

# *Dislocations in French–English bilingual children: an elicitation study*

Article

Accepted Version

Herve, C., Serratrice, L. ORCID: <https://orcid.org/0000-0001-5141-6186> and Corley, M. (2016) Dislocations in French–English bilingual children: an elicitation study. *Bilingualism: Language and Cognition*, 19 (5). pp. 987-1000. ISSN 1469-1841 doi: <https://doi.org/10.1017/S1366728915000401>  
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To link to this article DOI: <http://dx.doi.org/10.1017/S1366728915000401>

Publisher: Cambridge University Press

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## Highlights

- Frequency matters in bilinguals' and monolinguals' use of LDs in French and English.
- In English, the sub-optimal nature of LDs reinforced the resistance to LD primes.
- Exposure to French increased the probability of producing LDs after LD primes in both English and French.
- Language exposure and the processing of high frequency constructions affect CLI.

For Peer Review

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6 Dislocations in French-English bilingual children: An elicitation study\*  
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26 (\*) Acknowledgments: we gratefully acknowledge the staff and children at *Collège Bilingue*  
27 *Français de Londres*, *La Petite Ecole Bilingue (London and Paris)*, *L'Ermitage (Paris)*,  
28 *Beaver School (Manchester)* and *L'Ecole Maternelle rue Saint-Jacques (Paris)* for their  
29 enthusiastic collaboration.  
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3 Abstract

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5 This paper presents the results of two sentence production studies addressing the role of prior  
6 linguistic modelling, discourse-pragmatic appropriateness and language exposure on the  
7 phenomenon of cross-linguistic influence (CLI) in bilingual 5-year-olds. We investigated  
8 whether French-English bilingual children would be as likely as monolingual children to use  
9 a left-dislocation structure in the description of a target scene. We also examined whether  
10 input quantity played a role on the degree of accessibility of these syntactic constructions  
11 across languages. While the results indicate a significant effect of elicitation condition only in  
12 French, amount of exposure to French predicted the likelihood of producing a left-dislocation  
13 in both French and English. These findings make a new contribution to the role of language  
14 exposure as a predictor of CLI. The data also support the recent proposal that CLI arises out  
15 of processing mechanisms.  
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32 Keywords: bilingual first language acquisition, cross-linguistic influence, language  
33 processing, discourse-pragmatics  
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### CLI: input quantity and language processing

One of the central questions in bilingual language development research over the last fifteen years has been the issue of cross-linguistic influence (CLI), i.e. the extent to which, and under what circumstances, the two languages of a bilingual child interact and give rise to linguistic behaviours that are quantitatively and/or qualitatively different from those of monolingual children. Hulk & Müller (2000) were the first to formulate specific predictions about CLI, although Döpke (1998) had already flagged the issue in a previous study of word order in English-German bilingual children. Hulk & Müller's (2000) seminal hypothesis was that CLI occurs in bilingual children if (a) the structure in question is at the interface between two modules of grammar, and more specifically at the interface between discourse-pragmatics and syntax in the so-called C-domain, and if (b) there is a degree of overlap between the two language systems at the surface level (Hulk & Müller, 2000: 228-229). Since then, evidence of CLI occurring even after the instantiation of the C-domain has been reported for the realization of pronominal arguments especially in null-subject and non-null-subject language pairs (Paradis & Navarro, 2003; Serratrice, Sorace, & Paoli, 2004; Sorace, Serratrice, Filiaci, & Baldo, 2009). Recently cross-linguistic effects have also been observed at the clause level for structures such as compound nouns in Persian and English (Foroodi-Nejad & Paradis, 2009), Noun+Adj strings in French and English (Nicoladis, 2006) and passive structures in Spanish and English (Vasilyeva, Waterfall, Gámez, Gómez, Bowers, & Shimpi 2010). Capitalizing on Hulk & Müller's (2000) early work, subsequent research started examining additional predictors of CLI including factors such as language dominance, processing mechanisms, input quality and age. The present study specifically focuses on whether CLI is affected by prior linguistic processing and amount of language exposure.



Puppet B (postv.subj.): To pire i Hara.  
 it-CL took-3SG □ the Hara-NOM  
*'Hara took it'.*

(Argyri & Sorace, 2007: 89)

(2) Puppet A (postv.subj.): Den thimate [ti efage i Maria].  
 not remember-3SG what ate-3SG the Maria-NOM  
 "She doesn't remember what Maria ate."

