

ARTICLE

# Structural complexity reduction in English–French bilingual children’s event encoding

Helen ENGEMANN

University of Mannheim

**Corresponding author:** Helen Engemann; Email: [H.Engemann@uni-mannheim.de](mailto:H.Engemann@uni-mannheim.de)

(Received 22 April 2022; revised 02 February 2023; accepted 02 May 2023)

## Abstract

Previous research on the L1 acquisition of motion event expression suggests that mapping multiple semantic components onto syntactic units is associated with greater difficulties in verb-framed than in satellite-framed languages, because the former require more complex structures (using subordination). This study investigated the impact of this language-specific difference in English–French bilingual children’s caused motion expressions. 2L1 children ( $n = 96$ ) between 4 and 10 years and monolingual English and French children ( $n = 96$ ) described video animations portraying caused motion events involving multiple semantic components. Results revealed reduced rates of subordinate constructions in bilinguals’ French descriptions, and more so in older than younger children, while English responses aligned with monolinguals. Semantic density of responses strongly predicted syntactic complexity, but exclusively in French. These asymmetric findings indicate a task-specific syntactic relief strategy and are discussed in the context of theoretical claims about universal biases of event encoding and bilingual-specific optimisation strategies.

**Keywords:** Simultaneous bilingual development; syntactic complexity; caused motion; language-specific properties; crosslinguistic influence

## Introduction

Conveying an everyday motion event (such as putting a glass on a table or rolling a ball across a street) involves making several choices that are to some extent guided by language-specific factors (Slobin, 2004; Talmy, 1985, 2000). These concern both the types of semantic information habitually selected for expression and information packaging – that is, how information is routinely mapped onto the lexical and morphosyntactic devices. A focus of research in the past two decades has been on exploring the consequences of crosslinguistic variation in motion expression for the process of child language acquisition across a wide variety of first languages (e.g., Berman & Slobin, 1994; Bowerman, 1996; Bowerman & Choi, 2001). One of the key insights emerging from this line of research is that language-specific and universal

factors interact in shaping children's acquisition process. While virtually all the available research examines monolingual children of various L1s, it is still less clear how these factors play out in bilingual children acquiring typologically different languages. Moreover, most of the existing developmental research has centred on semantic aspects of motion expression, but less is known about how and when children tune into the language-specific syntactic packaging patterns to map these semantics aspects onto syntactic units (for exceptions, see Allen *et al.*, 2007; Hickmann *et al.*, 2018).

In this respect, recent theoretical revisions of Talmy's original typology are particularly relevant, as they focus on the morphosyntactic dimension of motion expression and have direct implications for language acquisition. According to an influential proposal (Beavers *et al.*, 2010), crosslinguistic variation in motion expression is a by-product of language-specific morphosyntactic resources: more specifically, of the means available in a language to compactly combine several information types within a sentence. That is, while satellite-framed languages, such as English, can rely on a range of prepositions and particles to systematically encode additional information outside the verb (e.g., *into*, *out of*, *across*), speakers of verb-framed languages, like French, typically need to take recourse to syntactically more complex constructions involving a subordinate clause (e.g., *Il traverse la route en courant* 'He crosses the road by/while running'). Thus, the task of mapping multiple semantic elements onto syntactic units implies different degrees of formal complexity across languages and hence, different challenges for the acquisition task. Beavers *et al.* (2010) claim that there is a universal bias to prefer syntactically less complex to more complex options of event expression. Although these proposals have immediate testable implications for processes of child development, they have yet to be investigated directly in an acquisition context.

In this study, I propose that bilingual first language acquisition provides a unique testbed for directly investigating the implications of recent theoretical revisions of Talmy's typology regarding the role of language-specific and universal factors in children's acquisition process. The present study thus attempts to close gaps in L1 research by exploring the development of motion expressions from the perspective of syntactic packaging choices in the hitherto underexplored context of simultaneous bilingual language acquisition. The question addressed in the current study is whether English–French bilingual children between the ages of four and ten show evidence of a universal preference for syntactically less complex event representations in a video-based elicited description task. While most acquisition studies have investigated voluntary motion (involving the semantic components of Path and Manner), the domain of inquiry in the current study is that of caused motion events, a generally underexplored domain in research. For the purposes of the present investigation, caused motion constitutes a domain particularly advantageous for syntactic analyses since it involves a greater number of salient elements to be expressed and therefore creates more pressure to use syntactically complex structures.

In what follows, I first summarise the relevant language-specific properties of English and French caused motion event expression pertaining to syntactic packaging. I then provide a review of previous research examining child L1 acquisition of motion event expression from the perspective of syntactic structures. Finally, I discuss relevant proposals of bilingual-specific strategies and biases in children and adults that could alternatively explain tendencies to reduce complexity.

### Language-specific properties of caused motion expression

According to Talmy (1985, 2000), a motion event minimally involves a universal set of semantic components, which include the presence of motion *per se*, a FIGURE which is located or moves with respect to another entity (GROUND) and the trajectory followed by the Figure in relation to the Ground (PATH). In addition, motion events may involve an optional CO-EVENT, such as MANNER (the activity of state exhibited by the Figure) and CAUSE (the cause of the occurrence of motion). Talmy's typological distinction hinges on where the semantic core component of Path is characteristically expressed. Speakers of VERB-FRAMED languages, such as French, typically encode Path in the verb root, either omitting the overt expression of co-events such as Manner and Cause entirely or relegating them to the verbal periphery (notably by using subordinate constructions, such as gerunds, see (1)). In SATELLITE-FRAMED languages, speakers habitually express Path via particles and prepositions, thus freeing up the verb slot for encoding the co-events of Manner and Cause, as illustrated in (2). Note that considerable intra-linguistic variability in French allows for alternative satellite-framed and syntactically less complex ways of expressing multiple event components, partly owing to the existence of verbs that conflate Manner and Cause (e.g., *pousser* 'push', *tirer* 'pull') which can be used in combination with a restricted repertoire of French Path-prepositions (see (3) and (4)).

- (1) Il monte la colline en tirant la valise.  
'He ascends the hill by/while pulling the suitcase.'
- (2) He's pulling the suitcase up the hill.
- (3) Il tire la valise jusqu'en bas de la colline.  
'He pulls the suitcase all the way to the bottom of the hill.'
- (4) Il tire la valise vers le bas.  
'He pulls the suitcase towards the bottom.'
- (5) Il tire la valise dans la maison.  
'He pulls the suitcase in the house.'
- (6) Il entre la maison en tirant la valise.  
'He enters the house by/while pulling the suitcase.'
- (7) Il tire la valise pour entrer dans la maison.  
'He pulls the suitcase in order to enter the house.'

Nonetheless, the use of these French Path-prepositions is more constrained than in English. Importantly, while they convey the directionality of Path (namely, motion towards a certain endpoint or goal), they cannot be used independently to denote a boundary-crossing implying a change of state. That is, unlike their English counterparts 'across', 'into', 'out of', the inherently locative French prepositions cannot unambiguously express a boundary-crossing by themselves, but only attain this interpretation by pragmatic inference (see example in (5)). The only unambiguous alternatives involve using two verbs in a matrix-subordinate construction, as illustrated in the gerund construction in (6) and the infinitival construction in (7). Consequently, when a motion event calls for the expression of multiple salient event components, as is the case in the present context of caused motion, speakers of French rely to a greater extent on more complex structures than speakers of English. Indeed, although there are some limited French prepositional devices available that allow for the expression of some Paths outside the verb, the only systematic means available to do so unambiguously and independently of the type of Path involved rely on using syntactic subordination and hence formally more complex structures.

Thus, complex motion events, such as caused motion, bring into sharper relief the kind of language-specific divide which Beavers *et al.* (2010) propose underlies the Talmyan distinction between verb-framed and satellite-framed languages. The difference in where Path vs. Manner/Cause are typically expressed in a language is argued to reflect more basic and motion-independent language-specific differences in the morphosyntactic resources available for combining several information components within a sentence (e.g., case marking, subordination, adjunction, etc.). According to this proposal, the attested crosslinguistic differences and intra-typological variation in motion event encoding can be explained as an epiphenomenon of more basic language-specific constraints that are not exclusive to the encoding of motion. A second major claim by Beavers *et al.* (2010) relevant to the present study is that intra-typological (dis-)preferences for certain encoding options over others can be explained as the result of a universal bias to prefer morphosyntactically less complex over more complex structures owing to ease of processing (Beavers *et al.*, 2010, p. 36). It is important to note at this point that linguistic complexity is a multi-faceted notion and that there is no broad consensus on how to define or measure it (Ehret *et al.*, 2021). An important distinction conventionally drawn in the literature is that between absolute and relative complexity (e.g., Dahl, 2004; Miestamo, 2008). While the former refers to abstract, system-inherent properties of language (e.g., the number of grammatical rules or irregular forms within a language), the latter is concerned with complexity relative to language users, encompassing notions such as the processing cost, effort and difficulty of acquisition or learning associated with linguistic structures. Both constructs are relevant to the claims made by Beavers *et al.* (2010) as they explain preferences for event encodings options that show specific structural properties (i.e., absolute complexity) by ease of processing (i.e., relative complexity). Thus, complexity as related to language users should in turn be measurable in terms of objectively quantifiable preferences for structures with certain abstract properties.

