a convergent pattern.

Multimodal encoding of voluntary motion events: redistribution

Study II examined whether or not we should conceive of convergence patterns differently if we take into account multi-modal expressions. We investigated the idea that multi-modal analyses might show that more semantic information is encoded as compared to information from speech-only, thus providing evidence of addition instead of redistribution and/or reduction. The multi-modal results do show evidence of convergence, but no evidence of an accumulation of specific features crosslinguistically. There is no evidence of bilinguals adding, for example, MANNER in gesture in French to express an underlying cumulative representation that includes MANNER of motion information.

Multi-modal convergence shows parallels with uni-modal patterns of convergence in that the bilinguals and monolinguals in French do not differ from each other, but the bilinguals and monolinguals in Dutch do. They are in-between the monolinguals in Dutch and the monolinguals and themselves in French, especially when considering broad co-expressivity. Furthermore, if we look at exact alignment of speech and gesture, the bilinguals in Dutch align their (PATH) gesture more often with PATH elements in speech. This could be seen as highlighting what is salient in the representation and where the locus of convergence is. Multi-modal convergence patterns are not just driven by speech, but by speech AND gesture properties.

Variety of motion events: reduction and redistribution

Lastly, we considered the different shapes convergence might take when we look at different motion event subtypes. For UP-events we find no evidence of convergence, since the monolinguals and bilinguals in each language show the same language-specific patterns. For the DOWN-events we observe convergence with a shift in Dutch. The semantic density patterns show a shift in Dutch from encoding two semantic elements to encoding one semantic element, which is driven by a greater use of semantically light verbs. This can be seen both as simplification (semantically less specified) and redistribution (greater use of an element also used in the monolingual sample). We observe, for example, that *kruipen* "crawl" and *klimmen* "climb" are rarely used for DOWN-events by the bilinguals in Dutch, even though they are prevalent in the monolingual sample. Potentially, this is due to the fact that their translation equivalent in French, *grimper*, is only used

for climbing up and not DOWN. If this is the case, then redistribution is still valid (there is an available option that increases in use), but the simplification side (less semantic specificity) might suggest lexical convergence rather than simplification.

For the ACROSS-events we observe convergence as a result of a shift in both languages. The bilinguals in Dutch show a greater use of utterances encoding only one element and the bilinguals in French show a greater use of utterances encoding two elements. This is arrived at by means of main verbs; in Dutch *oversteken* is used to a greater extent, and in French its translation equivalent *traverser* is used to a lesser extent. Convergence in this case can be classified as redistribution.

Future directions

This thesis sheds some light on occurrences and forms of convergence in one semantic domain. However, a number of important issues remain to be addressed to explore convergence as a driving force in multilingual language use and organization of the bilingual system. These issues concern a) the relationship between convergence and other forms of crosslinguistic influence, b) the principles behind convergence and the nature of processing economy, c) complementary evidence beyond language production data, and d) how convergence fits into models of (multimodal) bilingual speech production.

The relationship between convergence and other forms of crosslinguistic influence

A central issue that needs to be resolved in order to further our understanding of convergence is its relationship to other forms of crosslinguistic influence. In our studies we have distinguished convergence from both attrition and incomplete acquisition on language history and language use criteria. Since our participants are adults who use both languages on a daily basis, and have done so for a number of years, in an environment where both languages are present, neither attrition nor incomplete acquisition are plausible explanations for the patterns we may observe. Note however, that even though attrition and incomplete acquisition can sometimes be distinguished from convergence, the processes are not necessarily mutually exclusive, but can exist in parallel (e.g., Brown & Gullberg, 2013; Pavlenko, 2009a). We cannot distinguish convergence from (bidirectional) transfer on language history and language use criteria alone, and data from the study does not explicitly speak to any differences. At the moment there is no satisfactory solution to this methodological conundrum, and in fact, it is difficult to separate transfer and convergence on either background or output criteria. It might be prudent to re-evaluate the validity

of this distinction and consider whether one might be a sub-process of the other.

The undefined nature of processing economy

Thus far we have left the motivation underlying convergence unexplored. Convergence might simply be an unintentional by-product of language contact within the individual. However, it is also possible that the force behind convergence is to make the system run more smoothly, to streamline the process of managing two languages simultaneously, that is, to economise. In this vein others have proposed that convergence occurs for reasons of "optimization" (Muysken, 2013), "processing economy" (Muysken, 2000), "simplification" (Toribio 2004; Flecken 2011), and "functionality" (Berthele 2012). However, it is not entirely clear what it means for a particular feature to be "optimized" or "economized" in terms of, for example, storage, the linguistic context beyond the word, or convergence in a conversational setting.