Puppet B (prev.subj.): \*Den thimate [ti i Maria efage]. □  
 □ not remember-3SG what the Maria-NOM ate-3SG  
 "She doesn't remember what Maria ate."

(Argyri & Sorace, 2007: 90)

Similar results were observed by Serratrice et al.'s (2009) study on 6- to 10-year-old Italian-English and Spanish-Italian children's encoding of specificity and genericity in plural noun phrases. The English-Italian bilingual children accepted significantly more ungrammatical bare nouns in generic contexts in Italian, as in (3), than all the other groups. Crucially, the bilinguals living in the UK performed less accurately in Italian than the bilinguals in Italy. The children's limited exposure to Italian had an effect on their acceptance of bare nouns in generic context in this language.

(3) \*In genere squali sono pericolosi. (ungrammatical generic)

in general sharks are dangerous

"In general sharks are dangerous."

(Serratrice et al, 2009: 246)



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3 Along the same lines, Serratrice et al. (2011) also observed an effect of the language  
4 of the environment on CLI in a study examining 6- to 10-year-old English-Italian and  
5 Spanish-Italian children's knowledge of pronominal objects. The English-Italian children in  
6 the UK accepted infelicitous postverbal object pronouns in [- focus] contexts as in (4) twice  
7 as often as the Italian monolingual children and more often than all other bilingual groups.  
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16 (4) Voice over: Che cosa ha fatto Minnie a Paperina?  
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18 "What has Minnie done to Daisy?"  
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21  Scrooge: Ha abbracciato lei. (Pragmatically inappropriate)  
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23  "(She) has hugged her."  
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25 (Serratrice et al, 2011: 12)  
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30 The common denominator of these studies investigating the role of language exposure is the  
31 assumption that the bilinguals would be predominantly exposed to the language of their  
32 living environment. This is however not uncontroversial; one of the reasons the studies  
33 reviewed here found an overall effect of the language of the community is because they were  
34 considering older school-age children for whom we can assume that the language of the  
35 community plays a more significant role in their daily interactions than the minority home  
36 language. In the case of pre-school children, who may be spending more time at home with a  
37 minority language-speaking parent or other minority language-speaking caregivers, making  
38 the same assumption is potentially more problematic as the role of the community in the  
39 child's daily language input would be considerably more restricted than for older children.  
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41 Therefore, research investigating the role of input quantity on CLI should always include an  
42 independent measure of language exposure, especially in the case of younger children for  
43 whom relative exposure to the two languages cannot be straightforwardly inferred from their  
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3 environment. A measure of language exposure could then be used as a quantitative predictor  
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5 of the likelihood of CLI (see Unsworth, 2013 ; 2014 for a recently developed tool assessing  
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7 current and cumulative exposure).  
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10 The role of individual language exposure as a predictor of CLI is yet under-  
11  
12 investigated, but there is now a large and expanding body of literature on the role of input  
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14 quantity and quality in bilingual development. A positive correlation has repeatedly been  
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16 reported between amount of language exposure and language proficiency in lexical  
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18 development (Marchman & Martínez-Sussman, 2002; Patterson, 2002), onset of  
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20 combinatorial speech (Hoff, Core, Place, Rumiche, Senior & Parra, 2012; Marchman,  
21  
22 Martínez-Sussman & Dale, 2004); and various aspects of grammatical development (Blom,  
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24 2010; Gathercole, 2007). At the same time some studies have shown that there is not always  
25  
26 a straightforward relationship between input quantity and proficiency. Two recent vocabulary  
27  
28 studies with French-English Canadian children (Smithson, Paradis & Nicoladis, 2014;  
29  
30 Thordardottir, 2011) did not find the often reported differences with monolingual peers for  
31  
32 some groups of bilinguals (pre-schoolers), and for some aspects of expressive vocabulary.  
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34 With respect to morphological acquisition Paradis, Nicoladis, Crago & Genesee (2011)  
35  
36 showed that the acquisition rate of French regular past tense in French-dominant French-  
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38 English bilingual four-year-olds was not significantly different from that of monolingual  
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40 peers despite the bilinguals' reduced amount of exposure to French.  
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### 47 ***Processing and shared syntactic representations***