Based on the proposal by Beavers *et al.* (2010), several testable predictions can be generated for child language acquisition. First, during early stages of development, children may show language-independent preferences for relatively simpler packaging strategies, even if these diverge from the target language the child is exposed to. That is, children's development may reveal indications of a universal preference for morphosyntactic simplicity. Second, we should expect motion expression in languages involving more complex structural patterns to take longer to acquire than in languages where this can be achieved via comparatively simpler means. In other words, when several event components are at stake, as in caused motion, children acquiring a verb-framed language, such as French, should take longer to tune into the target-like means of doing so than children acquiring a satellite-framed language. In dual language contexts in which one language requires structurally more complex event encoding than the other, bilingual children may show a preference for the relatively simpler structural options, which may hence result in quantitative or qualitative structural crosslinguistic influence.

### *Syntactic packaging of motion events in L1 acquisition*

The majority of L1 motion research focusses on the acquisition of semantic and discourse organisational aspects of motion expression (e.g., see Berman & Slobin, 1994), while there are hardly any studies examining children's event encoding from the perspective of syntactic packaging. The few available studies (Allen *et al.*, 2007; Hickmann *et al.*, 2018)

are crosslinguistic investigations comparing children acquiring various typologically different L1s in terms of the impact of language-specific syntactic tendencies known to characterise adults' event descriptions. The general conclusion drawn from these studies is that, in line with semantic aspects of motion event encoding, both universal and language-specific factors seem to play a role in guiding children's patterns of syntactic packaging in their acquisition process.

Allen *et al.* (2007) investigate syntactic packaging preferences in video-elicited voluntary motion narrations (containing both Path and Manner) by three-year-old children acquiring English as their L1 compared to two verb-framed languages, Turkish and Japanese. Joint encoding of both Path and Manner requires the use of relatively more complex structures involving two-clause matrix-subordinate structures in Japanese and Turkish, while this can be achieved by syntactically simple compact packaging patterns in English (e.g., *He jumps down the hill*). Importantly, the stimuli used in the study are designed such that both Path and Manner are salient so as to maximise the crosslinguistic syntactic contrasts by minimising the chances of children producing responses that only contain one of the information components. Results show that while three-year-olds' motion narrations are already largely attuned to the language-specific semantic-syntax mappings preferred by their adult counterparts, they also reveal evidence of some language-independent syntactic tendencies. Specifically, children of all languages show a preference for compact packaging within a single verbal clause, resulting in Turkish- and Japanese-speaking children frequently using atypical descriptions mirroring the syntactic patterns of English-speaking children rather than those characteristic of their respective target language. The authors attribute these findings to the greater difficulty involved in learning the syntactically complex structures required in the two verb-framed languages to produce target descriptions expressing both salient event components (Allen *et al.*, 2007, p. 41).

A recent large-scale crosslinguistic study by Hickmann *et al.* (Hickmann *et al.*, 2018) compares the L1 acquisition of caused motion expressions (using the same stimuli as the current study) in a verb-framed language (French) to that of two satellite-framed languages (German and English) across several dimensions and finds that the production of complex event descriptions (involving a subordinate clause) is heavily impacted by language. Thus, while subordination occurs very rarely in both German- and English-speaking children, who instead show a strong preference for simple compact structures, children acquiring French use subordination significantly more frequently. Moreover, age is reported to only affect syntactic packaging preferences in French, reflecting children's increasing use of complex structures, whereas syntactic packaging choices remain stable across all tested ages in German and English. Relating these findings to the increase in semantic density (the number of event components expressed) shown in French (but not in English or German), the authors suggest that the production of semantically dense responses in French may depend on children's mastery of complex structures, hence explaining the "greater and later developmental progression in French than in English and German." (Hickmann *et al.*, 2018, p. 1269).

To summarise, even though neither of the above studies takes Beavers *et al.*'s (2010) idea as a starting point, the research available to date seems to lend some preliminary support to their proposal. Thus, syntactically more complex event encoding options appear to represent an acquisitional challenge for children, resulting both in typologically atypical event expressions at early stages of acquisition (at least up to age three) and in a protracted developmental path for verb-framed languages. At the same time, these findings raise questions about how bilingual children who are simultaneously exposed

to a verb-framed and a satellite-framed language may acquire the language-specific syntactic packaging preferences of each language and whether they reveal any preferences that may be indicative of potentially universal biases.

### *Bilingual-specific biases*

If bilingual children's syntactic packaging strategies reveal a preference for less complex event encoding, there could in principle be several reasons: while such tendency could indeed be indicative of a universal preference (Beavers *et al.*, 2010), it could alternatively result from a bilingual-specific bias. Research in the domain of bilingual motion event encoding has demonstrated that learners make use of various bilingual-specific strategies to negotiate their competing grammars (Pavlenko, 2011; Treffers-Daller & Tidball, 2015). Treffers-Daller and Tidball (2015) distinguish four different outcome scenarios linked to different bilingual strategies: TRANSFER (patterns align with the L1, but differ from the L2), RESTRUCTURING (patterns align with the L2, but differ from the L1), CREATIVE/HYBRID (patterns align with neither the L1 nor the L2), and CONVERGENCE (pattern alignment with both the L1 and the L2).

In what follows, the focus will be specifically on theoretical proposals and bilingual-specific strategies that have been explicitly linked in the relevant literature to predictions of complexity reduction via considerations of cognitive/processing costs, and which therefore lend themselves particularly well to testing the theoretical proposal by Beavers *et al.* (2010) at the centre of the present investigation. What is central to most of these proposals is the assumption (whether explicit or implicit) that bilingualism comes at a cost: thus, acquiring and processing more than one language involves managing constant competition between two systems (e.g., Bialystok *et al.*, 2012), which results in high cognitive load (for a review, see Adamou, 2021). Cognitive load has been invoked to explain various phenomena in bilingual production, processing, and acquisition. Most relevant to the current study, there are several related proposals of bilingual-specific strategies that are claimed to allow bilingual speakers to “economise” on these cognitive costs. A central one concerns the CONVERGENCE account (Bullock & Toribio, 2004), according to which bilinguals over-rely on crosslinguistically congruent options, thus capitalising on options that work in both languages as a means of reducing processing costs (Toribio, 2004). In a similar vein, Muysken (2013) attributes crosslinguistic convergence tendencies to a bilingual optimisation strategy employed to reduce the processing costs involved in managing language-specific options.

Empirical support for convergence as a bilingual cost reduction strategy comes from several psycholinguistic studies: Ameel *et al.* (2009) report convergent categorisation patterns in a study testing French–Dutch bilinguals' naming of container objects, such that bilinguals' categorisation choices in each language are more similar to one another than to those exhibited by Dutch and French monolinguals, respectively. Results in a study on the production of aspectual markers (Flecken, 2011) indicate that when a time constraint is introduced, Dutch–German bilinguals overuse the option that is available in both languages (the simple verb form), strengthening an interpretation of convergence as a processing strategy of cognitive load reduction. Similarly, a study on Spanish–English speakers' memory of motion events (Filipović, 2011) finds that bilinguals' recognition performance patterns reflect a convergence strategy of opting for ‘whatever-works-in-both’ (Filipović, 2011, p. 481).

To date, the convergence account has not been directly investigated in the context of bilingual language acquisition despite the explicit claim that simultaneous bilingual children should be particularly susceptible to convergence processes because they are “called on to regularly produce and process information in two languages (e.g., within the one-parent/one-language-paradigm)” (Toribio, 2004, p. 172). Nonetheless, several proposals in the bilingual acquisition literature predict phenomena akin to convergence in bilingual children, even though they are not couched specifically in this terminology and depart from the assumption of cognitive cost reduction. Thus, the ambiguity/overlap hypothesis (Hulk & Müller, 2000; Müller & Hulk, 2001) posits that bilingual children will show a quantitative preference for structures that are available in both of their languages, hence resulting in enhanced crosslinguistic convergence in their overall production rates of this structure. Directly related to the ambiguity hypothesis is the claim that crosslinguistic influence in simultaneous bilingual children can be explained as a temporary relief strategy that occurs when children are faced with a complex grammatical phenomenon in one language and will temporarily use the less complex equivalent of the same phenomenon in their other language to overcome this challenge (Müller & Hulk, 2001). Thus, bilingual children may temporarily transfer a simpler structural option into the language with the more complex structure as a strategy of dealing with structures that they do not yet fully master. In a similar vein, the BILINGUAL BOOTSTRAPPING account (Gawlitczek-Maiwald & Tracy, 1996) proposes that when a particular structure has not been fully acquired in one of the languages, bilingual children may strategically deploy the structural resources from their other language to temporarily fill syntactic gaps.