Firstly, it is unclear what optimization means exactly when we consider storage and selection. A key feature of convergence is that it makes use of similarities between the languages and increases these where possible, presuming that this benefits the bilingual system in some fashion. A similar case, however, can be made for divergence. Kellerman (1978) suggests that L2 learners are willing to accept direct translations of words as valid when it concerns a concrete, prototypical use of the word, but not when its use is more metaphorical. In this case too much similarity is deemed as being suspicious rather than opportunistically useful. Similarly, Clyne (2003) lists divergence as one of the principles governing the development of contact varieties, describing instances where trilinguals explicitly choose words that differ in form, even when there are much more similar lexical options available.

In processing terms, economy is typically measured in terms of access speed. Processing speed might be faster for languages that are more separated, as there would be fewer competitors (see Tokowicz & MacWhinney, 2005). For storage and conceptual-lexical links, economy might be something very different from processing and language integrity.

Secondly, it is unclear what economy means when we consider patterns beyond the single word. For example, in the case of placement verbs our findings make a case for simplification as the prevalent pattern. There is a distinction in one language which does not exist in the other language, and in the bilingual variety the distinction is dropped in favour of a more general choice. Instead of two categories there is now only one. This seems like a straightforward case of simplification. However, verbs do not exist in a vacuum; rather, they interact with their context, specifically the particles and prepositions they co-occur with (distributed semantics, Sinha & Kuteva,

1995). If we take into consideration the prepositions that occur together with motion and placement verbs we see that a general verb rarely co-occurs with a general preposition. It is more common for one to be general and the other to be more specific. In other words, if bilinguals adopt a more general verb they might just be shifting the burden of specificity onto the preposition (see Hickmann & Hendriks, 2006). It might still be considered simplification; since both languages now employ the same system, but one language is not necessarily simpler than the other, it only uses a more general verb.

Thirdly, we might consider what optimization means in a conversational context. A particular bilingual language variety might be considered more optimal with respect to the meshing of language specific properties of each of the languages of the bilingual speaker in question in speech production. But just like verbs do not exist in a vacuum, neither does language use in general. A converged bilingual variety might make understanding the message harder for a possible interlocutor (see also, Sedivy, 2013). A converged bilingual variety by definition increases the overlap between a bilingual's two languages, yet simultaneously, the overlap between the bilingual and a monolingual variety of a language necessarily decreases. Conversational smoothness between speakers might thus be sacrificed for reasons of operational (processing) economy in the individual.

This ties in with the idea that bilingual (and specifically also trilingual) language users are more at ease with ambiguity (Dewaele & Wei, 2012). For example, more general semantics could be seen to be more ambiguous than more specific semantics, supporting these findings. Similarly, Berthele (2012) suggests that functionality might be important in lexical choices (specifically regarding placement verbs). He argues that bilinguals have experience that general placement verbs function well. The more specific placement verbs might therefore be unnecessarily detailed and, consequently, the more specific part of the meaning could easily be omitted. However, it is worth noting that there is no evidence of the semantic domain of placement verbs overall moving towards a semantically more general state. Equally, there is no evidence of other unnecessary distinctions disappearing (e.g., grammatical gender).

Summing up, convergence is likely to occur for reasons of optimization/economy. Yet the notion of optimization is not clear-cut; it might mean different things when discussing, for example, storage, connectivity, processing, and language integrity. Economy and optimization are intuitive notions, yet in order for them to be useful constructs as a driving force behind convergence, we need to explore them further, broader linguistic and conversational contexts.

Convergence beyond language production (and beyond the single moment)

This thesis addresses convergence from a variety of angles and modalities to shed some light on the phenomenon. One obvious caveat is that the current study (and most of its predecessors) only considers language production data. Since a considerable part of the discussion about how convergence work deals with processing, storage, and conceptual representations, it is desirable to obtain converging evidence (no pun intended) from comprehension studies. For example, the results of study I (placement verbs) strongly suggest that for lexical semantics convergence takes place at the conceptual/representational level, that is the bilingual's underlying categories have changed compared to the monolingual ones. However, this remains an assumption until we explore comprehension of the semantics by way of, for example, a priming study or a mismatch paradigm. Some evidence has been presented that patterns of convergence do not have influence beyond the linguistic realm (e.g., non-linguistic categorization, Ameel et al., 2005; Pavlenko & Malt, 2011), but influence on comprehension is relatively unknown. There is a vast literature on bilingual comprehension, which assumes considerable co-activation of the two languages in play, but does not discuss this in terms of convergence (see, for example, Blumenfield & Marian, 2007; Calomé, 2001; Kroll, Bobb, & Wodniecka, 2006; Schwartz & Kroll, 2006).

