

How (not) to cross a boundary: Crosslinguistic influence in simultaneous bilingual children's event construal

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Research Article

Cite this article: Engemann H (2021). How (not) to cross a boundary: Crosslinguistic influence in simultaneous bilingual children's event construal. *Bilingualism: Language and Cognition* 1–13. <https://doi.org/10.1017/S1366728921000298>

Received: 2 December 2020

Revised: 18 May 2021

Accepted: 24 May 2021

Keywords:

bilingual first language acquisition; crosslinguistic influence; motion events; co-activation; bilingual speech production processes

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Abstract

Simultaneous bilingual children sometimes display crosslinguistic influence (CLI), widely attested in the domain of morphosyntax. It remains less clear whether CLI affects bilinguals' event construal, what motivates its occurrence and directionality, and how developmentally persistent it is. The present study tested predictions generated by the structural overlap hypothesis and the co-activation account in the motion event domain. 96 English–French bilingual children of two age groups and 96 age-matched monolingual English and French controls were asked to describe animated videos displaying voluntary motion events. Semantic encoding in main verbs showed bidirectional CLI. Unidirectional CLI affected French path encoding in the verbal periphery and was predicted by the presence of boundary-crossing, despite the absence of structural overlap. Furthermore, CLI increased developmentally in the French data. It is argued that these findings reflect highly dynamic co-activation patterns sensitive to the requirements of the task and to language-specific challenges in the online production process.

1. Introduction

It is widely acknowledged that the human mind is well equipped to acquire and handle two or more languages. Within the domain of simultaneous child bilingualism, the consensus is that children will follow the same developmental trajectory as monolinguals and differentiate their languages early on (e.g., Genesee, Nicoladis & Paradis, 1995). Nonetheless, a substantial body of research has shown that regularly processing and producing two language systems results in crosslinguistic interactions that can give rise to both quantitative and qualitative deviations from monolinguals. When such deviations can be attributed to the presence of the other language, they are referred to as CROSSLINGUISTIC INFLUENCE (CLI).

The majority of studies investigating CLI in 2L1 settings have centred on the acquisition of morphosyntactic phenomena (see Serratrice, 2013 for a review), whilst research on CLI in bilingual children's semantic and conceptual development is relatively scarce (for exceptions, see Gathercole, Pérez-Tattam, Stadthagen-Gonzalez & Thomas, 2014; Nicoladis, Rose & Foursha-Stevenson, 2010). Most studies that address CLI in the semantic domain have been conducted with adult bilinguals (e.g., Alferink & Gullberg, 2014; Ameel, Malt, Storms & van Assche, 2009; Brown & Gullberg, 2013). These studies are often motivated by the question whether and to what extent speakers' semantic and conceptual L1 systems may restructure and converge with the L2. In contrast to adult L2 acquisition, cognitive and linguistic development proceed in parallel in 2L1 development. The evidence available to date suggests that children's construal of their L1 semantic categories is guided not only by non-linguistic cognitive factors, but also by language-specific properties, which has been attested across various semantic fields and in typologically diverse languages (Bowerman, 1996a, 1996b; Bowerman & Choi, 2001; Choi, 2006; Hickmann, Hendriks & Champaud, 2009). These findings raise the question as to how CLI plays out in simultaneous bilinguals' semantic and conceptual development.

Another research gap concerns the longevity of CLI in simultaneous bilingual development. In many studies, CLI is assumed to be a temporary developmental phenomenon that children will eventually overcome as their linguistic and cognitive resources develop. For instance, Hulk and Müller (2000) attribute the occurrence of CLI to bilingual children's exposure to more varied input supporting a wider range of possible analyses. As a consequence, bilingual children simply "take longer than monolinguals to figure out the language-specific analysis" (Hulk & Müller, 2000, pp. 228), but once they do, CLI is predicted to disappear. In a similar vein, the BILINGUAL BOOTSTRAPPING HYPOTHESIS proposed by Gawlitzek-Maiwald and Tracy (1996) conceives of CLI as a developmental relief strategy, which allows children to fill temporary lexical or syntactic gaps by pooling resources from both of their languages, particularly when development in one language is more advanced with respect to a given property. It follows from

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both of the above developmental perspectives that CLI should diminish or cease entirely once its developmental motivation no longer applies.

Amongst the studies that have investigated CLI as a function of age the results are inconclusive. Whilst there is some evidence for a decline of CLI and eventual convergence with L1 adults (e.g., Unsworth, 2012), other studies have reported prolonged CLI persisting into later stages of childhood (Argyri & Sorace, 2007; Bosch & Unsworth, 2020; Sorace, Serratrice, Filiaci & Baldo, 2009). These findings pertain exclusively to the domain of morphosyntax, however, while to our knowledge there is to date no available research on the longevity of CLI in children's semantic and conceptual development. If CLI is indeed something that characterises 2L1 speakers' productions and comprehension beyond childhood and potentially even into adolescence and adulthood, this would challenge the widely held assumption that 2L1 bilingual acquisition ultimately results in L1-like attainment (e.g., Meisel, 2011a; De Houwer, 2009).

The present study aims to contribute to closing these research gaps by addressing the role of age and language-specific semantic constraints in the context of motion events in English–French bilingual children. In what follows, I first outline two competing theoretical accounts for CLI in simultaneous child bilingualism (2.1). I then review the literature on how motion is verbalised in English and French (2.2) and what we know about the acquisition of motion event expression in different child and adult bilingual contexts (2.3).

2. Background

2.1 Explaining CLI: Overlap or co-activation?

An influential account that has shaped research into CLI in the past two decades is the OVERLAP HYPOTHESIS advanced by Hulk and Müller (2000). The authors propose two conditions for the occurrence of CLI in 2L1 bilingual development. First, language A has a single option for a given structure which overlaps (at least partially) with one of multiple structural options of language B. Second, the structures of interest are situated at vulnerable interfaces, particularly between syntax and discourse-pragmatics that are known to be problematic in monolingual L1 acquisition. Fulfilment of these two necessary (though not sufficient) conditions (Hulk & Müller, 2000, pp. 229) will make bilingual children's productions susceptible to overusing the crosslinguistically shared structure in language B, thus resulting in exclusively quantitative differences from monolingual children. CLI is expected to be unidirectional, affecting only the language with multiple options. Some of the research testing the overlap hypothesis across different language combinations is indeed consistent with its predictions (e.g., Döpke, 1998, 2000; Schmitz, Patuto & Müller, 2012). Other studies, however, have demonstrated CLI outside critical interfaces (e.g., Serratrice, Sorace, Filiaci & Baldo, 2009), and in the absence of crosslinguistic overlap (e.g., Nicoladis, 2002, 2003; Yip & Matthews, 2000). At the same time, some studies have reported an absence of CLI when both linguistic conditions are met (e.g., Nicoladis et al., 2010), thus undermining their predictive value.