What all of the above proposals have in common is that they would predict a bilingual preference for less complex structures in situations in which the two languages differ in their relative degree of complexity with respect to a given phenomenon and in which the less complex option is available in both languages (or at least shows some degree of crosslinguistic similarity/structural overlap). These conditions apply in the present case of caused motion: as was shown earlier (see (3) and (4)), there is some degree of structural overlap between French and English caused motion encoding, such that the same simple compact pattern that is characteristic of English is also partly available in French. Hence, any potential evidence for a preference for this packaging pattern would in principle be consistent both with a bilingual-specific convergence strategy and with a universal preference. I propose that the setup of the study at hand and the language-specific contrast examined allow us to adjudicate between the two proposals, as different outcomes would be expected for each. These are presented in the following section.

## The present study

### *Aims and contribution*

The aim of the present study is to investigate bilingual children’s development of syntactically complex structures as a function of language-specific properties and age, using a semi-spontaneous production task designed to elicit maximally information-dense caused motion event descriptions, comprising five relevant semantic components. The study aims to contribute to current research by extending previous studies in two main ways. First, while previous research on syntactic packaging in the motion domain has exclusively focused on crosslinguistic comparisons of monolingual



children, this study is the first to investigate simultaneous bilingual children in direct comparison with monolingual controls of each language. Second, the present investigation of syntactic development across four age groups ranging from pre-school (4 years) to pre-adolescence (10 to 11 years) makes it possible to distinguish purely developmental (and hence temporary) deviations in bilingual children's syntactic patterns from more general effects of bilingualism that can potentially persist well beyond childhood. To achieve these objectives, the present study examines the effect of children's bilingualism, the impact of language-specific properties, and the factor of age on syntactic complexity.

Several quantifiable operationalisations of syntactic complexity are possible, corresponding to different dimensions of (absolute) syntactic complexity: complexity by coordination, subordination, and phrasal complexity (De Clercq & Housen, 2019; Norris & Ortega, 2009). In the present study, syntactic complexity is defined as the sub-construct of subordination, which was operationalised as the proportion of responses involving the presence of at least one subordinate clause. The choice of subordination as a measure was motivated by its developmental relevance for L1 acquisition data generally, in light of research demonstrating that subordination is acquired late and well after coordination, (e.g., Crosson *et al.*, 2008; Diessel, 2004) and has been used as a metric to account for timing patterns in child acquisition contexts (e.g., Tsimpli, 2014). The notion of subordination is also relevant for the acquisition of motion event encoding in particular, where subordination (but not coordination) has been shown to be associated with protracted acquisition trajectories (see Hickmann *et al.*, 2018). Hence, the construct of subordination is considered best suited to testing the claim by Beavers *et al.* (2010) on complexity in event encoding in the present child acquisition context.

A secondary objective of this study was to explore the relation between the choice of syntactic pattern and the task requirement of information density. In other words, does the task demand of producing information-dense responses encourage the use of more complex syntactic packaging patterns (e.g., via subordination) that allow children to systematically express multiple event components simultaneously? This question relates to the frequent observation in elicited production studies that the degree of syntactic complexity exhibited by children's narrations varies greatly as a function of task demands and genre (for a review, see Frizelle *et al.*, 2018). However, it has not yet been addressed in the context of crosslinguistic differences in syntactic packaging patterns of motion encoding. Thus, if there is a relation, such that specific syntactic patterns afford more information-dense responses, this raises the question of whether this relation is more pronounced in one language than the other and moreover, whether it is affected by children's bilingualism.

### *Hypotheses*

The study tests several hypotheses regarding the factors of age and language. First, in line with previous research on monolingual children (Harr, 2012; Woerfel, 2018), children's use of subordinate constructions is expected to show a general increase as a function of age. Moreover, based on previous findings on motion expression in English and French specifically (Hickmann & Hendriks, 2010; Hickmann *et al.*, 2018), this increase is expected to vary as a function of language, such that a more dramatic increase is expected for French than for English, independently of acquisition type. What about the effect of bilingualism, the main focus of this study? Given that subordination has been shown in



previous research to be used rarely by English monolingual children in motion expressions, but to represent one of the preferential patterns in French children by 8 years of age (Harr, 2012; Hickmann *et al.*, 2018), several potential outcomes can be entertained for bilingual children. First, the null hypothesis is that bilingual children simply follow the syntactic packaging preferences of their monolingual peers in each of their languages and do not show quantitative divergences in their rates of subordinate constructions.

Alternatively, if bilingual children's rates of subordination diverge from monolinguals', a bilingual-specific strategy of cognitive cost reduction vs. a universal bias account would predict different outcomes. According to a (bilingual-specific) convergence account, we should expect bilingual children to show convergent patterns across both languages – that is, rates of subordinate constructions should align across their English and French descriptions. In contrast, if a general universal bias to prefer less complex packaging strategies applies, this should result in asymmetric divergences from monolingual tendencies, such that any given divergences should mainly affect children's French responses as a reduction in the rates of subordination, whilst no divergences should be expected from English monolinguals' syntactic choices (given that the typical English packaging choices are syntactically simple clauses).

With respect to the relationship between semantic density and syntactic complexity, based on previous research (Hickmann *et al.*, 2018), the hypothesis was that if a relationship between semantic density and syntactic complexity obtained, there should be an interaction effect between language and acquisition type: Semantic density was expected to predict syntactic complexity mainly (or exclusively) in French and more strongly in bilinguals than in monolinguals.

## Method

### Participants

The participants were 96 bilingual children who acquired English and French from birth and two corresponding control groups of English and French monolingual children (48/ language). To avoid potential practice and priming effects across languages, a between-subjects design was adopted with half of the bilingual children performing the task in English, and half in French. Thus, the combination of children's language of testing (English vs. French) and acquisition type (monolingual vs. bilingual) yielded four groups: English monolinguals (EM), French monolinguals (FM), bilinguals who were tested in English (EB) and bilinguals who were tested in French (FB). Children belonged to four age groups (24/age group) of approximately 4, 6, 8, and 10 years. A summary of participants' background characteristics is provided in Table 1.

Children were recruited via day-care centres (the youngest age group) and schools in England and France. Monolingual English children were based in Cambridge at the time of testing; monolingual French children lived in Paris. None of the monolingual children were reported to have had regular exposure to any other languages. All bilingual participants were recruited in France to keep the ambient majority language constant, in accordance with research demonstrating the effect of the majority language on early bilinguals' motion expressions (Daller *et al.*, 2011). Many of these children had, however, also lived in the UK or the US for some time. To ensure maximally balanced exposure to both languages at home as well as at school/day-care, all selected bilingual children were raised by a native French-speaking and a native English-speaking parent using the one-parent-one-language approach and attended either bilingual day-care centres or international dual-language

**Table 1.** Participant characteristics

		EM	EB	FM	FB
age 4	n	12	12	12	12
	mean age in years ( <i>SD</i> )	4;0 (0.3)	4;6 (0.6)	4;4 (0.3)	4;9 (0.8)
	female/male	6/6	8/4	6/6	4/8
age 6	n	12	12	12	12
	mean age in years ( <i>SD</i> )	6;0 (0.2)	6;8 (0.5)	6;4 (0.3)	6;7 (0.6)
	female/male	5/7	5/7	6/6	6/6
age 8	n	12	12	12	12
	mean age in years ( <i>SD</i> )	8;0 (0.2)	8;6 (0.3)	8;3 (0.3)	8;8 (0.4)
	female/male	7/5	6/6	6/6	6/6
age 10	n	12	12	12	12
	mean age in years ( <i>SD</i> )	10;0 (0.3)	10;4 (0.2)	10;4 (0.5)	10;2 (0.4)
	female/male	5/7	5/7	6/6	8/4

immersion schools in Paris or Aix-en-Provence.<sup>1</sup> A language background questionnaire was filled out by parents of all participants to obtain information about children’s regular linguistic exposure from different sources within and outside the family context. For bilingual children, additional questions addressed family language policies, frequency, and duration of extended stays abroad, and self-rated fluency levels from ‘1’ (= ‘poor’) to ‘10’ (= ‘native-like’). Parents’ fluency ratings indicated that children were highly proficient in both their English ( $M_{fluency} = 9.5$ ;  $SD = 1.2$ ) and French ( $M_{fluency} = 9.6$ ;  $SD = 1.1$ ). Fluency scores did not significantly differ between languages, as shown by a Wilcoxon signed-rank test ( $z = 1.11$ ,  $p = .255$ ), suggesting a high degree of balance. Children whose fluency ratings between the two languages diverged by more than two points on the questionnaire scale ( $n = 7$ ) were excluded from the analysis as outliers.