Secondly, one of the issues brought up in the introduction is whether convergence is a process or an outcome. The data in this thesis does not speak to this issue, since there is only a single moment of observation. In order to better understand the potential developmental process leading to converged patterns as observed in functional adult bilinguals in the current study, longitudinal studies are needed (e.g., Ameel, Malt, & Storms, 2008). Within a developmental paradigm we should also entertain the possibility of a more dynamic view of convergence, which allows for different patterns depending on shifts in language use and language mode. Toribio (2004) already attested increased convergence in a code-switching language context as opposed to in a single-language context, suggesting that convergence might be sensitive to so-called language mode (Grosjean, 1998b).

Models and mechanisms of convergence

The issues of "where" convergence occurs and "how" it takes place are obviously not unrelated. The current data show that convergence occurs most often by a shift in the Dutch pattern, yet there is no obvious external reason for this asymmetry. There is no discernible difference in, for example, the bilinguals' (self-reported) usage patterns of the two languages, proficiency levels, or linguistic environment. The sociolinguistic situation in Belgium is complex and underlying prestige issues are a possible

contributing factor in convergence (e.g., Baetens Beardsmore, 1971; Treffers-Daller, 2002; Willemyns, 2002). However, some shifts in French do occur in the data. Treffers-Daller (2012) has observed the use of Dutch constructions in Brussels French suggesting that, even if prestige issues play a role, they do not wholly preclude shifts in French from occurring. The asymmetry observed in the current data must thus, at least partly, be due to language internal properties. We have proposed that one such language internal factor is that Dutch provides more opportunity for shift in terms of variation and semantic specificity. This proposal fits with models of the bilingual lexicon, i.e., how linguistic representations/conceptualisations are stored, organised, and accessed.

The most prominent model of bilingual lexical access is the Revised Hierarchical Model (RHM, Kroll & Stewart, 1994), which allows for a relationship between the two languages and the mental lexicon that develops over time. Focusing mostly on second language learners, the RHM proposes that L2 access to the conceptual store initially runs through the L1, whereas later the L2 develops its own direct links accounting for asymmetries in access speed between L1→ L2 and L2 → L1 word naming (e.g., Dijkstra, 2005; Jiang & Forster, 2001; Kroll & Stewart, 1994). Even though the current study does not focus on second language learners, the dynamic component of the RHM is presumably also sensitive to changes in language use patterns.

Pavlenko (2009b) argues that in models such as the RHM there is only a single conceptual store, and thus no room for language-specific concepts or partially overlapping representations, i.e., those instances where two translation equivalents share part of but not all of their meaning components (which could be argued to be most translation pairs). Making use of the Distributed Features model (DF, De Groot, 1992), which does allow for partial overlap, Pavlenko proposes the Modified Hierarchical Model (MHM). The MHM retains the dynamic possibilities of the RHM while adding the feature-based possibilities of the DF model. The results from the placement verb study can be accounted for within the framework of the MHM. The lexical semantics for the bilinguals in Dutch are modified to merely the information that overlaps in both languages (PUTTING SOMETHING SOMEWHERE), excluding the more language-specific non-overlapping meaning (RESTING ON A BASE IN A CANONICAL POSITION). A consequence of convergence on the shared part of the meaning is that cumulative specificity is never an option.

It is an important question at what level in the model convergence operates. From our results it is unclear whether this happens at the level of the conceptual category, or the semantic label associated with the category. For example, study I shows bilingual use of one word in Dutch where

monolinguals use two words. We have discussed this as a merged category at the conceptual level, that is, bilinguals use the same word for both categories and also mean the same thing by it. However, until a perception study is conducted, it remains a theoretically possible option that bilinguals have the same two conceptual categories as the monolinguals, but are not differentiating the two lexically.

Principles of convergence might differ between lexical semantics and distributional patterns. The results of study II (multimodal convergence) and study III (variation within a semantic domain) are ambiguous with respect to where they originate. Multimodal convergence deals with gestural semantic information, which does not necessarily have a presence in models like the MHM. Gesture models, on the other hand, typically do not include a multilingual component. The results on variation within a domain similarly go beyond the word level into context. Neither type of convergence is necessarily explained very well by a "word/concept" model of the bilingual mental lexicon, since it is the connections with the surrounding contextual network and non-linguistic conceptual features that are important.