An alternative proposal views CLI in early bilingualism as a result of CO-ACTIVATION during bilinguals' online speech production process (Nicoladis, 2006; Nicoladis et al., 2010). This account is based on speech production models (Ferreira & Dell, 2000; Levelt, Roelofs & Meyer, 1999) that assume several distinct stages

of implicit decisions speakers make when realising an utterance. According to Nicoladis (2006), CLI is presumed to occur as a result of co-activation during the stage of linguistic formulation (or LEMMA LEVEL), where the intended message from the first stage of CONCEPTUALISATION is mapped onto language-specific forms, involving the selection of lexical items and syntactic frames. In bilinguals, the syntactic frames of both languages are always simultaneously co-activated to some extent, leading to competition. Based on this account, Nicoladis (2006) explains bidirectional reversal errors observed in English–French bilingual children's adjective placement. Although only pre-nominal adjectives are shared crosslinguistically (e.g., *une grande fille* 'a tall girl'), bilingual children also produced some target-deviant post-nominal adjectives in their English (e.g., *apple green*), which cannot be accounted for by the overlap hypothesis. Within a co-activation account, wishing to produce 'green apple' in English activates the lexicalisations and their associated syntactic frames in both languages. That is, both the English pre-nominal adjective order and the French post-nominal adjective order are activated, although the latter to a lesser degree, as it is not the language selected. Sometimes the non-target option can win out, leading to reversal errors, when recent language exposure or practice has strengthened activation of the non-target language. The co-activation account is in line with empirical evidence on crosslinguistic priming in bilingual children (Hsin, Legendre & Omaki, 2013), demonstrating that recent exposure to one language can lead to morphosyntactic interference in children's other language, even in the absence of structural overlap. Recently, there have been proposals in the literature to reconceptualise CLI as the outcome of crosslinguistic priming (Hervé, Serratrice & Corley, 2016; Serratrice, 2016), as a potential means of providing a unified psycholinguistic approach to explaining different manifestations of CLI across different bilingual populations. The purpose of the present study is to test the predictions of structural overlap and of co-activation, conceptualised within this more recent framework of crosslinguistic priming, in the context of English–French bilingual children's motion event expressions.

2.2 Motion typology: English and French

Although motion is a universally fundamental concept that pervades human experience, its linguistic expression manifests a surprising degree of crosslinguistic variation. Talmy's semantic typology (1985, 2000) is an attempt to systematise this variation by classifying languages according to how the conceptual components of motion event structure are typically mapped onto linguistic devices. In accordance with Talmy (1985, pp. 60–61), motion is defined in this paper as an event involving a FIGURE moving with respect to a GROUND entity following a certain PATH. Additionally, motion events may include optional semantic components that constitute co-events, such as the MANNER of motion or CAUSE. Talmy distinguishes languages according to where path, the 'core schema' of a motion event, is most typically expressed. In so-called verb-framed languages (V-languages), such as French and other Romance languages, path is routinely encoded in the main verb (e.g., *monter* 'ascend'), whilst manner is either not verbalised at all or appears in peripheral devices outside the main verb, such as gerundives (e.g., *en courant* 'by running') or adverbials (e.g., *à quatre pattes* 'on all fours'). The reverse pattern is found in satellite-framed languages (S-languages), like English and other Germanic languages, where speakers habitually verbalise manner in the main verb

and encode path in so-called satellites, i.e., devices outside the main verb, such as particles and prepositional phrases (e.g., *into the room*).¹ These lexicalisation patterns are to be understood as probabilistic tendencies that do not preclude alternative, but more marked ways of expressing motion within a language (e.g., Latinate path verbs in English, such as *enter*, *exit*).

With respect to English, the S-framed pattern has indeed been observed to apply very consistently both with respect to basic and more complex motion events (e.g., caused motion). For French and indeed other Romance languages, however, the V-framed classification has proven more problematic. This is due to the availability of several additional lexicalisation options that do not easily fit the V-framed constellation. In French, S-framing is licensed when expressing motion WITHIN a location without implying a displacement (e.g., *danser dans la maison* ‘to dance in the house’). Second, even when describing motion events that do involve displacement, manner-verbs in French can combine with a limited inventory of prepositions that allow path-encoding (e.g., by referring to goals as in *jusque* ‘towards’). These observations have led to revisions of Talmy’s original typology with respect to V-languages. One important refinement concerns the BOUNDARY-CROSSING CONSTRAINT (Slobin & Hoiting, 1994) according to which path encoding within the verb is obligatory only when a boundary-crossing is involved. In the absence of boundary-crossing, both framing patterns are licensed, resulting in a split framing behaviour that is typical of many V-languages. From the perspective of the bilingual learner, it follows from the above characterisation that there is partial structural overlap between English and French motion encoding. S-framing patterns are available in French, although they are more restricted morphosyntactically, owing to a highly constrained repertoire of path-encoding prepositions, and are excluded entirely only in boundary-crossing situations.

2.3 Motion in bilingual contexts

The majority of research on motion expression in bilinguals has targeted adults: either late L2 learners, or bilingual adults who have acquired both languages in early childhood. Only a few studies have investigated motion expression in bilingual children. Findings for each bilingual acquisition context are reviewed in turn. In adult L2 learning, findings suggest that mapping the target-appropriate semantic component onto the main verb is unproblematic, at least for learners of a V-language. Thus, several studies on L2 learners of Spanish (Cadierno & Ruiz, 2006; Larrañaga, Treffers-Daller, Tidball & Gil Ortega, 2012; Navarro & Nicoladis, 2005) report no evidence of L1 transfer of manner verbs, even at intermediate proficiency levels. In contrast, encoding outside the main verb is reported to give rise to persistent transfer in both directions of acquisition: some studies find that L2 learners of V-languages continue to encode path information via partly ungrammatical PPs and particles (Cadierno, 2004; Navarro & Nicoladis, 2005), thus replicating the pattern of their S-framed L1. Conversely, using PPs and particles target-appropriately has been shown to prove challenging for L1 speakers of V-languages who continue to rely on bare verbs in their S-framed L2 (Navarro & Nicoladis, 2005; Stam, 2010), even at advanced proficiency levels. The boundary-crossing constraint constitutes another source of persistent difficulty for L2

learners of V-languages. A range of studies demonstrates that, even at highly advanced levels of proficiency, learners continue to violate the constraint by inaccurately mapping manner onto verbs in combination with anomalous path satellites (e.g., Cadierno & Ruiz, 2006; Larrañaga et al., 2012).

In the context of adult bilinguals who have acquired both languages in early childhood, the available research suggests unique ‘in-between’ patterns that diverge from the typical tendencies of monolinguals of both languages. For example, bidirectional investigations of motion expression in Spanish–English bilinguals (Filipović, 2011; Hohenstein, Eisenberg & Naigles, 2006) have found higher rates of manner verbs in bilinguals’ Spanish relative to monolinguals, but lower rates than in English monolinguals. Similar intermediate encoding tendencies have been observed outside the main verb. In a study on Turkish–German speakers (Daller, Treffers-Daller & Furman, 2011), bilinguals have been reported to use more path satellites than Turkish (V-framed) monolinguals, but fewer than German (S-framed) monolinguals.