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49 Research on bilingual development has also started to investigate whether the daily  
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51 processing of two languages affects the rate of bilingual development (i.e. acceleration,  
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53 delay) and the bilingual children's use of their languages (i.e. transfer) (Nicoladis, Rose, &  
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55 Foursha-Stevenson, 2010; Sorace & Serratrice, 2009). Specifically, a growing body of  
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3 evidence suggests that the additional processing demands caused by the simultaneous  
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5 acquisition of two languages would be responsible for delays in the development of  
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7 grammatical structures or cross-linguistic transfer (Nicoladis, 2006, 2012; Pirvulescu, Pérez-  
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9 Leroux, & Roberge, 2012; Pirvulescu, Pérez-Leroux, Roberge, Strik, Thomas, 2014;  
10  
11 Serratrice et al., 2011; Sorace et al., 2009).

14 Recently, studies adopting the structural priming paradigm have contributed to the  
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16 study of syntactic representations in bilingual adults and children. The structural, or syntactic,  
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18 priming methodology is based on speakers' tendency to repeat the syntactic structures they  
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20 have recently been exposed to (Bock, 1986). Observing people's sensitivity to primed  
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22 expressions provides information on the nature of syntactic representation (Branigan, 2007:  
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24 1). While syntactic priming has been used extensively with monolingual adults and  
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26 increasingly with children (Kidd, 2012; Savage, Lieven, Theakston, & Tomasello, 2003,  
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28 2006; Shimpi, Gámez, Huttenlocher, & Vasilyeva, 2007; Thothathiri & Snedeker, 2008),  
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30 relatively few studies have used this paradigm to examine the issue of shared syntactic  
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32 representations in bilinguals and to explore a processing account of CLI. So far, these few  
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34 studies have mainly focused on proficient adult speakers of an L2 (Hartsuiker, Pickering, &  
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36 Veltkamp, 2004; Schoonbaert, Hartsuiker, & Pickering, 2007). Experiments on advanced  
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38 adult second language learners (Desmet & Declercq, 2006; Hartsuiker et al., 2004; Loebell &  
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40 Bock, 2003; Schoonbaert et al., 2007) have provided evidence of structural priming across  
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42 languages (from L1 to L2 or from L2 to L1) suggesting that bilingual adults share syntactic  
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44 representations across languages for certain structures such as passive or ditransitive  
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46 constructions that exist in their two languages.  
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52 Vasilyeva et al. (2010) conducted the first structural priming experiment with  
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54 Spanish-English bilingual 5-year-olds. Following Hartsuiker et al.'s (2004) design, the  
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56 children were primed with passive or active structures across languages (i.e. Spanish to  
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3 English or English to Spanish). The results did show a significant cross-linguistic priming  
4 effect, but this effect was unidirectional from Spanish to English. When primed with Spanish  
5 *fue*-passive sentences, the children increased their use of passive constructions in English.  
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8 However, the reverse effect was not observed; exposure to English passives in the prime  
9 sentences did not lead to a significant increase of *fue*-passives in Spanish. The fact that  
10 priming from English to Spanish was not successful is somewhat problematic. Although the  
11 study did not include independent measures of language proficiency or of language exposure,  
12 the authors concluded, on the basis of an analysis of the level of syntactic mastery in the  
13 children's responses to the experiment, that there was not a substantial difference across their  
14 two languages to justify the asymmetry of the results. Instead they proposed that the relative  
15 infrequency of the *fue*-passive construction in Spanish was responsible for the lack of  
16 priming after exposure to English passives.  
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30 In another cross-linguistic syntactic priming experiment on bilingual children Hsin,  
31 Legendre & Omaki (2013) set out to test whether grammatical structures are represented in a  
32 language-independent format so that all syntactic structures are available in both languages  
33 regardless of their language-specific realization. Hsin et al. (2013) showed that Spanish-  
34 English five-year-olds could be primed to use the (largely unattested) Adj-N word order in  
35 Spanish in a target picture description after hearing an English prime containing the canonical  
36 English Adj-N word order. They also included a baseline elicitation condition with no prime,  
37 and a neutral condition where the target picture description in Spanish was preceded by an  
38 English sentence containing an adjective embedded in a relative clause; in both of these  
39 conditions the proportion of Adj-N responses was significantly lower than in the priming  
40 condition. The authors also reported a marginal correlation between language dominance, as  
41 measured by standardized tests of receptive vocabulary, and the use of the Adj-N order in the  
42 elicitation condition; they also found a strong correlation between these variables in the  
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3 neutral condition. However, the authors did not observe any significant correlation between  