Van Hell & De Groot (1998b) studied what can be thought of as convergence of contextual information for word pairs ("context availability"). They found that the words bilinguals associated with two translation equivalents were more similar than the associations monolingual speakers had. This effect was stronger for concrete than abstract words and even more so for cognates. Translation pairs with a high degree of meaning overlap, such as *oversteken* "cross" in Dutch and *traverser* "cross" in French, might thus have similar contextual links in both languages leading to a similar frequency of use across the languages.

There are many elements of the different operating models of the bilingual system that provide potential explanations of how convergence might work. However, at the moment the findings in the current study do not fit into any one model comfortably. A final future line of inquiry should therefore be dedicated to developing a model that is compatible with the multifaceted nature of patterns of convergence.

This thesis explored various manifestations of convergence in bilingual language use. The results discussed here show that patterns of convergence can be observed at the level of both lexical and distributed semantics as well as cross-modally in speech and gesture. The findings confirm a prevalence of reduced and redistributed over cumulative converged patterns: reduced patterns driven by convergence on the shared part of the meaning and redistributed patterns driven by existing variation with viable lexical options. Convergence is a complex, yet promising notion, with many avenues left to explore.

APPENDIX 1
STILLS OF STIMULUS VIDEOS STUDY I
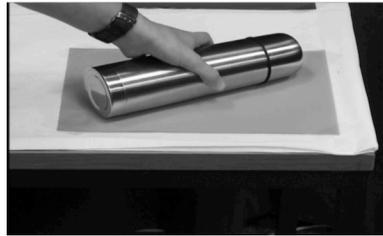
Horizontal items
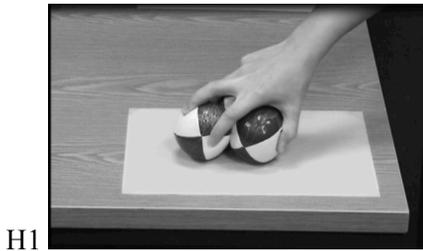
H1

H2

H3
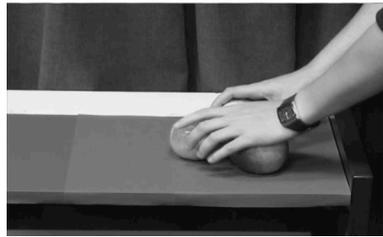
H4

H5

H6

H7

H8

H9

H10

Vertical items

V1

V2

V3
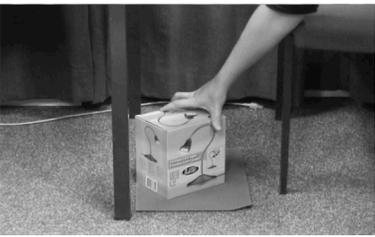
V4

V5

V6

V7

V8

V9
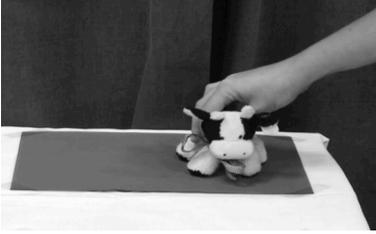
V10

APPENDIX 2
DESCRIPTIONS OF STIMULUS VIDEOS FOR STUDY II & III[7]

ACROSS-items

(1) A man runs to a country road, runs across the road, and runs away.

(2) A girl rides to railroad tracks on a bicycle, rides across the tracks, and rides away.

(3) A baby crawls to a street, crawls across the street, and crawls away.

(4) A boy walks to a river, swims across the river, and walks away.

(5) A boy walks to a frozen river, slides across the river on his boots, and walks away.

(6) A girl walks to a frozen lake with skates on, skates across the lake, and walks away.

UP/DOWN-items

 (7) A squirrel runs to a tree, up to a hole in the tree, in and out of the hole, down, and away.

(8) A caterpillar crawls to a plant and up to a leaf, eats a piece, crawls down and away.

(9) A bear walks to a tree, climbs up to a beehive, takes honey, climbs down, eats the honey, and walks away.

(10) A cat runs to a telephone pole and up to a bird's nest, drops an egg, jumps down, licks the egg, and runs away.

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[7] We are grateful to Maya Hickmann for kindly allowing us to use these stimuli developed in her lab (Hickmann & Hendriks, 2011).

(11) A mouse tiptoes to a table, climbs up a table leg to a piece of cheese, takes the cheese, slides down, and tiptoes away.

(12) A monkey walks to a banana tree, climbs up, takes a banana, slides down backwards, and walks away.