In the context of early childhood bilingualism, some of the few available studies report similar in-between encoding tendencies as in adult bilinguals. Thus, in an investigation of Spanish early L2 learners of English in an instructional setting, Avelo and Athanasopoulos (2016) find evidence for L2 influence on the semantics of children’s L1 verbs, such that manner is encoded more frequently, but path less so, relative to Spanish monolinguals. Although the study is unidirectional and hence does not test children’s encoding preferences in their L2, the authors conclude that their findings suggest a merging process of lexicalisation tendencies of children’s two languages. In a bidirectional study of simultaneous English–French bilingual children who acquire both languages naturalistically, Miller, Furman and Nicoladis (2018) observe unidirectional CLI such that bilinguals differed from English monolinguals in their more frequent lexicalisation of path (only in token numbers, not in type). Note that Miller et al.’s (2018) analysis is based on the overall encoding of path and manner, without distinguishing between verbs and satellites. Our own previous research on the acquisition of caused motion expression in early successive and simultaneous English–French bilingual children (Engemann, 2012, 2016; Harr & Engemann, 2011) suggested prolific asymmetric CLI in the opposite direction from what was reported in Miller et al. (2018). Bilinguals’ French descriptions showed evidence of pervasive influence from English S-framing strategies, whereas English expressions showed little influence from French. Crucially, CLI affected both the verb and peripheral devices. Thus, bilinguals overwhelmingly preferred to use verbs conflating manner and cause (e.g., *pousser* ‘push’) and resorted to various strategies for expressing path outside the main verb, including some target-deviant PPs and more marginal but formally target-appropriate means, such as gerunds (e.g., *en traversant* ‘by crossing’).

Summarising, the available research on motion expression in various bilingual contexts suggests an asymmetry in the difficulty of the learner task involved for adult L2 learners of V- vs. S-languages. Specifically, the boundary-crossing constraint and the morphosyntactic restrictions governing peripheral path encoding associated with V-languages appear to be vulnerable to transfer and resistant to restructuring. The evidence for adult bilinguals who acquired both languages in childhood suggests unique bilingual-specific patterns resulting from bidirectional CLI that may potentially indicate convergence in lexicalisation patterns. If this is indeed the case, it raises the question as to when such merging process starts developmentally and

¹In line with widely accepted revisions of Talmy’s original proposal (Beavers et al., 2010), a broadened notion of ‘satellite’ is adopted in this paper, which includes PPs.

underscores the need for more studies on child bilinguals' motion expression. The scarce evidence available to date on bilingual children is inconclusive and too heterogeneous to allow for meaningful comparisons. It is unclear, for instance, why the two studies on simultaneous English–French bilingual children (Engemann, 2016; Miller et al., 2018) arrived at different results concerning the directionality of CLI. It is possible that the type of motion event described (complex caused versus simple voluntary motion) and the different outcome measures used play a role. As to the latter, CLI may not become apparent to the same extent if semantic encoding via main verbs and satellites is conflated in the same measure, as was the case in Miller et al. (2018). This underscores the need for fine-grained semantic analyses of motion encoding strategies that take into account the potentially differential impact of language-specific morphosyntactic repertoires.

3. The present study

The current study extends previous research on motion event expression in bilingualism in two main ways. First, by investigating simultaneous bilingual children, the study examines an acquisition context which to date has received relatively little attention within the conceptual and semantic domain. Second, the study aims to expand the focus of previous research on motion in simultaneous bilingual children by going beyond the verb: in line with recent revisions of Talmy's typology (Beavers, Levin & Tham, 2010) the analysis conducted in this study crucially also takes into account the verbal periphery and the role that language-specific morphosyntactic constraints in prepositional inventories may play. Furthermore, the study proposes a systematic investigation of the role of the boundary-crossing constraint as a potentially vulnerable locus of CLI.

The overall objective of this study is to contribute to our understanding of what motivates CLI in simultaneous bilingual development. Two theoretical proposals, the overlap hypothesis and the co-activation account (see 2.1) are put to the test, which generate different predictions with regard to the directionality of CLI, the effect of age, the role of boundary-crossing and the occurrence of qualitative deviations, summarised in what follows.

(a) Directionality of CLI

If overlap predicts the direction of CLI, then English–French bilinguals should display influence mainly or exclusively from English to French, whilst English motion descriptions should remain largely unaffected. If, however, co-activation is the determining factor, then we should expect some degree of bidirectional CLI, as the framing pattern of one language will always to some degree co-activate the predominant framing pattern of the other language.

(b) Boundary-crossing

There is partial overlap between English in French in the availability of S-framing as long as no boundary-crossing is involved (see 2.2). According to the overlap hypothesis, we should therefore expect any CLI to be restricted to events that do not involve a boundary-crossing. Alternatively, co-activation should result in some CLI independently of condition (+/- boundary-crossing), given the constant co-activation and competition of framing variants of both languages. Nevertheless, even under a co-activation account, the overlapping structure may receive more activation

and result in amplified CLI in descriptions of boundary-crossing events.

(c) Effect of age

Based on the overlap hypothesis, CLI is a temporary developmental phenomenon. One should therefore expect a decline of CLI with children's increasing age. Alternatively, co-activation would not necessarily predict an age-related lessening of CLI. In fact, two outcomes are compatible within the co-activation model. Either, CLI remains constant with age (as co-activation is considered a general feature of bilingual speech production) or CLI increases with age as children's linguistic abilities develop and consequently allow for more linguistic resources to be co-activated across both languages. This second possibility would be in line with some recent research on cross-linguistic priming in adult bilinguals showing that priming effects become stronger as a function of learners' L2 proficiency (Bernolet, Hartsuiker & Pickering, 2013; Hartsuiker & Bernolet, 2017). Taking age as proxy for growing language proficiency in bilingual children's acquisition process, one might therefore predict a similar strengthening of priming as a function of children's age.

(d) Qualitative target deviations

Given that the overlap account only predicts quantitative differences from monolingual peers, no qualitative deviations should occur under this account. In contrast, a co-activation would allow for the occurrence of target deviant structures in contexts in which a non-overlapping structure from the other language receives sufficient activation to override the competing grammatical structure of the language in operation.

4. Method

4.1 Participants

Participants comprised 96 simultaneous English–French bilingual children and a control group of 96 monolingual English and French children ($n = 48$ per language). An independent subject design was adopted whereby half of the bilingual children ($n = 48$) performed the task in English and half of them in French, resulting in a total of four groups: English monolinguals (EM), French monolinguals (FM), bilinguals who were tested in English (EB) and bilinguals who were tested in French (FB). To test for effects of age, all participants were divided into two age groups ($n = 24$ /age group): age group 1 (AG1) for children aged between four and six years of age, and age group 2 (AG2) for children between eight and ten years of age. Table 1 summarises participants' background characteristics.

All children were recruited through their nurseries and schools in England and France. The monolingual English children grew up in Cambridge and the monolingual French children lived in a suburb of Paris. The monolingual children had no naturalistic exposure to any other language than their L1 and only minimal exposure to a second foreign language in a classroom setting. The bilingual children attended English–French bilingual day-care centres and schools in Paris and Aix-en-Provence. Collecting all of the bilingual data in France controlled for the factor of the ambient language, which is known to often become the dominant language in bilingual acquisition contexts (Daller et al., 2011). Prior to data collection, a language background questionnaire was administered to participants' parents gathering information about family language practices adopted, children's

Table 1. Means and standard deviations of participant characteristics.

		EM	EB	FM	FB
AG1	N	24	24	24	24
	Mean age in years (SD)	5 (1.1)	5.9 (1.1)	5.4 (1.1)	5.8 (1.3)
	Girls/boys	12/12	13/11	12/12	10/14
AG2	N	24	24	24	24
	Mean age in years (SD)	8.9 (1.1)	9.5 (1)	8.6 (1.1)	9.8 (.6)
	Girls/boys	12/12	11/13	12/12	14/10

everyday linguistic exposure from each parent and other sources, the frequency and lengths of visits abroad and self-rated levels of fluency (both for parents and their child) on a scale from 1 (= poor) to 10 (= native-like). Only children who were exposed to both English and French from birth were included in the sample. Children whose fluency assessment diverged by more than two points between their two languages on the questionnaire scale were not included in the study.