**Materials**

The stimuli comprised a total of 40 short colour video animations (approximately 7 seconds each) that were originally designed by Hickmann *et al.* (see Hickmann & Hendriks, 2010; Hickmann *et al.*, 2018) to elicit verbalisations of caused motion events. Target stimuli consisted of 32 items portraying the same human agent carrying out an action that caused the displacement of an object along different Paths and in different Manners (see Figure 1 for an example). Each target item presented children with five semantic components (see summary in Table 2) that were relevant for motion and that could be selected for expression. Two of these components (Cause and Agent’s Manner) were held constant across items, while the remaining three (Causing Manner, Object’s Manner, and Path) systematically

<sup>1</sup> As pointed out by an anonymous reviewer, there are differences in some types of complex constructions in the varieties of French spoken in Paris in Aix-en-Provence (see Detey *et al.*, 2010). Since the French sample size from Aix-en-Provence is negligible ( $N = 5$ ) and shows no differences in the variables examined, regional variation is not further examined in this study.

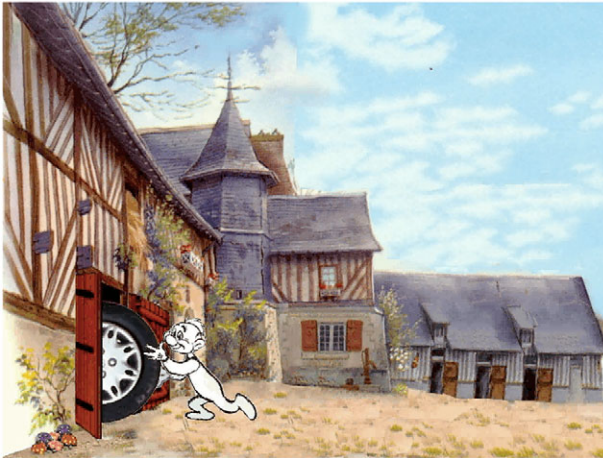


Figure 1. Example of a target stimulus used in the study (here shown as a still).

Table 2. Types of information components in target items

Semantic component	Description	Realisation in stimuli
Cause	causal relation between agent and object	constant: agent causes object to move
Agent's Manner	manner of agent's motion	WALK
Causing Manner	manner of agent's action causing object's displacement	PUSH, PULL
Object's Manner	manner in which object moves	ROLL, SLIDE
Path	trajectory followed by agent and object	UP, DOWN, ACROSS, INTO

varied. Crossing of these variants (see Table 2) generated 16 combinations (2 Causing Manner x 2 Object's Manner x 4 Path). To allow for generalisation of findings beyond individual items, each combination was presented in two different versions (thus resulting in 32 target items), showing different background sceneries, ground entities, and objects (16 different objects in total). Additionally, participants were presented with seven distractor items that occurred at regular intervals (one after each block of four test items) and showed unrelated motion events involving an inanimate entity causing other objects to move (e.g., a ball rolling into a bottle, causing it to break). A training item at the very beginning of the task served to familiarise participants with the requirements of the task and the relevant event components. To avoid order effects, children were randomly assigned to one of four semi-randomised orders.

### Procedure

Children were seen individually in a quiet room at their day-care centre (the youngest age group) or school. They were invited to sit in front of a laptop screen on which they were

shown the video animations one by one. All sessions were audio-recorded. The experimenter instructed children to describe what had happened in each of them after the clip had ended. To elicit maximally information-dense event descriptions, the younger children (4 to 5 years) were introduced to a doll at the beginning of the session that was blindfolded and seated behind the screen. Because she could not see, children were asked to tell her what had happened in the videos. Older children (from 6 years onwards) were invited to tell what they had seen to a fictitious listener who had no visual access to the animated videos and would have to retell them later based on their audio-recorded descriptions. With the bilingual children, the experimenter only conversed in the intended target language and induced a maximally monolingual mode by talking to them in the target language for a few minutes before the start of the task.

For the training item, the experimenter made sure that children noticed and verbalised all three manipulated event components. When responses to this item were incomplete, the experimenter replayed the video and prompted children to direct their attention to the relevant components by using appropriate eliciting questions (e.g., “What about the tyre?” when the response failed to mention the Object’s Manner of motion, or “And where did he go?” when Path was omitted). After the training item, care was taken not to influence children’s event expression by avoiding specific questions and prompts that would guide their attention. When necessary, children were encouraged to proceed with their responses (e.g., “Okay, go ahead!”). In cases where children provided no description or only irrelevant responses (omitting any reference to motion, e.g., “The sky was blue.”), the experimenter followed a standardised procedure of asking the general question “What happened?” to elicit a motion-relevant description.

### Coding

Children’s descriptions were transcribed in CHAT format (MacWhinney, 2000). The analyses focus on target responses, which correspond to the portions of children’s descriptions that verbalise the portrayed target event. To arrive at measures of syntactic packaging, all target responses were first segmented into clauses. A clause was defined as a proposition containing one verb. Crucially, this verb could be finite, as in the main clauses in (8) to (10), but could also involve infinitives or gerundives, as in the subordinate clause in (9). Target responses could thus be mono-clausal, as in (8), but could also contain more than one clause in the case of subordinate constructions, (9), coordination, (10), juxtaposition, (11), or a combination of any of these clausal categories, as in (12).

- (8) He’s pushing the tyre into the barn.
- (9) Il descend la colline en poussant le ballon vers le bas.  
‘He’s going down the hill while pushing the ball downwards.’
- (10) Il est monté comme ça et puis il l’a tiré.  
‘He went up like this and then he pulled it.’
- (11) He went down the snowy hill. The suitcase was sliding.
- (12) Popi fait tourner la roue et il traverse la rue en la poussant toujours.  
‘Popi rolls the wheel, and he crosses the road while pushing it.’

Target responses were coded for subordination, distinguishing responses containing at least one subordinate clause (coded as ‘complex’) from responses without subordinate clauses (coded as ‘simple’). For the purposes of statistical analysis (see below), target

responses were transformed into a binary dependent variable, i.e., as the presence or absence of subordination (1 = presence of at least one subordinate clause vs. 0 = absence of subordinate clause(s)).

A secondary dimension of coding was aimed at providing a measure of the semantic density of target responses, defined as the number of information components (out of the total of five portrayed in the stimuli) verbalised by children. Density coding distinguished between semantic density (SD) levels ranging from 'SD0' (when there is reference to the fact of motion, but without mention of any of the five relevant event components, e.g., *He went there*) to 'SD4+' (four or more information components are mentioned, e.g., *He's walking slowly while dragging the bag up the roof*). For the purposes of the present study, however, the analysis focuses solely on whether semantically dense descriptions (defined as any response that provided three or more information components, henceforth 'SD3 +') predicted the use of complex syntactic packaging patterns (containing at least one subordinate clause).

### Statistical analyses

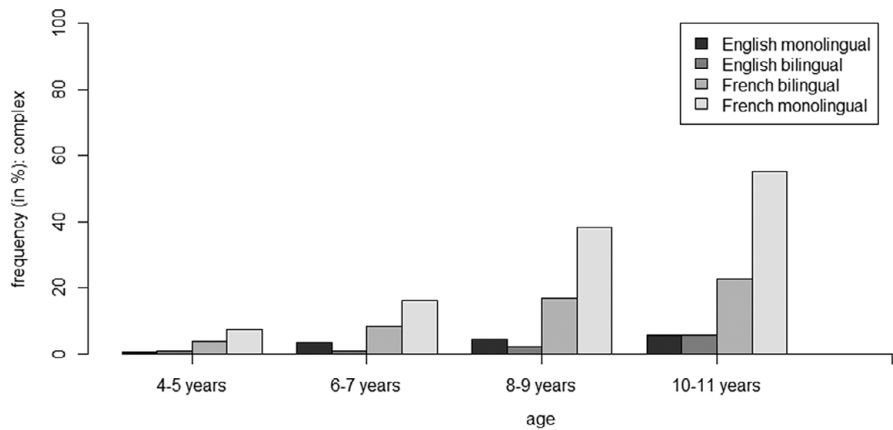
Mixed-effects logistic regression analyses (Baayen, 2008) were carried out in R version 4.0.0 (R Core Team, 2020), using the function `glmer` from the `lme4` package (Bates *et al.*, 2015). Guided by the above hypotheses, the models were fitted with the predictors (fixed effects) of Age (four levels: four, six, eight, and ten years) and Language Acquisition (English monolingual, English bilingual, French monolingual, and French bilingual).<sup>2</sup> All categorical variables were coded as dichotomous dummy variables (1 vs. 0). Item and Subject were specified as random intercepts to control for variation of both variables. Due to convergence failure, random slopes were not included in any of the models reported. Using the `emmeans` package (Lenth *et al.*, 2022), post-hoc pairwise comparisons were run using Tukey-adjusted *p*-values for multiple comparisons. To address the question of whether the probability of selecting formally complex (+ subordination) response patterns could be predicted by the use of highly information-dense event descriptions (SD3 +), a mixed-effects logistic regression model was fitted with High Density (responses mentioning three or more information components = 1; responses verbalising fewer than three = 0), Language Acquisition, and their interaction term (High Density \* Language Acquisition) as fixed effects, and Subject and Item as random intercepts.

## Results

### Reduced rates of subordination in bilingual French

Analyses were run on a total of 6132 target motion event descriptions. Irrelevant responses that did not make any reference to the fact of motion were excluded from the analysis. Figure 2 visualises the frequencies of complex responses across the four age groups as a function of acquisition type (for raw counts and corresponding percentages, see Table A in the Appendix, Supplementary Materials).