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SAMENVATTING IN HET NEDERLANDS

Talen bestaan niet los van elkaar. Ze komen met elkaar in contact in de maatschappij en in het individu, en daarbij laten ze onvermijdelijk sporen van dat contact achter. Een centraal thema in de studie van tweetaligheid en tweedetaalverwerving is dan ook het verbeteren van onze kennis over deze sporen, ofwel "de invloed van iemands kennis van één taal op de kennis en het gebruik van een andere taal" (Jarvis & Pavlenko, 2008, p. 1). Een van de fenomenen die een rol zouden kunnen spelen in tweetalige taalproductie patronen is convergentie. Convergentie kan ruim genomen gedefinieerd worden als een verandering in één of beide talen van een tweetalige waardoor de twee talen dichter bij elkaar komen te liggen dan de twee eentalige varianten (Ameel, Malt, Storms, & Van Assche, 2009). Ter illustratie, Frans-Nederlandse tweetaligen en eentalige sprekers van deze talen gebruiken verschillende categorieën als ze gevraagd wordt om flessen en andere objecten (zoals bussen en bakjes) een naam te geven (Ameel et al., 2005). De dingen bijvoorbeeld die in het Nederlands door eentaligen "fles" worden genoemd, worden in het Frans door eentaligen verdeeld over twee verschillende categorieën, namelijk *bouteille* en *flacon*. Frans-Nederlands tweetaligen behouden in het Frans deze twee categorieën, maar ze maken ze niet helemaal hetzelfde. In plaats daarvan verplaatsen ze een aantal objecten van de *flacon*- naar de *bouteille*-categorie waardoor de *bouteille*-categorie meer op de *fles*-categorie gaat lijken.

Hoewel men het eens lijkt over het bestaan van een dergelijk proces als convergentie, is men het minder eens over het precieze hoe en wat van het fenomeen. De meningen verschillen over wat convergentie precies inhoudt, wat de stuwende kracht achter convergentie is, en waar we het zoal tegenkomen (zie bijvoorbeeld, Ameel et al., 2009; Ameel et al., 2005; Brown & Gullberg, 2008, 2013; artikelen in Bullock & Toribio, 2004; Clyne, 2003; Müller & Hulk, 2001; Muysken 2000, 2013; Pavlenko 2011; Treffers-Daller & Tidball, 2012). Het doel van dit proefschrift is dan ook om onze kennis van het fenomeen convergentie in tweetalig taalgebruik te vergroten. Het bespreekt convergentiepatronen voor verschillende componenten van de taalproductie van Frans-Nederlands tweetaligen binnen één semantisch domein, namelijk het domein van bewegingsacties (bijvoorbeeld *in een boom klimmen* of *een kopje op tafel zetten*). Wanneer twee talen dichterbij elkaar komen kan dat verschillende patronen opleveren. Breed genomen zijn er drie mogelijkheden: reductie, herverdeling, en opeenstapeling. Er kan een reductie plaatsvinden waarbij tweetaligen alleen de dingen die overeenkomen in een taal behouden. Er kan een herverdeling plaatsvinden waarbij tweetaligen dezelfde elementen gebruiken maar niet met dezelfde frequentie. En er kan een opeenstapeling van elementen plaatsvinden waarbij tweetaligen de specificiteit van de ene taal overhevelen naar de andere taal. De vragen die centraal staan zijn a) waar komen we convergentie tegen, en b) hoe ziet convergentie eruit. We kijken zowel naar fijne (bijvoorbeeld de semantiek van specifieke werkwoorden) als grove (bijvoorbeeld de semantische dichtheid in een hele zin) maten en betrekken ook multimodale informatie bij de analyses.

Studie I: Frans-Nederlandse tweetaligen maken geen onderscheid tussen *leggen* en *zetten*.

Studie I behandelt beschrijvingen van plaatsingsacties, zoals *een kopje op tafel zetten*. In het Nederlands en in het Frans worden deze plaatsingsacties op verschillende manieren uitgedrukt. In het Frans gebruikt men meestal een algemeen plaatsingswerkwoord, namelijk *mettre* "leggen / zetten". In het Nederlands moet echter een keuze gemaakt worden tussen twee specifiekere werkwoorden, namelijk *leggen* en *zetten*. Deze twee werkwoorden specificeren naast de plaatsingactie ook de eindpositie van het geplaatste object. Voor *zetten* is dat over het algemeen verticaal en met een specifieke

onderkant, en voor *leggen* is dat horizontaal en zonder specifieke onderkant, of niet liggend op die onderkant.