4.2 Materials

Event verbalisations were elicited using short video animations (lasting 15 seconds each), which were originally designed by Hickmann and colleagues (Hendriks & Hickmann, 2011; Hickmann, Taranne & Bonnet, 2009). The task comprised one training item, followed by 12 target items and 12 control items. Table 2 provides a list of all target scenes with their associated manner and path components. To avoid order effects, stimuli were presented in six orders to which subjects were assigned randomly. Target items showed an agent performing a spontaneous movement along a given path and in a given manner (e.g., a boy swimming across a river). Items were divided into two sets of six videos each, corresponding to the two conditions ‘boundary-crossing’ (BC) vs. ‘non-boundary-crossing’ (NBC). BC items (see Figure 1 for an example) involved ground referents that could be construed as a spatial boundary, such as a road or river, and showed an agent crossing this spatial boundary in various manners along a horizontal axis. NBC events depicted spontaneous displacements along a vertical axis carried out in various manners. In each item, an animal referent moved up and subsequently down the same ground referent (e.g., a mouse crawls up a table leg to grab a piece of cheese and slides back down). The set of NBC items thus comprised two target displacements per item (one up-target and one down-target), hence yielding a total of 12 target events (as opposed to 6 target events in the BC condition).²

4.3 Procedure

The task was conducted with each child individually in their nursery or school in a quiet room. Participants were seated at a table

²The non-boundary-crossing condition included two targets instead of one because the materials by Hickmann and colleagues (2009b) were designed to test a hypothesised difference between up- and down-trajectories in French, where verbs jointly lexicalising path and manner are available for upward but not for downward motion (e.g., *grimper* ‘to crawl upwards’).

with a computer screen in front of them, on which they were shown the video clips. They were invited by the experimenter to verbalise what had happened in each of them after the end of each clip. With bilingual participants, the experimenter negotiated a monolingual mode by talking to them in only one of the languages for a few minutes before the start of the experiment. To elicit descriptions that relied maximally on explicit verbal means, children were asked to tell what they had seen in the videos to an imaginary listener who themselves had no visual access to the cartoons. Participants were to imagine that the listener would later have to reproduce the stories themselves on the basis of their descriptions. For the younger children (aged four to five years), this fictitious listener was represented by a doll they were introduced to at the beginning of the task and that they were asked to blindfold as part of a secret-telling game. In order to familiarise children with the requirements of the task, each session started with a training item, similar to the target stimuli, which was designed to sensitise participants to the relevant semantic components of manner and path. After the training phase, target stimuli were presented to children with an introductory commentary by the experimenter that provided them with the appropriate lexical items for the figure (e.g., *here’s a caterpillar*) and ground (e.g., *look, there’s a river*) portrayed in a given item.

4.4 Coding and analysis

Children’s descriptions were transcribed in CHAT format according to CLAN conventions (MacWhinney, 2000) and were coded for three dimensions:

- (i) the (motion-relevant) semantic information encoded, distinguishing path (e.g., *down*), manner (e.g., *to cycle*), or both path and manner (e.g., *grimper* ‘climb upwards’).
- (ii) the linguistic devices selected to encode semantic information: either the main verb (e.g., *ice-skate*) or satellites, defined as any peripheral devices outside the main verb (e.g., PPs, particles, such as *up*, but also subordinate constructions, such as gerundives).
- (iii) target-deviant motion encoding, including unacceptable reversals of the typical framing pattern (e.g., *?courir en traversant la rue* ‘run by crossing the road’) and ungrammatical PPs (e.g., *il court *à travers la rue* ‘he runs across the road’).³

To conduct mixed-effects logistic regression analyses (Baayen, 2008) the categorical dependent variables yielded by the coding (see 4.4) were transformed into binary outcomes (1 vs. 0), i.e., as the presence or absence of a category. Three outcome variables were selected to best reflect S-framing vs. V-framing: ‘manner verb’ and ‘path satellite’ to represent S-framing and ‘path verb’ to reflect V-framing.⁴ The question addressed by the inferential analyses was whether the likelihood of using S-framed vs. V-framed encoding strategies and the occurrence of target deviations can be predicted by participants’ Language Background (bilingual vs. monolingual), their Age (younger vs. older age group), Condition (+/- boundary crossing) and/or interactions of any of these factors. Mixed logit models were fitted with

³These categories were based on our previous findings of target-deviant idiosyncrasies in English–French bilinguals’ descriptions of caused motion (Engemann, 2012, 2016).

⁴There was no theoretically motivated reason to analyse satellites encoding manner as they are not characteristic of either of the two typological framing strategies.

Table 2. List of target stimuli used to elicit motion event descriptions.

	Item	Scene	Path	Manner
Non-boundary-crossing	1	Mouse climbs up a table and slides down	Up Down	Climb Slide
	2	Caterpillar crawls up a plant and crawls down	Up Down	Crawl Crawl
	3	Cat jumps up a telephone pole and jumps down	Up Down	Jump Jump
	4	Bear climbs up a tree and climbs down	Up Down	Crawl Crawl
	5	Squirrel runs up a tree and runs down	Up Down	Run Run
	6	Monkey climbs up a palm tree and climbs down	Up Down	Climb Climb
Boundary-crossing	7	Baby crawls across a street	Across	Crawl
	8	Man runs across a road	Across	Run
	9	Boy slides across a river	Across	Slide
	10	Boy swims across a river	Across	Swim
	11	Girl skates across a lake	Across	Lake
	12	Woman cycles across train tracks	Across	Cycle

**Fig. 1.** Example of a dynamic motion event from the boundary-crossing condition used in the study (here shown as a still).

Language Background, Age and Condition as fixed factors (i.e., the predictor variables) while simultaneously accounting for by-item and by-subject variance by including random intercepts for both variables. Moreover, interactions between the fixed factors were also modelled (Language Background * Age * Condition). To allow for main effects, contrasts were sum-coded. The sum-coded predictors were Language Background (1 = monolinguals, -1 = bilinguals), Age (1 = AG2, -1 = AG1), and Condition (1 = NBC, -1 = BC). Separate models were run for the English and the French data. One reason was that the main interest of the present study was whether bilinguals differed from monolinguals, while language contrasts were the working assumption based on previous research on typological differences between English and French (see 2.2). Another reason was that the data corresponded to two separate experiments that had been carried out using a between-subject design (see 4.1). All

analyses were carried out in R version 4.0.0 (R Core Team, 2020) using the `glmer` function of the `lme4` package (Bates, Mächler, Bolker & Walker, 2015).