<sup>2</sup>This predictor was created by combining the factors of Language (English vs. French) and Acquisition Type (monolingual vs. bilingual) to allow for direct comparisons across the four groups of interest in this study.



**Figure 2.** Frequencies of complex responses (using subordination) as a function of age and language acquisition type.

To assess the likelihood of using complex structures (i.e., responses containing at least one subordinate clause), the following mixed-effects logistic regression model was run, with Age and Language Acquisition entered as predictors:

```
model1 <- glmer(subordination ~ age + language.acquisition
+ (1|item) + (1|subject), data = dat, family = 'binomial',
control = glmerControl(optimizer = c)"bobyqa").
```

Pairwise comparisons of the different age groups (averaged over levels of language acquisition group) are reported in Table 3 and yielded the following results: Four-year-olds overall used subordination significantly less frequently compared to both eight-year-olds and ten-year-olds. It also occurred significantly less frequently in six-year-olds than in eight-year-olds and ten-year-olds, respectively. In contrast, subordination showed no significant increases between the ages of four and six, and eight and ten, respectively, indicating that the use of subordinate structures only starts gaining momentum after age six, and then reaches ceiling levels by age eight, when considering all language acquisition groups together.

**Table 3.** Pairwise comparisons between age groups averaged over levels of language acquisition for the use of complex responses (i.e., using subordination)

Contrast	Estimate	SE	Z	p-value	
4-5 years – 6-7 years	–0.812	0.489	–1.661	.345	
4-5 years – 8-9 years	–2.149	0.466	–4.609	< .001	***
4-5 years – 10-11 years	–2.935	0.461	–6.366	< .001	***
6-7 years – 8-9 years	–1.337	0.438	–3.051	.012	*
6-7 years – 10-11 years	–2.123	0.432	–4.909	< .001	***
8-9 years – 10-11 years	–0.786	0.399	–1.969	.2	

Results are given on the log odds ratio (not the response) scale. Results are obtained using emmeans function with Tukey p-value adjustments. Significance codes: \*\*\*\*:  $p < .001$ ; \*\*\*:  $p < .01$ ; \*\*:  $p < .05$ ; .:  $p < .1$

**Table 4.** Pairwise comparisons between language acquisition groups averaged over levels of age for the use of complex responses (i.e., using subordination)

Contrast	Estimate	SE	Z	p-value
English monolingual - English bilingual	-0.237	0.51	-0.466	.966
English monolingual - French bilingual	-2.142	0.473	-4.531	< .001 ***
English monolingual - French monolingual	-3.674	0.472	-7.788	< .001 ***
English bilingual - French bilingual	-1.905	0.452	-4.215	< .001 ***
English bilingual - French monolingual	-3.437	0.445	-7.718	< .001 ***
French bilingual - French monolingual	-1.532	0.393	-3.903	< .001 ***

Results are given on the log odds ratio (not the response) scale. Results are obtained using emmeans function with Tukey *p*-value adjustments. Significance codes: '\*\*\*\*':  $p < .001$ ; '\*\*\*':  $p < .01$ ; '\*\*':  $p < .05$ ; '.':  $p < .1$ .

As inspection of Figure 2 suggests, age seems to impact the use of subordination much more dramatically in French than in English, and to different degrees in bilinguals and monolinguals. This picture is supported by the statistical results of the pairwise comparisons across the four language acquisition groups (averaged over age groups), summarised in Table 4. These results revealed significant differences in the use of complex structures between all groups, except for the comparison between English monolinguals and English bilinguals. As indicated by the negative estimates, subordinate structures occurred overall less frequently in the English data (both bilinguals and monolinguals) than in the monolingual and bilingual French children's responses. In other words, the use of subordinate structures was strongly affected by language (English < French), and this language effect was reflected in both monolingual and bilingual response patterns. Secondly, children's language acquisition type (bilingual vs. monolingual) significantly affected the rates of subordination in French, indicating that bilinguals overall (i.e., irrespective of age) were less likely to use complex structures than monolinguals, while no significant difference was detected between bilinguals and monolinguals in the English data.

Next, four additional mixed models were run within each age group to further locate the effect of language acquisition type. The structure of all four models was analogous to model 1, except that Language Acquisition was now the sole predictor variable (*subordination ~ language.acquisition + (1|item) + (1|subject)*). Post-hoc pairwise comparisons for all four models are reported in Tables B1 to B4 in the Appendix (Supplementary Materials). Results showed that in four-year-olds, none of the language acquisition groups differed significantly from one another regarding their use of complex structures, likely due to the overall very low rates of subordination in this age group (compare Figure 2 above). Significant group differences only started to emerge with respect to language at age six: Pairwise comparisons revealed that six-year-old French monolinguals used complex structures significantly more frequently both when compared to English monolingual peers (English monolingual vs. French monolingual: estimate = -3.15,  $SE = 1.21$ ,  $Z = 2.61$ ,  $p = .045$ ) and to English bilingual peers (English bilingual vs. French monolingual: estimate = -3.91,  $SE = 1.28$ ,  $Z = -3.06$ ,  $p = .012$ ), reflecting the predicted impact of language typology on subordination. Interestingly, this language effect did not, however, extend to French bilinguals whose rates of complex structures did not diverge significantly from any of the other groups (neither English nor French).



The results for the two older age groups reflect the expected increase in the use of subordination in children's French (see also Figure 2), resulting in significant group differences. Within eight-year-olds, pairwise comparisons showed significant differences according to language, but no significant differences between bilinguals and monolinguals within the same language. In French, both monolinguals and bilinguals used subordination at significantly higher rates when compared to either of the English groups, thus reflecting the impact of language typology across both language backgrounds. This language effect was most pronounced when comparing monolinguals of each language (English monolingual vs. French monolingual: estimate = -4.12,  $SE = 0.87$ ,  $Z = -4.73$ ,  $p < .001$ ) and English bilinguals with French monolinguals (estimate = -4.28,  $SE = 0.86$ ,  $Z = -5.01$ ,  $p < .001$ ), but weaker in the comparisons involving French bilinguals (English monolingual vs. French bilingual: estimate = -2.6,  $SE = 0.87$ ,  $Z = -3.01$ ,  $p = .014$ ; English bilingual vs. French bilingual: estimate = -2.76,  $SE = 0.85$ ,  $Z = -3.24$ ,  $p = 0.01$ ), reflecting the in-between behaviour characterising bilingual children's French. The last model conducted within the ten-year-olds revealed a similar picture, showing robust language differences evident in all combinations of comparisons between English and French groups. In addition to these language effects, pairwise comparisons within French revealed an effect of bilingualism, such that French bilinguals used subordination significantly less frequently than monolingual peers (estimate = -1.85,  $SE = 0.56$ ,  $Z = -3.27$ ,  $p = .01$ ). As Figure 2 illustrates, this effect was due to a prominent increase in subordinate structures in French monolinguals relative to age eight (38.2% vs. age ten: 55.2%), which was not seen in the French bilingual children to the same extent (age eight: 16.9%, age ten: 22.9%). In contrast, bilingualism did not affect subordination rates in English (English monolingual vs. English bilingual: estimate = -0.74,  $SE = 0.71$ ,  $Z = -1.05$ ,  $p = .72$ ) where children again showed close alignment across groups (6% of complex structures in both bilinguals and monolinguals).

In summary, the results for subordination indicate that the strength of language effects as well as effects of bilingualism (within the French data) increase with age, as subordination begins to emerge as a major packaging pattern in children's French while remaining rare across all ages in English. Thus, with age, bilingual children's syntactic packaging strategies in French increasingly diverge from their monolingual peers and instead begin to manifest patterns that are quantitatively in between the tendencies exhibited by English and French monolinguals.

### *Qualitative deviations in bilinguals' complex structures*

Even though the results of the analyses reported above suggest that English bilinguals did not depart from their monolingual counterparts in terms of HOW OFTEN subordination was used, additional qualitative analyses of the data revealed some noteworthy differences in HOW they used complex structures, which suggests potential influence from French. In monolingual English children, subordination was achieved almost exclusively via participial constructions, as illustrated in (13). When English bilinguals used such participial complements, they were often preceded by the preposition *by* (5 out of a total of 13 cases), as exemplified in (14), and thus closely resemble the typical French gerundive construction (e.g., *en poussant* 'by pushing'). In contrast, this participial innovation never occurred in the monolingual English data. Although the construction is not ungrammatical in English, it is unconventional in contexts without transparent instrumental meaning (e.g., *The burglar managed to get in by climbing through the window*). What is more, the fact that in all instances of this construction, the gerund encoded Cause and

Manner (rather than Path) further points to influence from French, where the subordinate verb typically serves to encode co-events. A further qualitative deviation from monolingual subordination strategies consisted in English bilinguals' use of infinitival purpose clauses combining a light motion verb (typically *to go*) with a Path-encoding preposition, as shown in (15). Note that these infinitival structures likewise never occurred in the English monolingual data and appear to be modelled on a frequently used French construction (see (16) for comparison). In contrast, subordinate constructions used by bilingual French children did not show qualitative structural deviations from monolinguals. Most subordination strategies consisted in gerundives or infinitival purpose clauses that were used in formally target-like ways.<sup>3</sup>

- (13) He walked up the hill dragging a car behind him. [10-year-old English monolingual]
- (14) He rolled the wheel to the other side by pushing it. [8-year-old English bilingual]
- (15) He's pulling the pushchair to go onto the other side of the road. [10-year-old English bilingual]
- (16) C'est Popi qui fait tourner sa roue pour aller dans la grotte. [10-year-old French monolingual]  
'It's Popi who makes his wheel turn to go in the cave.'