De keuze tussen *leggen* en *zetten* is niet alleen semi-verplicht, maar het is, cruciaal, ook een binaire keus en het is lastig om tussenvormen te verzinnen. Dit staat in contrast tot eerdere studies over convergentie waarin over het algemeen de structuur van categorieën met flexibelere kernen en grenzen centraal staan. De scheidslijn tussen twee kleuren is bijvoorbeeld makkelijker een stukje te verschuiven (e.g., Ameel et al., 2009; Ameel et al., 2005; Athanasopoulos, 2009; Pavlenko & Malt, 2011). Deze studies laten dan meestal ook convergentiepatronen zien waarbij er subtiele verschuivingen van de categoriekernen of -grenzen te zien zijn terwijl tegelijkertijd de bredere categorie structuur onaangetast blijft. In deze studie staat de vraag centraal of we nog steeds convergentie vinden als er een niet-vrijblijvende keuze tussen twee werkwoorden gemaakt moet worden, dus wanneer er weinig ruimte is voor subtiele verschuivingen. En als we convergentie vinden, hoe ziet die er in dat geval uit?

We lieten eentalig Frans-sprekende, eentalig Nederlands-sprekende en tweetalige Frans-Nederlands-sprekende deelnemers aan de studie (allemaal uit België) korte filmpjes beschrijven van een meisje dat dingen opruimt. De beschrijvingen laten zien dat de eentalig Franstaligen inderdaad voornamelijk algemene plaatsingswerkwoorden gebruiken (*mettre* en *(dé)poser*), en dat de eentalig Nederlandstaligen daarentegen onderscheid maken tussen dingen die *weggezet* en *weggelegd* worden. De tweetalige deelnemers beschreven de filmpjes twee keer, een keer in het Frans en een keer in het Nederlands. In de Franse versie verschillen de resultaten niet veel van de eentalig Franse beschrijvingen; de tweetaligen gebruiken algemene plaatsingswerkwoorden om de opruimacties te beschrijven. In het Nederlands zien de eentalige beschrijvingen er echter wel anders uit dan de tweetalig Nederlandse beschrijvingen. In plaats van onderscheid te maken tussen *leggen* en *zetten* gebruiken de tweetaligen *leggen* voor alle plaatsingsacties.

Deze studie laat zien dat convergentie niet alleen gebeurt wanneer de grenzen tussen categorieën makkelijk kunnen verschuiven, maar ook wanneer de keuze binair en semi-verplicht is. Convergentie hoeft dus niet de vorm te nemen van een subtiele verschuiving maar kan af en toe ook in een vrij opvallende verandering van betekenis resulteren. In dit geval wordt het plaatsingselement behouden, maar benoeming van de oriëntatie laat men

achterwege. Dit kan getypeerd worden als convergentie van het reductieve type. De informatie die de talen delen wordt behouden, maar de taalspecifieke informatie wordt achterwege gelaten.

Studie II: Spraak en gesture laten parallelle convergentie patronen zien
Studie II gaat in op het globale karakter van convergentie vanuit een multimodaal perspectief. Dit houdt in dat zowel spraak als *gesture*, de spontane bewegingen die we maken terwijl we praten, bij de analyses betrokken worden. Spraak en gesture zijn nauw met elkaar verbonden en worden vaak gezien als modaliteit-specifieke afspiegelingen van een en hetzelfde onderliggende idee (e.g., Kendon, 2004; McNeill, 1992). Spraak en gesture drukken daarom vaak congruente, maar niet noodzakelijkerwijs identieke, informatie uit. Studies met tweedetaalsprekers laten zien dat gecombineerde gesture- en spraakproductie soms rijkere onderliggende ideeën kan onthullen dan dat spraak alleen zou laten zien (e.g., Gullberg, 2009a; Stam, 2006).

Convergentie in het domein van bewegingsacties is meestal van het gereduceerde (e.g., Pavlenko, 2009c) of herverdeelde type (e.g., Hohenstein et al., 2011) hoewel er ook een aantal voorbeelden van opeenstapelende convergentie te vinden zijn (e.g., Daller et al., 2011). We veronderstellen dat het in acht nemen van multimodale uitdrukkingen, bij uitstek geschikt als kanaal om extra informatie toe te voegen, meer convergentie van het cumulatieve type zou kunnen onthullen.