5. Results

5.1 Encoding patterns

This section first provides descriptive statistics of the semantic information types (manner, path, or both manner and path) participants encoded in verbs vs. satellites, independently of condition and age. Then, the results of the inferential analyses on the following three outcome variables are reported: manner verbs, path satellites, and path verbs. Table 3 summarises the frequencies of semantic information encoded via verbs and satellites relative to the total number of verbs and satellites used respectively, by language and language background (monolinguals vs. bilinguals). Figure 2 represents the same information graphically. As shown by Figure 2, the majority of English verbs in both monolinguals and bilinguals encoded manner whilst satellites almost exclusively encoded path. This neat semantic distribution is in line with the typological tendencies expected for English. The French data demonstrated the expected preference for main verbs to encode path in both monolinguals and bilinguals, but revealed a more mixed pattern for satellites, which expressed path and manner to roughly the same extent in both groups. Moreover, looking at the total counts of satellites in French as compared to English suggests that French motion descriptions relied much more on encoding via bare verbs, whilst English speakers routinely coupled main verbs with satellites. This observation is in accordance with tendencies that have been widely reported by previous research (e.g., Berman & Slobin, 1994; Navarro & Nicoladis, 2005).

Manner verbs

Figure 3 displays the proportions of motion verbs that encoded manner information produced by each participant group across

Table 3. Semantic information encoded via verbs and satellites in English and French by monolinguals and bilinguals.

		Verbs			Satellites		
		manner	path	manner + path	manner	path	manner + path
EM	Counts	522	41	2	9	664	15
	Total	769			769		
	%	67.9	5.3	0.3	1.2	86.3	2
EB	Counts	559	84	0	11	709	11
	Total	846			846		
	%	66.1	9.9	0	1.3	83.8	1.3
FM	Counts	134	600	76	72	90	8
	Total	836			836		
	%	16	71.8	9.1	8.6	10.8	1
FB	Counts	155	571	67	67	69	5
	Total	814			814		
	%	19	70.1	8.2	8.2	8.5	0.6

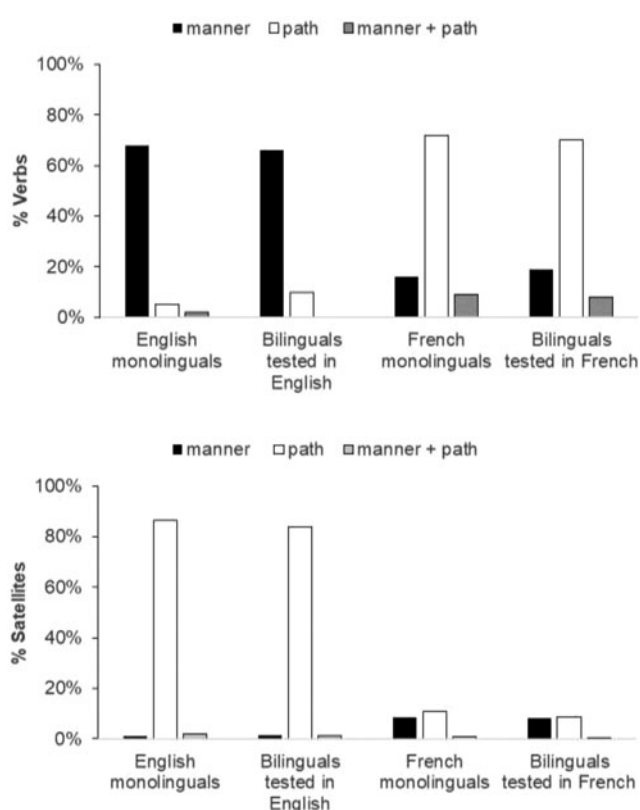


Fig. 2. Semantic information encoded via verbs and satellites by group.

the two tested conditions. Focusing on the results of the mixed-effects logistic regression for English first, the model revealed a main effect of condition ($\beta = -0.94$, $SE = 0.46$, Wald's $z = -2.05$, $p < .05$), such that manner verbs occurred significantly less frequently in BC events, independently of participants' age and language background. No other factor was found to significantly affect the likelihood of producing manner verbs in English. Turning to French, the results also showed a main effect

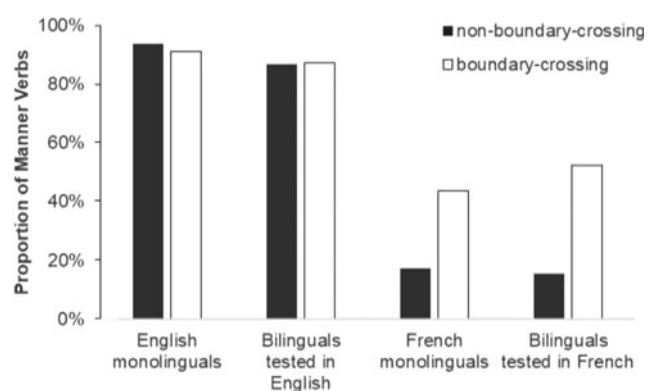


Fig. 3. Proportion of verbs encoding manner by group and condition.

of condition ($\beta = -1.83$, $SE = 0.73$, Wald's $z = -2.52$, $p < .05$), which was qualified by two significant interactions. Consistent with predictions under the overlap hypothesis, condition interacted with language background ($\beta = 0.75$, $SE = 0.29$, Wald's $z = 2.62$, $p < .01$): BC events attracted more manner verbs in both groups than NBC events and this difference was more pronounced in bilinguals than in monolinguals. The second significant interaction effect was observed between condition and age ($\beta = 0.88$, $SE = 0.29$, Wald's $z = 3.04$, $p < .01$). While manner verbs were more frequent in BC events across both age groups (AG1: 51.7%, AG2: 38%) than in NBC events (AG1: 16.2%, AG2: 15.9%), they showed a decrease with age only in the BC condition.

Path satellites

Recall that, just like manner verbs, the outcome variable 'path satellites' reflects the typical S-framing tendency. In the English sample, the model revealed a significant main effect of condition on the likelihood of producing path satellites ($\beta = 3.2$, $SE = 0.64$, Wald's $Z = 5.13$, $p < .001$), which was qualified by an interaction effect with age ($\beta = -2.73$, $SE = 0.46$, Wald's $Z = -5.97$, $p < .001$). Figure 4 shows that while path satellites in the English data were overall less frequent in the BC than in the NBC condition,

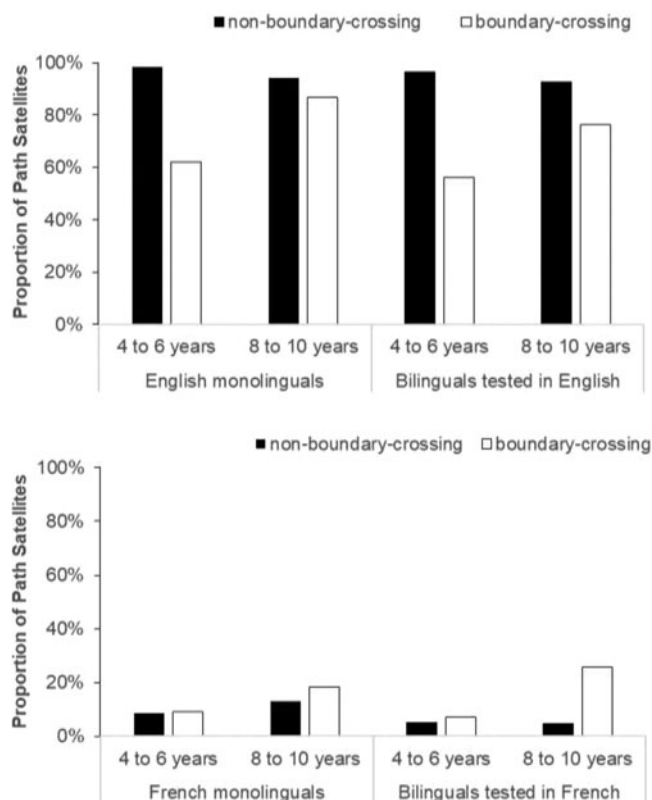


Fig. 4. Proportion of satellites encoding path by group, condition and age.

they increased markedly with children's age in descriptions of BC events and showed a slight decrease in NBC events. In line with the results for manner verbs, there was no effect of language background in the English data.