### *Semantic density predicts syntactic complexity in French, but not in English*

A second question addressed in the study was whether the use of subordination might predict the likelihood of information-dense responses (defined as containing three or more event components) and thus serve as a strategy to solve the demanding task of expressing multiple event components. If indeed high-density responses predict the occurrence of syntactically complex structures, a further question was whether this relationship was modified by children's language acquisition type. To elucidate these questions, a mixed-effects logistic regression analysis was run using the interaction term of the variables High Density and Language Acquisition (specifying 'English monolingual' as reference level) as predictor with Subordination as outcome variable:

*model2 <- glmer(subordination ~ high\_density\*language.acquisition  
+ (1|item) + (1|subject), data = dat, family = 'binomial',  
control = glmerControl(optimizer = c)"bobyqa").*

Results (reported in Table 5 and visualised in Figure 3) indicated a significant interaction effect between High Density and Language Acquisition in line with predictions, such that high semantic density strongly predicted syntactically complex responses in French, both in monolinguals and bilinguals, but not in English. In other words, following typological tendencies, in French, children take recourse to syntactically complex constructions to

<sup>3</sup>The sole absence of these constructions in the monolingual samples is, however, not to be taken as proof of crosslinguistic influence. As pointed out by an anonymous reviewer, more conclusive evidence for transfer would require a bilingual comparison group with a different language combination, e.g., two satellite-framed languages.

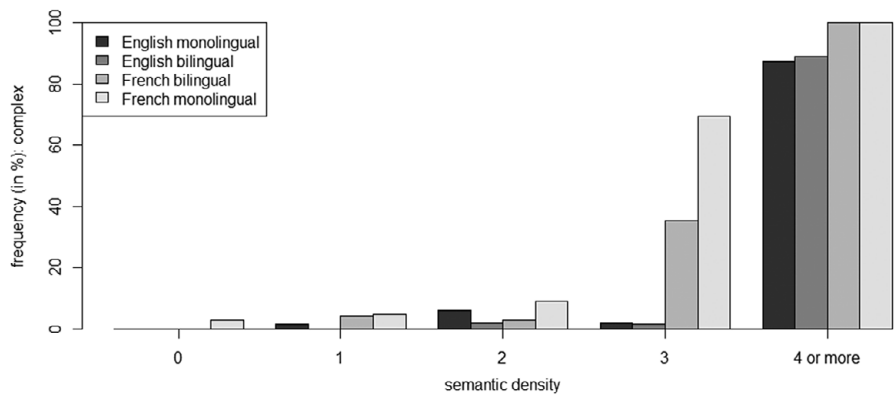
**Table 5.** Parameters of model 2 concerning the use of complex structures (+ subordination) predicted by an interaction of high semantic density and language acquisition type

Fixed effects	Estimate	SE	Z	p-value	
Intercept	−5.596	0.529	−10.583	< .001	***
high_density	0.681	0.404	1.683	.092	.
English bilingual	0.514	0.7	.734	.463	
French bilingual	1.039	0.605	1.717	.086	.
French monolingual	2.638	0.594	4.438	< .001	***
high_density: English bilingual	−0.255	0.616	−0.414	.679	
high_density: French bilingual	2.694	0.486	5.538	< .001	***
high_density: French monolingual	2.777	0.46	6.035	< .001	***

Significance codes: '\*\*\*\*':  $p < .001$ ; '\*\*\*':  $p < .01$ ; '\*\*':  $p < .05$ ; '.':  $p < .1$

achieve information-dense event descriptions, whereas in English, children rely on syntactically simple patterns to do so. Figure 3 illustrates that in English, complex subordinate structures only become necessary when four or more information components are expressed simultaneously, as in example (17) below, while simple structures suffice for responses mentioning up to three components. In contrast, complex structures become hard to avoid in French as soon as responses combine more than two information components (see (6) above). Figure 3 also clearly demonstrates that the relationship between semantic density and syntactic complexity holds much less strongly for French bilinguals than monolinguals: When it comes to expressing three event components, French bilinguals occupy an intermediate position between monolinguals of each language, indicating that bilingual children rely to a lesser extent on subordinate structures when expressing three event components in French than their monolingual peers, but considerably more so than English monolingual children.

- (17) He walked along a path and went into a cave dragging the chair behind him.  
[English bilingual, aged 10]



**Figure 3.** Rates of responses using subordination as a function of semantic density and language acquisition type.

## Discussion

### *Summary of findings: Asymmetric complexity reduction in bilinguals*

This study set out to investigate bilingual children's development of syntactic complexity, operationalised in terms of rates of subordination in caused motion event expression descriptions. The research questions addressed were, first, what role language-specific factors and age play in shaping simultaneous bilingual children's use of complex vs. simple packaging choices in relation to monolinguals of each language. Specifically, the study tested a theoretical proposal (Beavers *et al.*, 2010) according to which there is a universal bias to prefer syntactically simpler over more complex event descriptions. The nature and directionality of divergences in bilinguals' syntactic packaging choices were examined as potentially indicative of such bias. The second research question was whether the use of complex structures in children's event descriptions could be predicted by their information density and whether such relation was modified by language and bilingualism. The hypothesis was that bilinguals would either show asymmetric divergences that would mainly affect their rates of subordination in French, but not their English (which would support a universal bias account), or alternatively, they would manifest convergence across both of their languages, reflecting a bilingual-specific optimisation strategy of convergence (Muysken, 2013; Toribio, 2004).

Results showed a general increase of subordination with age (irrespective of language), confirming the findings of previous research on child narrative (e.g., Frizelle *et al.*, 2018; Lindgren, 2021). Subordination rates were also strongly impacted by language, such that complex structures were altogether very rare in English whilst representing a major response strategy in French descriptions of both bilinguals and monolinguals from age 8 onwards, in line with previous crosslinguistic research on L1 acquisition (e.g., Hickmann *et al.*, 2018). Regarding the effect of language acquisition type (bilingual vs. monolingual), the results revealed clearly asymmetric patterns of complexity reduction: Bilingual children's French syntactic response strategies strongly diverged from their monolingual peers' in that syntactic subordination occurred significantly less frequently than in French monolinguals, but significantly more so than in English monolinguals and bilinguals, resulting in an intermediate pattern in relation to the respective monolingual groups. In contrast, English bilinguals closely aligned quantitatively with English monolinguals, showing similarly low rates of subordinate structures. However, qualitative analyses of complex structures in bilinguals' English descriptions also suggested some degree of crosslinguistic influence from typical French subordinate constructions. Furthermore, the results demonstrated that information density was a strong predictor of syntactically complex responses, but exclusively in French and much less in French bilinguals' descriptions than in monolinguals'. This is in line with previous findings indicating a stronger reliance on syntactically complex patterns in verb-framed than in satellite-framed languages to encode multiple information components jointly (e.g., Allen *et al.*, 2007; Hickmann *et al.*, 2018). In the following section, potential explanations of these findings are discussed.

### *Universal bias and/or crosslinguistic influence?*

The present finding of crosslinguistically asymmetric divergences in subordination rates is consistent with the prediction of complexity reduction generated by a universal bias account (Beavers *et al.*, 2010). As such, the results can be interpreted as reflecting speakers' "general preferences for simplicity in event encoding" (Beavers *et al.*, 2010,

335). Following this line of reasoning, such universal bias may become apparent in bilingual acquisition contexts as an overuse of structurally simpler packaging options in one of their languages in relation to respective monolinguals. However, the data suggests that this account needs to be qualified to some extent. First, it should be emphasised that while bilingual children's French response patterns overall showed reduced frequencies of subordinate constructions in relation to monolinguals, such quantitative reduction of complexity did not entail qualitative simplification. That is, despite the morphosyntactic difficulty involved, bilinguals' subordinate constructions in French were grammatically perfectly well-formed and did not show evidence of a general syntactic deficit or difficulty with structurally complex constructions *per se*. In other words, it is not the structures themselves that were simplified; instead, bilinguals tended to favour syntactically simple compact packaging strategies relative to monolingual French peers. At the same time, bilingual children revealed a remarkable sensitivity to the statistical distribution of syntactic strategies of both of their languages by settling for rates of subordination that quantitatively range mid-way between the extremes of respective monolingual groups. A second qualification concerns the structural innovations observed in bilingual children's English use of subordinate constructions which suggested structural calquing of French gerundives (e.g., *He went into the cave by pushing a tyre*). Even though these instances were rare overall (since subordinate clauses were on the whole marginal in English), they accounted for roughly half of children's subordinate clauses, suggesting that crosslinguistic syntactic influence from French did play a role despite the morphosyntactic difficulty involved. The fact that this resulted in bilingual children creating more rather than less complex structures somewhat weakens an account in terms of a universal preference for syntactically simpler event expressions. As pointed out by an anonymous reviewer, these instances also mirror patterns of complexification documented by Mougeon *et al.* (2005) in contact varieties of Canadian French, such as the innovative use of semantically more specific and complex collocational patterns transferred from English (e.g., *aller sur un voyage* 'to go on a trip' instead of the traditional *faire un voyage* 'to make a trip'). Similarly, Dahl (2009) argues that language contact can lead to an increase in linguistic complexity, as the adoption of innovations that co-exist alongside traditional patterns gives rise to linguistic competition and hence an increase in the complexity of the overall language system. The occurrence of such instances of complexification in child bilingual development thus suggests that neither individual nor societal language contact necessarily results in linguistic simplification.