Net als bij de plaatsingsacties verschillen het Frans en het Nederlands er in hoe ze normaliter met bewegingsacties omgaan. Bij een bewegingsactie zijn meerdere verplichte componenten aanwezig: een figuur (degene die beweegt), het pad (de weg die het figuur aflegt), de grond (datgene waarover het figuur beweegt). Daarnaast is er een optioneel element manner, de manier waarop het figuur (zich) beweegt. Een voorbeeld:

(1) De eekhoorn   klimt   in de boom   omhoog
      Figuur   manner   grond   pad

In deze studie gaat het voornamelijk over de elementen pad en manner. In het Frans wordt meestal alleen het pad talig uitgedrukt, en dat gebeurt door het werkwoord (bijvoorbeeld, *L'écureuil monte l'arbre* "De eekhoorn gaat omhoog in de boom"). In het Nederlands worden echter in de meeste gevallen zowel pad als manner talig uitgedrukt waarbij de manner in het werkwoord komt en het pad in de periferie (bijvoorbeeld, *De eekhoorn klimt*

in de boom omhoog). In deze studie onderzoeken we eerst hoe eentaligen en tweetaligen bewegingsacties in het Nederlands en het Frans beschrijven. Daarnaast kijken we in hoeverre spraak en gesture hetzelfde uitdrukken of niet. We kijken daarbij zowel naar de overlap in betekenis, zowel op zinsniveau als op niveau van de delen van de zin die precies met het gesture opgelijnd zijn.

De resultaten laten zien dat zowel eentalige als tweetalige sprekers in het Frans gewoonlijk maar één semantisch element uitdrukken in hun beschrijvingen van een bewegingsactie, namelijk pad. Eentalige sprekers van het Nederlandse drukken daarentegen voornamelijk twee elementen uit, zowel pad als manner. De tweetaligen in het Nederlands hebben ook een voorkeur voor het uitdrukken van zowel manner als pad, maar niet zo sterk als de eentaligen. Met andere woorden, de tweetaligen gebruiken dezelfde opties, maar niet met dezelfde frequentie. De spraakresultaten laten dus een convergentie effect zien van het herverdeelde type, maar alleen in het Nederlands en niet in het Frans.

The multimodale resultaten laten een vergelijkbaar patroon zien. Als we kijken naar het zinsniveau dan blijken zowel een- als tweetaligen in het Frans een voorkeur te hebben voor complete overlap in spraak en gesture, beiden pad. Daarentegen hebben zowel een- als tweetaligen in het Nederlands een voorkeur voor het uitdrukken van zowel manner als pad in spraak, maar alleen pad in gesture. Op zinsniveau voegt het gesture geen extra informatie toe. De multimodale convergentiepatronen lopen daarmee parallel aan de spraakresultaten.

Spraak-gesture-combinaties op het niveau van de delen die precies samenvallen (waarbij spraak en gesture precies overlappen) laten zien dat Fransprekende een- en tweetaligen nog steeds een voorkeur hebben voor alleen pad in zowel spraak als gesture. In het Nederlands verschuiven de patronen echter, waarbij er meer totaal overlappende spraak-gesture-combinaties zijn op het niveau van samenvallende delen dan op zinsniveau. Met andere woorden, gestures worden opgelijnd met de componenten in spraak die dezelfde betekenis hebben. Daarbij doen tweetaligen dit meer dan eentaligen. De Nederlandse spraak-gesture-combinaties van tweetaligen zien er meer uit als de spraak-gesture-combinaties van Franse eentaligen dan de spraak-gesture-combinaties van Nederlandse eentaligen.

 Er is zowel op unimodaal als multimodaal niveau bewijs voor convergentie. Er is in deze studie echter geen enkele aanwijzing dat gesture gebruikt wordt

om een specifieker onderliggend idee aan te vullen. Multimodale analyses geven geen aanleiding om de voornamelijk herverdeelde aard van convergentie te herzien.

Studie III: Variatie in convergentiepatronen binnen één semantisch domein: de rol van intra-taal variatie

Studie III behandelt de verscheidenheid aan convergentiepatronen binnen één semantisch domein. Hoewel het domein in studie III net als in studie II dat van bewegingsacties is worden in deze studie subtypes onder de loep genomen. Zoals gezegd verschillen het Frans en het Nederlands verschillen in hoe ze bewegingsacties normaal gesproken beschrijven. Beide talen hebben echter ook opties die afwijken van de standaard, maar die binnen een bepaalde context wel degelijk gepast zijn. Voor subtypes van bewegingsacties, zoals bijvoorbeeld omhoog en omlaag, kunnen de typische beschrijvingen afwijken van de standaard voor de taal in zijn geheel. In het Frans komen bijvoorbeeld twee soorten beschrijvingen van beweging omhoog veel voor. Er is de optie om alleen pad te gebruiken (in het werkwoord) wat overeenkomt met wat het meest voorkomende patroon in de taal in zijn geheel, maar er is ook een optie om zowel pad als manner te gebruiken door middel van een specifiek lexicaal werkwoord (*grimper* "omhoog klimmen"). Deze studie onderzoekt de typische patronen voor drie subtypes van bewegingsacties: omhoog, omlaag, en over. We kijken daarbij of variatie van de standaard patronen invloed heeft op of en hoeveel convergentie er plaatsvindt.