Within the French sample, the model also revealed a significant main effect of condition ($\beta = -0.72$, $SE = 0.3$, Wald's $Z = -2.41$, $p < .001$), which was further qualified by two significant interactions effects. First, condition interacted with language background ($\beta = 0.89$, $SE = 0.36$, Wald's $Z = -2.49$, $p < .05$), such that bilinguals encoded path via satellites more frequently in the BC condition than monolinguals, but less than monolingual children when describing NBC events, as visualised by Figure 4. Note that this interaction corresponds to the effect observed for manner verbs in French (see above). Second, there was a significant interaction effect between age and condition ($\beta = -1.01$, $SE = 0.36$, Wald's $Z = -2.84$, $p < .01$) in French: older children used more path encoding satellites than younger children, but this increase was much more pronounced in the BC condition than in NBC descriptions (see Figure 4).

Summarising the results for encoding tendencies that characterise S-framing, while no differences between monolinguals and bilinguals were detected in the English data, French motion descriptions showed a bilingual preference for S-framing tendencies both with respect to the verb (manner) and to the verbal periphery (path satellites). This preference was either restricted to or more pronounced in descriptions of BC events, as evidenced by the interaction effects between condition and language background.

Path verbs

As path verbs reflect the typical V-framing strategy, which has no readily available equivalent in English, recall that the overlap

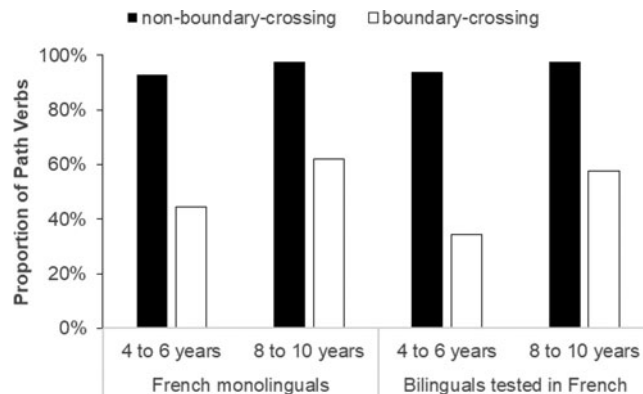


Fig. 5. Proportion of verbs encoding path in French by group, condition and age.

hypothesis would not predict effects of language background on this outcome variable. Under the co-activation account, however, bidirectional CLI would be expected even in the absence of structural overlap, such that bilinguals might use more path verbs in their English than monolingual English peers. Starting with the results for English (see Figure 2 and Table 3 for frequencies), the model revealed a significant main effect of language background ($\beta = -0.72$, $SE = 0.33$, Wald's $Z = -2.18$, $p < .05$) such that bilinguals used more path verbs (9.9%) than English monolinguals (5.3%). No other predictor in the English data was found to be significant.

The analysis within French revealed significant main effects of condition ($\beta = 3.51$, $SE = 0.53$, Wald's $Z = 6.6$, $p < .001$) and of age ($\beta = 1.14$, $SE = 0.23$, Wald's $Z = 4.93$, $p < .001$). As Figure 5 illustrates, these effects corresponded to a higher frequency of path verbs in NBC than in BC event descriptions and a general increase of path verbs with children's age. Although this age-dependent increase appears more prominent in the BC than in the NBC condition, there was no significant interaction effect of age and condition ($\beta = -0.18$, $SE = 0.38$, Wald's $Z = -0.47$, $p = 0.64$). Language background did not have any significant effect on the production of path verbs ($\beta = 0.16$, $SE = 0.23$, Wald's $Z = 0.68$, $p = 0.5$).

Summarising, in their English descriptions bilinguals used path verbs more frequently relative to English monolinguals, while no such group difference was obtained for French descriptions. In contrast to the results for S-framing (manner verbs and path satellites) found for French, the effect of language background on English path verbs was not qualified by condition or age.

5.2 Target deviations

Target-deviant encoding strategies (as defined in 4.4) represent a qualitative and more overt manifestation of CLI than the semantic encoding tendencies dealt with in preceding sections. Recall that the overlap hypothesis only predicts quantitative deviations from monolingual development, whereas crosslinguistic co-activation does not preclude the occurrence of qualitative deviations. Table 4 displays the total frequencies of all target deviations that occurred in bilinguals and monolinguals across both languages and age groups. As Table 4 shows, target deviations were largely restricted to the French data, with only two instances of ungrammatical framing reversals occurring in bilinguals' English (e.g., *he crossed the road on doing running). In the French data, all framing reversals corresponded to manner

Table 4. Counts of target deviations in monolinguals and bilinguals in English and French.

			Framing reversals	Ungrammatical satellites
English	monolinguals	Ages 4 to 6	0	0
		Ages 8 to 10	0	0
	bilinguals	Ages 4 to 6	1	0
		Ages 8 to 10	1	0
French	monolinguals	Ages 4 to 6	1	1
		Ages 8 to 10	5	1
	bilinguals	Ages 4 to 6	2	6
		Ages 8 to 10	3	16

verbs used in combination with gerundives encoding path (e.g., ? *un monsieur court en traversant la route* ‘a man runs by crossing the road’), which are judged to be unacceptable by adult L1 speakers (Pourcel & Kopecka, 2005). Interestingly, such framing reversals were also occasionally produced by monolingual French children (6 instances). Note that all instances of target deviations, independently of language background, occurred in the boundary-crossing condition.

Ungrammatical satellite usage only occurred in the French data and was mainly restricted to bilinguals (22 cases vs. 2 cases in monolinguals), especially the older age group (16 cases vs. 6 cases in the younger age group). All instances once again occurred in the boundary-crossing condition and corresponded to variations of the existing French locative preposition *à travers* (‘through’) used idiosyncratically by participants as a marker of path to express a boundary-crossing. Such descriptions (e.g., *nager *à travers une rivière* ‘swim across a lake’), result not only in violations of the boundary-crossing constraint, but also amount to a semantic overextension of the atelic preposition *à travers* to telic contexts. Ungrammatical satellites of this kind were used by 20 out of the total of 24 bilingual participants tested in French, indicating that this phenomenon characterised bilinguals’ boundary-crossing descriptions more generally and was not due to a few outliers. Nonetheless, the overall occurrence of target deviations was very low and only accounted for 0.96% of the total of utterances produced by French monolinguals and 3.32% of bilinguals’ French descriptions.

For the inferential analysis, the binary outcome variable was defined as the presence or absence of a target deviation (both framing reversals and ungrammatical satellites taken together). A mixed logit model was fitted for the French data with language background, age, and their interaction term as fixed effects; item and subject were entered as random effects.⁵ Due to the sparsity of target-deviant observations in English, no analysis was conducted for the English sample. Significant main effects were observed both for language background ($\beta = -1.42$, $SE = 0.52$, Wald’s $Z = -2.76$, $p < .01$) and for age ($\beta = 1.12$, $SE = 0.52$, Wald’s $Z = 2.16$, $p < .05$), but not for the interaction term of both factors ($\beta = 0.08$, $SE = 1.03$, Wald’s $Z = 0.08$, $p < .94$). This confirms the picture obtained for the descriptive statistics displayed in Table 4. Thus, in French descriptions of BC events, bilinguals produced target-deviant motion descriptions significantly more

frequently than monolinguals, and older children did so more than younger ones.