I propose that the analysis on semantic density suggests that strategic crosslinguistic influence may be at play. Recall that semantically highly dense event responses predicted the use of complex structures in French, but not in English, reflecting the fact that solving the task was formally more challenging in French requiring recourse to syntactically more costly structures than in English. It is therefore likely that in this challenging task-specific context bilingual children resorted to the syntactically less costly and more compact packaging pattern because it proved advantageous for solving the challenging task of expressing multiple event components simultaneously. Such strategy would be in line with claims in the bilingual acquisition literature that explain crosslinguistic influence as a syntactic relief strategy (see Gawlitzek-Maiwald & Tracy, 1996; Müller & Hulk, 2001) allowing children to pool the structural resources of both of their languages and to either temporarily transfer the simpler structure into the language using a more complex structure ('overt' influence, see Mougeon *et al.*, 2005, i.e., qualitative divergences) or to reinforce the use of a crosslinguistically congruent simpler option ('covert' influence, i.e., a quantitative departure, such as the reinforced use of a feature or structure). The

latter type of influence can account for the reduced rates of subordination observed in bilinguals' French.

What is striking in the present case is that if we are indeed dealing with covert crosslinguistic influence as a syntactic relief strategy, this influence appears to be developmentally quite persistent. Recall that these quantitative divergences from monolinguals in fact increased significantly with age and were most pronounced in the oldest age group of ten-year-olds, which calls into question the transitory nature of crosslinguistic interactions in bilingual first language acquisition (see Engemann, 2022, for evidence of similarly developmentally persistent crosslinguistic influence regarding the semantics of motion encoding). Interestingly, the overt structural influence observed in this study did in fact point in the other direction – that is, more complex structures from French (gerundives) were transferred into the language typically favouring simple compact encoding patterns. Future research investigating older simultaneous bilinguals (adolescents as well as adults) will have to ascertain whether we are indeed dealing with a developmental and hence temporary relief strategy or a more general bilingual phenomenon akin to the “opportunistic planning” strategy proposed by Green and Abutalebi (2013). In this vein, to comply with the task-specific demand of expressing multiple event components speakers would jointly activate the structures most suited to solving the task at hand in an *ad hoc* fashion, irrespective of the language membership of these structures.

An interpretation in terms of strategic task-dependent crosslinguistic influence is also supported by some of our previous research (Engemann, 2012) on bilingual event expression in the context of a semantically simpler voluntary motion task (involving only two salient event components, Manner and Path) in which simultaneous bilingual children failed to show divergences in their syntactic packaging strategies from corresponding monolinguals, despite crosslinguistic differences in habitual complexity rates. Since the main difference between these two narrative tasks lies in the number of relevant event components (two vs. five) and supplementary analyses in the present study revealed a strong relation between quantity of information expressed and syntactic complexity, this clearly suggests that task complexity must have played a role in yielding the asymmetric effects observed in this study. It is thus not far-fetched to assume that bilingual children capitalised on the highly systematic and syntactically less costly structure familiar from their English, overlapping partly with existing French packaging strategies, to solve the task in French as part of a syntactic relief strategy.

Note that this account is in fact not incompatible with a universal bias favouring syntactically simpler event expressions. I argue that applying such universal bias to a bilingual context in which one language favours syntactically more complex encoding options than the other, such a universal bias may in fact manifest itself in the form of overt crosslinguistic influence reinforcing the crosslinguistically congruent and simpler pattern. The task-specific pressure to encode multiple event components created a situation of added cognitive load which in turn may have enhanced activation of structures in children's bilingual repertoire which provided them with a convenient strategy of jointly expressing all relevant event components without requiring subordination. Thus, universal biases, strategic structural crosslinguistic influence and language-specific properties may have conspired to produce asymmetric syntactic divergences in bilingual children when confronted with communicative situations that involve a high degree of cognitive load.

To more clearly disentangle the role of each of the above factors, especially the relative weight of potential universal syntactic biases vs. crosslinguistic influence, future studies should examine bilingual settings in which two (similarly complex) verb-framed

languages are acquired simultaneously to ascertain whether bilingual children show a preference for syntactically simple event descriptions even when both of their languages habitually disprefer them for the expression of multiple event components. While the current crosslinguistic contrast between a verb-framed and a satellite-framed language allows us to distinguish between the theoretical proposals of convergence (as a bilingual-specific optimisation strategy) vs. a universal syntactic preference, one of its limitations is that the syntactic packaging preferences of English overlap with the claimed universally favoured structure, making it difficult to adjudicate between universal biases on the one hand and crosslinguistic influence on the other.

Future research should also explore the role of socio-economic status in bilingual and monolingual children's acquisition of syntactically complex constructions. In light of studies demonstrating a relation between markers of socio-economic status and learning across various linguistic domains, including syntactic complexity (Huttenlocher *et al.*, 2010; Vasilyeva *et al.*, 2008; for a recent review, see Pace *et al.*, 2017), it is to be expected that the acquisition of relatively complex syntactic constructions, such as the ones investigated in this study, is related to literacy skills (e.g., see Cilibrasi *et al.*, 2019 for literacy and relative clauses) and hence likely also to some extent affected by socio-economic status.

## Conclusion

To conclude, this study found that complexity reduction (manifesting as lower rates of subordination) in simultaneous bilingual children's syntactic development can affect their two languages asymmetrically, demonstrating that language-specific properties (crosslinguistic differences in syntactic complexity within a given domain) play an important role in shaping bilinguals' syntactic packaging preferences and the directionality of structural crosslinguistic influence. The unexpected finding that bilingual children also transfer more complex structures when their other language makes simpler syntactic means available demonstrates that bilingual acquisition contexts do not by necessity result in qualitative structural simplification. This has important implications for theories that propose added cognitive load as an explanation for any kind of target-deviant patterns observed in bilinguals. Rather, what the present study suggests is that in order to have any predictive power, accounts invoking universal biases for simplicity and cognitive load reduction must adopt a multi-dimensional view that takes into account cognitive load pressures arising not solely from the situation of bilingualism, but crucially also from the constellation of language-specific levels of complexity contributed by each language in a given domain, as well as by the demands of the specific task at hand. It has become a commonplace observation that the human brain is perfectly well adapted to handling and acquiring more than one language. Bilingual developmental research should investigate which language-specific properties are in fact cognitively costly to young learners and which referential domains and communicative tasks could help us to unveil the relative challenge involved in their acquisition. The asymmetric divergences observed in the present study underscore the importance of bidirectional studies on bilingual development that analyse children's productions in both of their languages. Moreover, the study illustrates that simultaneous bilingual language acquisition is a valuable source for investigations into the differential impact of language-specific factors vs. general cognitive biases on syntactic preferences.



**Acknowledgements.** I am grateful to all children, parents, schools, and day-cares that participated in this study. I would also like to thank two anonymous reviewers for their insightful comments. The publication of this article was funded by the Baden-Württemberg Ministry of Science, Research, and the Arts and by the University of Mannheim.

**Supplementary material.** The supplementary material for this article can be found at <http://doi.org/10.1017/S0305000923000338>.