De resultaten laten zien dat er inderdaad verschillende standaardpatronen zijn voor verschillende sub-types van bewegingsacties. In het Frans worden bewegingen omhoog beschreven door ofwel een pad-werkwoord ofwel een pad + manner werkwoord. Bewegingen omlaag-events worden beschreven door pad-werkwoorden en bewegingen over worden beschreven op een groot aantal verschillende manieren. In het Nederlands worden bewegingen omhoog over het algemeen beschreven door een manner-werkwoord met pad in de periferie. Bewegingen omlaag worden beschreven door een ofwel een manner-werkwoord ofwel een semantisch licht werkwoord (zoals *gaan*) in combinatie met een pad in de periferie. Bewegingen over worden beschreven door ofwel een pad-werkwoord (zoals *oversteken*) of een combinatie van een manner-werkwoord en een pad-uitdrukking in de periferie.

De verschillende subtypes laten ook verscheidenheid zien op convergentiegebied, zowel in hoe convergentie er uitziet als waar we het tegenkomen. Bij bewegingen omhoog zien we convergentie in geen van beide talen. Voor de bewegingen omlaag zien we convergentie in het Nederlands, maar niet in het Frans. En voor bewegingen over zien we convergentie in beide talen, zowel in het Frans als in het Nederlands. Deze diversiteit aan convergentiepatronen lijkt gedreven te worden door verschillen in de gebruiksfrequentie van een aantal specifieke werkwoorden: een semantisch licht werkwoord voor bewegingen omlaag in het Nederlands, een hogere frequentie van het gebruik van een pad-werkwoord voor bewegingen over in het Nederlands, en een verlaagde frequentie van de letterlijke vertaling van datzelfde werkwoord in het Frans. We zouden al deze convergentiepatronen kunnen bestempelen als herverdeling, maar in sommige gevallen leidt dit tot semantische versimpeling (bijvoorbeeld bij de bewegingen omlaag in het Nederlands) en soms tot een grotere semantische complexiteit (bijvoorbeeld bij de bewegingen over in het Frans).

Convergentiepatronen verschillen dus inderdaad per actie subtype en per taal. De resultaten helpen ons verder te ontdekken hoe convergentie werkt binnen een bepaald semantisch domein. Deze bevingen doen vermoeden dat er een centrale rol is weggelegd voor vertalingen met een hoge mate van overlap in betekenis. Een duidelijk voorbeeld hiervan zijn de directe vertalingen *oversteken* en *traverser*. In het Nederlands gebruiken de tweetaligen dit werkwoord vaker dan de eentaligen en in het Frans gebruiken de tweetaligen de vertaling minder vaak dan de eentaligen waardoor de tweetalige versie van de twee talen dichter bij elkaar komen te liggen dan de eentalige versies.

Samen laten deze drie studies zijn dat er binnen het semantische domein van bewegingsacties bewijs te vinden is voor verschillende vormen van convergentie. We laten zien dat convergentie zowel voorkomt op lexicaal als zinsniveau en zowel uni- als multimodaal. De bevindingen in dit proefschrift ondersteunen ook de voorkeur voor gereduceerde en herveelde types van convergentie: gereduceerde patronen die zich richten op de overlap in betekenis tussen de twee talen, en herveelde patronen gestuwd door bestaande variatie binnen een domein.

CURRICULUM VITAE

Inge Alferink was born in 1983 in Groningen, the Netherlands. She obtained a Bachelor's degree in English language, literature, and culture from the Rijksuniversiteit Groningen (RUG) in 2006. As part of the program she spent a year at the University of Manchester, UK. Afterwards, she continued in the Master's program in Applied Linguistics at the RUG graduating in 2009. She moved to Nijmegen to do her PhD work in linguistics at the Centre for Language Studies at the Radboud University and the IMPRS for Language Sciences.

Currently, Inge is employed as a postdoctoral fellow at the University of Toronto where she works on projects with topics as diverse as matching voices and faces within and across languages to the early singing abilities of toddlers.