6. General discussion

6.1 CLI patterns in motion encoding show evidence for co-activation

This study set out to investigate CLI in child simultaneous bilingual acquisition of English and French in the domain of voluntary motion expression. Two theoretical proposals, the overlap hypothesis (Hulk & Müller, 2000) and the co-activation account (Nicoladis, 2006), the latter reconceptualised within the framework of crosslinguistic priming (Hervé et al., 2016; Serratrice, 2016), were put to the test by examining the effects of age and structural overlap (instantiated by the semantic constraint of boundary-crossing) on bilinguals’ and monolinguals’ motion encoding strategies. Different outcomes were predicted for the two proposals in terms of the directionality of CLI, its development as a function of children’s age and the occurrence of qualitative target deviations. Children’s encoding preferences were analysed in terms of the frequency of packaging semantic information via verbs and peripheral devices, corresponding to the typical S- vs. V-framed strategies.

Before summarising the results, it is important to note that bilinguals’ encoding patterns largely followed the language-specific tendencies of their monolingual peers. Bilinguals’ English descriptions overwhelmingly combined manner verbs with path satellites. In French, bilingual children demonstrated a similar preference as monolinguals for relying on bare verbs encoding path, while making much less use overall of satellites than English speakers. The observation that bilinguals largely adhere to the typological tendencies of each of their languages and thus maintain the contrast between V- and S-framed information distribution principles is an important finding in itself. This shows, firstly, that bilinguals are sensitive to the typological differences characterising motion expression in their two languages from at least as early as four years of age, confirming previous crosslinguistic developmental research in this domain (e.g., Berman & Slobin, 1994; Hickmann et al., 2009a, b). Secondly, these results demonstrate that bilinguals differentiate their languages in the semantic-conceptual domain, in line with widely attested findings in other linguistic domains, such as morphosyntax (see Serratrice, 2013).

Notwithstanding the observed parallels, the statistical analyses also revealed a number of important departures from

⁵Condition was not entered as a predictor because all target deviations occurred exclusively in the boundary-crossing condition.

monolingual encoding patterns that support a co-activation account. The key finding in this respect is that, in their English descriptions, bilinguals used significantly more path verbs relative to English monolinguals, while bilinguals tested in French used manner verbs and path satellites more frequently than French monolinguals. In other words, in each of their languages, bilinguals displayed an increased use of the typical framing tendency of their other language, which demonstrates bidirectionality of CLI. Whilst inconsistent with the overlap hypothesis, bidirectional CLI is expected under the co-activation account, which assumes that the prevalent pattern of one language always simultaneously co-activates that of the other language. Given that in the present study, bilinguals' encoding tendencies in each language were still considerably closer to those of monolinguals of each language than to each other, it would however be misleading to equate the current findings with the 'in-between' patterns reported in some previous studies on child and adult bilinguals (Aveledo & Athanasopoulos, 2016; Filipović, 2011; Hohenstein et al., 2006). Nevertheless, the observed general tendency towards a convergence of lexicalisation patterns goes in the same direction documented by previous research on adult bilinguals (e.g., Alferink & Gullberg, 2014; Brown & Gullberg, 2013).

The second main finding concerns the effects of condition and age on the occurrence and nature of CLI. Regarding condition (+/- boundary-crossing), bilinguals' tendency to use S-framing encoding strategies in their French was amplified when describing events involving a boundary-crossing. Moreover, target-deviant motion encodings, such as illicit framing reversals and unacceptable 'pseudo-PPs', exclusively occurred in descriptions of boundary-crossings. Given the absence of structural overlap in this condition due to the boundary-crossing constraint (Slobin & Hoiting, 1994), these findings are incompatible with the overlap hypothesis. The results on the effect of age provide further evidence against the overlap account, which would have predicted CLI to diminish with age. Instead, target-deviant path expressions increased significantly between the two tested age groups. Likewise, target-like means of instantiating S-framing (manner verbs and path satellites) did not demonstrate a decrease with age. Both analyses indicate that CLI may be a more persistent phenomenon in bilingual children's production patterns than assumed by the overlap account.

To summarise, having analysed CLI in terms of directionality, age and the role of semantic constraints, the findings presented in this study strongly speak against the overlap account. CLI was shown to occur bidirectionally, to either remain stable or even partly increase with age and to manifest itself mainly in exactly the condition which did not afford structural overlap. In what follows, I propose an explanation of these findings within an extended version of Nicoladis' co-activation account (2006).

6.2 The dynamics of co-activation during the online speech production process

Even though the co-activation account would predict CLI to occur independently of the presence or absence of structural overlap, it does not explain why CLI should be more prevalent or even exclusive to the condition that did not afford crosslinguistic overlap, i.e., the boundary-crossing condition. In what follows I argue that this is the result of complex interactions between linearisation choices in the conceptualiser and language-specific morphosyntactic restrictions that induce particular crosslinguistic co-activation patterns at the lemma level of speech production.

I thereby propose to extend Nicoladis' account of co-activation by including Levelt's notion of linearisation (1981, 1989) as a crucial ingredient of speech production that can contribute to explaining the task-dependent dynamics of co-activation.

Given the sequential nature of the speech channel, which requires a linear presentation of one word at a time, Levelt (1981, pp. 305) states that "the speaker has a LINEARIZATION PROBLEM – that is, a linear order has to be determined over any knowledge structure to be formulated". Empirical research on speakers' linearisation strategies suggests that more salient or activated concepts go first in speech production (Ferreira & Rehrig, 2019; Levelt, 1989). In the present context, the observed prominence of manner verbs in boundary-crossing items, which occurred in all participant groups independently of language background, is likely an artefact of the task in that all the items in this condition portrayed manners that corresponded to activities with a strong leisure character (e.g., ice-skating), which plausibly increased their saliency and hence their activation level to child participants. In terms of linearisation strategies, the increased saliency of manner should give rise to an increase in descriptions that mention manner first, that is, before path. In English, the default lexicalisation pattern already aligns with this strategy, in that manner is typically encoded in the main verb occurring before the PP. That is, the typical sequencing of semantic components in English already fits the increased activation level of the concept of manner in boundary-crossing events. In French, however, where manner is typically either omitted or encoded in the verbal periphery, this increased manner saliency prompted children – both monolinguals and bilinguals – to encode this component in the main verb more frequently than they typically would. In the bilingual children, this tendency was further reinforced relative to monolinguals owing to their simultaneous co-activation of the English pattern, where manner is routinely expressed first.