## References

- Adamou, E. (2021). Are bilinguals confronted with high cognitive costs? In *The adaptive bilingual mind: insights from endangered languages* (pp. 99–162). Cambridge: Cambridge University Press.
- Allen, S., Özyürek, A., Kita, S., Brown, A., Furman, R., & Ishizuka, T. (2007). Language-specific and universal influences in children's syntactic packaging of Manner and Path: a comparison of English, Japanese, and Turkish. *Cognition*, **102**(1), 16–48.
- Ameel, E., Malt, B. C., Storms, G., & Van Assche, F. (2009). Semantic convergence in the bilingual lexicon. *Journal of Memory and Language*, **60**(2), 270–290.
- Baayen, H. (2008). *Analyzing linguistic data: A practical introduction to statistics using R*. Cambridge: Cambridge University Press.
- Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, **67**(1), 1–48.
- Beavers, J., Levin, B., & Tham, S. (2010). The typology of motion expressions revisited. *Journal of Linguistics*, **46**(3), 331–377.
- Berman, R., & Slobin, D. (1994). *Relating events in narrative: A crosslinguistic developmental study*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Bialystok, E., Craik, F. I., & Luk, G. (2012). Bilingualism: consequences for mind and brain. *Trends in Cognitive Sciences*, **16**(4), 240–250.
- Bowerman, M. (1996). The origins of children's spatial semantic categories: Cognitive versus linguistic determinants. In J. Gumperz & S. Levinson (eds.), *Rethinking linguistic relativity*, pp. 27–63. Cambridge: Cambridge University Press.
- Bowerman, M., & Choi, S. (2001). Shaping meanings for language: Universal and language-specific in the acquisition of spatial semantic categories. In M. Bowerman & S. Levinson (eds.), *Language acquisition and conceptual development*, pp. 475–511. Cambridge: Cambridge University Press.
- Bullock, B. E., & Toribio, A. J. (2004). Introduction: Convergence as an emergent property in bilingual speech. *Bilingualism: Language and Cognition*, **7**(2), 91–93.
- Cilibrasi, L., Adani, F., & Tsimpli, I. (2019). Reading as a predictor of complex syntax. The case of relative clauses. *Frontiers in Psychology*, **10**, 1450.
- Crosson, A. C., Lesaux, N. K., & Martiniello, M. (2008). Factors that influence comprehension of connectives among language minority children from Spanish-speaking backgrounds. *Applied Psycholinguistics*, **29**, 603–625.
- Dahl, Ö. (2004). *The growth and maintenance of linguistic complexity*. Amsterdam; Philadelphia, PA: John Benjamins.
- Dahl, Ö. (2009). Increases in complexity as a result of language contact. In K. Braunmüller & J. House (eds.), *Convergence and divergence in language contact situations*, pp. 41–52. Amsterdam: Benjamins.
- Daller, M., Treffers-Daller, J., & Furman, R. (2011). Transfer of conceptualisation patterns in bilinguals: The construal of motion events in Turkish and German. *Bilingualism, Language and Cognition*, **14**(1), 95–119.
- De Clercq, B., & Housen, A. (2019). The development of morphological complexity: A cross-linguistic study of L2 French and English. *Second Language Research*, **35**(1), 71–97.
- Diessel, H. (2004). *The Acquisition of Complex Sentences*. Cambridge, UK: Cambridge University Press.
- Ehret, K., Blumenthal-Dramé, A., Bentz, C., & Berdicevskis, A. (2021). Meaning and measures: interpreting and evaluating complexity metrics. *Frontiers in Communication*, **6**, 640510.
- Engemann, H. (2012). *Motion event expression in bilingual first language acquisition*. Ph.D. dissertation, University of Cambridge. <https://doi.org/10.17863/CAM.53093>

- Engemann, H. (2022). How (not) to cross a boundary: Crosslinguistic influence in simultaneous Bilingual children's event construal. *Bilingualism: Language and Cognition*, 25(1), 42–54.
- Filipović, L. (2011). Speaking and remembering in one or two languages: bilingual vs. monolingual lexicalization and memory for motion events. *International Journal of Bilingualism*, 15(4), 466–485.
- Flecken, M. (2011). Event conceptualization by early Dutch–German bilinguals: Insights from linguistic and eye-tracking data. *Bilingualism: Language and Cognition*, 14(1), 61–77.
- Frizelle, P., Thompson, P., McDonald, D., & Bishop, D. (2018). Growth in syntactic complexity between four years and adulthood: Evidence from a narrative task. *Journal of Child Language*, 45(5), 1174–1197.
- Gawlitsek-Maiwald, I., & Tracy, R. (1996). Bilingual bootstrapping. *Linguistics*, 34(5), 901–926.
- Green, D., & Abutalebi, J. (2013). Language control in bilinguals: The adaptive control hypothesis. *Journal of Cognitive Psychology*, 25(5), 515–530.
- Harr, A. K. (2012). Language-specific Factors in *First Language Acquisition. The Expression of Motion Events in French and German*, Berlin: Mouton de Gruyter.
- Hickmann, M., & Hendriks, H. (2010). Typological constraints on the acquisition of spatial language in French and English. *Cognitive Linguistics*, 21(2), 189–215.
- Hickmann, M., Hendriks, H., Harr, A., & Bonnet, P. (2018). Caused motion across child languages: A comparison of English, German, and French. *Journal of Child Language*, 45(6), 1247–1274.
- Hulk, A., & Müller, N. (2000). Bilingual first language acquisition at the interface between syntax and pragmatics. *Bilingualism: Language and Cognition*, 3(3), 227–244.
- Huttenlocher, J., Waterfall, H., Vasilyeva, M., Vevea, J., & Hedges, L. V. (2010). Sources of variability in children's language growth. *Cognitive Psychology*, 61(4), 343–365.
- Lenth, R., Buerkner, P., Love, J., Miguez, F., Riebl, H., & Singmann, H. (2022). Package 'emmeans': Estimated Marginal Means, aka Least-Squares Means. <https://cran.r-project.org/web/packages/emmeans/emmeans.pdf>
- Lindgren, J. (2021). The development of narrative skills in monolingual Swedish-speaking Children aged 4 to 9: A longitudinal study. *Journal of Child Language*, 1–14. doi:10.1017/S030500092100057X
- MacWhinney, B. (2000). *The CHILDES project: Tools for analyzing talk*. (3<sup>rd</sup> ed.). Mahwah, NJ: Lawrence Erlbaum Associates.
- Miestamo, M. (2008). Grammatical complexity in a cross-linguistic perspective. In M. Miestamo, K. Sinnemäki, & F. Karlsson (eds.), *Language complexity: Typology, contact, change*, pp. 23–41. Amsterdam/Philadelphia, PA: John Benjamins.
- Mougeon, R., Nadasdi, T., & Rehner, K. (2005). Contact-induced linguistic innovations on the continuum of language use: The case of French in Ontario. *Bilingualism: Language and Cognition*, 8(2), 99–115.
- Müller, N., & Hulk, A. (2001). Crosslinguistic influence in bilingual language acquisition: Italian and French as recipient languages. *Bilingualism: Language and Cognition* 4(1), 1–21.
- Muysken, P. (2013). Language contact outcomes as the result of bilingual optimization strategies. *Bilingualism: Language and Cognition*, 16(4), 709–730.
- Norris, J. M., & Ortega, L. (2009). Towards an organic approach to investigating CAF in instructed SLA: The case of complexity. *Applied Linguistics*, 30, 555–578.
- Pace, A., Luo, R., Hirsh-Pasek, K., & Golinkoff, R. M. (2017). Identifying pathways between socioeconomic status and language development. *Annual Review of Linguistics*, 3, 285–308.
- Pavlenko, A. (2011). Thinking and speaking in two languages: Overview of the field. In A. Pavlenko (Ed.), *Thinking and speaking in two languages*, pp. 237–257. Bristol: Multilingual Matters.
- R Core Team (2020). R: A language and environment for statistical computing. Retrieved from <http://www.R-project.org/>.
- Slobin, D. I. (2004). The many ways to search for a frog: linguistic typology and the expression of motion events. In S. Strömquist & L. Verhoeven (Eds.), *Relating events in narrative*, Vol. 2: *typological and contextual perspectives* (pp. 219–57). Mahwah, NJ: Erlbaum.
- Talmy, L. (1985). Lexicalization patterns: Semantic structure in lexical forms. In T. Schopen (ed.), *Language typology and syntactic description* (vol. 3): *Grammatical categories and the lexicon*, pp. 57–149. Cambridge: Cambridge University Press.
- Talmy, L. (2000). *Toward a cognitive semantics* (vol. II): *Typology and process in concept structuring*. Cambridge, MA: MIT Press.
- Toribio, A. (2004). Convergence as an optimization strategy in bilingual speech: Evidence from code-switching. *Bilingualism: Language and Cognition*, 7(2), 165–173.

- Treffers-Daller, J., & Tidball, F.** (2015). Can L2 learners learn new ways to conceptualise events? Evidence from motion event construal among English-speaking learners of French. In P. Guijarro-Fuentes, K. Schmitz, & N. Müller (eds.), *The acquisition of French in multilingual contexts*, pp. 145–184. Bristol: Multilingual Matters.
- Tsimpli, I. M.** (2014). Early, late or very late?: Timing acquisition and bilingualism. *Linguistic Approaches to Bilingualism*, 4, 283–313.
- Vasilyeva, M., Waterfall, H., & Huttenlocher, J.** (2008). Emergence of syntax: commonalities and differences across children. *Developmental Science*, 11(1), 84–97.
- Woerfel, T.** (2018). *Encoding motion events: The impact of language-specific patterns and Language dominance in bilingual children*. (Studies on Language Acquisition 58). Boston: de Gruyter Mouton.