In the online process of sequencing information, selecting the main verb for manner encoding has problematic consequences for subsequently expressing path in French. This is because, contrary to English, the repertoire of peripheral devices that can unambiguously express a trajectory is extremely restricted in French (see 2.2). Faced with this difficulty, bilinguals resorted to strategies that are either highly idiosyncratic (framing reversals) or outright unacceptable, as in the case of 'pseudo-satellites'. The fact that even monolingual French children occasionally produced such idiosyncratic expressions might thus reflect the same online linearisation difficulty induced by the situation of high manner saliency, which pushes the French motion system to its typological limits. Although this account is necessarily speculative, such dynamic patterns of crosslinguistic co-activation during the online production process, particularly in response to the linearisation challenge, could account for why qualitative target deviations were observed only in the boundary-crossing condition and only within French, where language-specific restrictions apply that complicate the task of jointly expressing multiple semantic components. Further studies are necessary to address the role of language-specific challenges for linearisation and the impact of conceptual saliency on crosslinguistic co-activation patterns.

6.3 Increase of CLI with age is consistent with co-activation as priming

Although there is some recent evidence of developmental persistence of CLI in simultaneous bilingual acquisition (Bosch & Unsworth, 2020) there is to my knowledge no study reporting

an age-related increase of CLI. In the present study, this was exactly what was found in relation to target-deviant satellites in bilingual children's French descriptions. From the perspective of co-activation, it is possible to explain such developmental reinforcement of CLI as a result of children's developing linguistic skills, allowing them to recruit more linguistic resources, that thus become available for co-activation. In the case of the observed target-deviations, children's developing syntactic abilities enabled them to use more complex constructions (such as the French *gerundive*) to encode path outside the main verb, giving rise to the observed framing reversals. In a similar vein, capitalising on locative prepositions as a means of path encoding presupposes a certain command of the prepositional system and its combinatorial potential with verbs. This line of argument is consistent with experimental evidence on crosslinguistic priming in second language learners showing stronger priming effects in more proficient learners (Bernolet et al., 2013; Hartsuiker & Bernolet, 2017). If this explanation is correct, CLI in simultaneous bilingual contexts should not necessarily diminish even in adulthood. Future research would need to ascertain the longevity of CLI from a lifespan perspective by testing adolescent and adult simultaneous bilinguals.

6.4 Implications and open questions

The findings of this study have theoretical implications regarding the role of language-specific semantic constraints for CLI in simultaneous bilingualism. Bilinguals' violation of the boundary-crossing constraint supports the claim that structures governed by semantic and discourse-pragmatic restrictions are vulnerable to CLI and may result in a weakening or even loss of these constraints in contexts of simultaneous bilingualism (Silva-Corvalán, 1994). What remains unclear is the role of structural overlap. Does such weakening of semantic constraints occur only in cases when there is partial overlap with the predominant structure of the other language, where these restrictions do not apply? Alternatively, is it an effect of bilingualism *per se* for semantic constraints to weaken as part of a general bilingual tendency to maximise crosslinguistically convergent patterns (e.g., Muysken, 2013)? Future research should address this question by systematically comparing the present scenario to the bilingual acquisition of language pairs governed by the same semantic constraint (e.g., two V-languages).

The observation that even in the younger age group (four to six years) bilingual children did not systematically adhere to the boundary-crossing constraint raises further questions about its developmental trajectory. Namely, are we dealing with the gradual weakening of a constraint that had previously been in place, or with a situation of incomplete acquisition? A longitudinal examination of boundary-crossing descriptions in both younger and older bilinguals than those tested in this study would be necessary to address this question. It is possible that bilinguals' semantic acquisition in this domain manifests a unique pattern from the beginning. If that is so, this raises further questions regarding bilinguals' event representations of motion and of boundary-crossing displacements in particular. Further studies relying on methods tapping into speakers' event cognition (such as e.g., eye-tracking, memory and categorisation) will have to ascertain whether the deviations observed on the linguistic level reflect unique bilingual patterns of event representations on a cognitive level.

A striking observation was the fact that even monolingual French children occasionally produced target-deviant 'pseudo-

satellites' and framing reversals deemed unacceptable by adult monolinguals. In the monolingual group, these deviations cannot be explained as a result of CLI, suggesting the possibility of ongoing processes of language change within French. If this is the case, the French motion system may be undergoing a typological shift towards a system allowing more systematic encoding of path information via satellites. Although necessarily speculative, this suggestion is compatible with recent claims in the literature that bilingual speakers are potential agents of language change (Fernández, De Souza & Carando, 2017; Kootstra & Muysken, 2017; Meisel, 2011b). Alternatively, French may simply be less straightforwardly V-framing than is generally acknowledged, which would lend support to arguments in the literature in favour of classifying French as a mixed or hybrid system (Kopecka, 2006; Pourcel & Kopecka, 2005). Further research is necessary to investigate to what extent the qualitative deviations observed in this study are the temporary result of bilinguals' overstretching the patterns of a highly variable system of motion encoding, or whether they reflect ongoing language change.

6.5 Limitations

Although the questionnaire administered in this study included parental self-rating measures of children's proficiency in both languages, no independent measures of proficiency, dominance and language exposure were collected in the study. Therefore, we cannot completely rule out the possibility that the occurrence of qualitative CLI in the French sample was due to children being dominant in their English. While acknowledging this possibility, the fact that all bilingual children tested in this study lived in France at the time of testing makes dominance from English less plausible, particularly in light of research suggesting strong effects of the ambient language on bilingual children's motion expression (Daller et al., 2011). If the language of children's environment played a role for the directionality of CLI, we would have expected children's English responses to be affected by their French rather than vice versa.

A second limitation concerns the design of the stimuli in this study. The events portrayed in the boundary-crossing condition conflated several factors: all of the items showed motion on the horizontal axis involving atelic types of manner with a strong leisure character. This makes it impossible to determine whether the strong manner focus observed in this condition is merely an artefact of the task or a more general feature of boundary-crossing events. Note, however, that in a previous study on caused motion expressions in bilingual children (Engemann, 2012) a similar effect of boundary-crossing was observed despite the fact that the manners presented were identical across all conditions and did not correspond to salient leisure activities. The tentative conclusion to draw from this is that there is something about boundary-crossing motion events more generally that induces greater attention to manner and consequently triggers CLI in the context of bilingualism. A promising avenue for future research would be to investigate boundary-crossing events further in different bilingual contexts by manipulating factors such as the degree of telicity involved in the activities shown, the presence of a change of state, and perceptual features such as the type of boundary and the direction of movement (horizontal vs. vertical).

7. Conclusions

The current study sought to explore the occurrence and nature of CLI in the domain of voluntary motion event expression in

simultaneous English–French bilingual children. The findings support a co-activation account of CLI (Nicoladis, 2006) according to which bilinguals' language systems are simultaneously co-activated independently of the presence of crosslinguistic structural overlap (Hsin et al., 2013). The reported results contribute to the current research on simultaneous bilingualism in several ways. First, the age-related persistence and in some cases even reinforcement of CLI calls into question the widely held assumption that CLI in simultaneous bilingualism is merely a temporary phenomenon bound to disappear. These results underscore the importance of investigating CLI across the lifespan and across different linguistic domains, including semantic representations. Second, the effects of event type (boundary-crossing) indicate that CLI is a highly dynamic phenomenon that is sensitive to the demands of the specific task at hand and to the ad-hoc requirements of the online production process, particularly the linearisation challenge. Moreover, bilinguals' selection and sequencing of semantic information suggest that co-activation may already be present at the level of the conceptualiser. This speaks to an earlier and more pervasive effect of CLI on bilinguals' speech production than previously assumed.

Acknowledgments. *I am indebted to all the bilingual and monolingual children who kindly participated in this study and to Gunnar Jacob for his statistical advice.

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