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5 language dominance and the use of Adj-N strings in the priming condition. Language  
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7 dominance, as measured by the children's receptive vocabulary, did not account for their use  
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9 of the infelicitous Adj-N order in Spanish. Overall, this study suggests that bilingual  
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11 children's mental representation of syntactic structures is shared across languages regardless  
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13 of whether they present a case of structural overlap. It also indicates that language dominance  
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15 measured in terms of receptive vocabulary alone is not a predictor of CLI.  
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19 In summary, syntactic priming has been successfully used to explore the issue of  
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21 shared syntactic representations in bilingual adults. Vasilyeva et al.'s (2010) and Hsin et al.'s  
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23 (2013) studies suggest that linguistic representations are shared across languages in bilingual  
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25 children too, regardless of their availability across languages, i.e. presence vs. absence of  
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27 overlap across the two languages. The findings of these studies also imply that CLI may be  
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29 conceptualized in terms of cross-linguistic structural priming, on the assumption that access  
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31 to structures in both languages is always available to the bilingual speaker. The routine  
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33 processing of grammatical constructions in two languages may occasionally lead to  
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35 interference between optimal and sub-optimal structures at the level of syntactic  
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37 representation resulting in CLI. Which factors predict the likelihood and the magnitude of  
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39 CLI remains unclear. Vasilyeva et al.'s (2010) findings suggest that the frequency of a  
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41 construction may affect the degree of activation of this structure at the level of syntactic  
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43 representation and thus the likelihood of CLI; whether the amount of exposure has any role to  
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45 play in predicting the likelihood of priming is yet to be seen.  
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50 To date, structural priming in bilingual children has exclusively been tested across  
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52 languages. However, within-language experiments should also be considered as bilingual  
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54 children may occasionally be exposed to attrited or non-native input containing morpho-  
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56 syntactic constructions that would be sub-optimal from a discourse-pragmatic point of view  
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(e.g. Tsimpli, Sorace, Heycock, & Filiaci, 2004). Caregivers' prolonged contact with another language is likely to result in contact-modified input displaying sub-optimal form-function mappings (Paradis & Navarro, 2003; Schmid, 2010); this would provide bilingual children with input containing constructions that are not discourse-pragmatically appropriate. The input availability of these constructions that are, on the one hand completely appropriate in one language (e.g. the use of pronouns in topic maintenance contexts in non-null-subject languages), and at the same time sub-optimal in the other language (e.g. the use of overt pronouns in topic maintenance contexts in null-subject languages) would make it likely that children themselves would reproduce these sub-optimal form-function mappings in their own speech. The two syntactic priming studies reviewed above have provided some evidence for the possibility that hearing a construction in language A will prime its use in language B, regardless of its grammaticality. Unlike priming experiments, the present elicitation studies consider the role of discourse-pragmatically appropriateness as well as input manipulation on the children's productions. Specifically, we ask whether bilingual children are more likely than monolingual children to use discourse-pragmatically inappropriate constructions when we consider input and output within one single language. Examining the role of pragmatically sub-optimal input would shed some light on how attrited or non-native input may affect bilingual children's use of their languages. Eliciting the production of within-language target descriptions would also provide information on the extent to which children's linguistic representations are shared across languages; hearing the experimenter use a description that is sub-optimal in language A (e.g. an overt pronoun for topic-maintenance in a null-subject language like Italian), but perfectly acceptable in language B (i.e. a non-null-subject language like English), would boost the activation of the structure and make it more likely that children would re-use it themselves when describing a target scene in language A thus producing a pragmatically inappropriate structure.

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5 ***CLI beyond pronominal realization: the expression of topicality at the sentence level in left***  
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7 ***dislocation***  
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10 So far the bulk of research examining CLI at the interface between syntax and  
11 discourse-pragmatics has focused on the realization of pronominal expressions (Hacohen &  
12 Schaeffer, 2007; Hauser-Grüdl, Arencibia Guerra, Witzmann, Leray, & Müller, 2010; Pinto,  
13 2006; Serratrice, 2007; see Serratrice, 2013 for a recent review). The present studies take the  
14 investigation of CLI at the interface between syntax and discourse-pragmatics beyond single  
15 referential expressions to the sentence level. We focus on the expression of topicality in two  
16 elicited production studies involving French-English bilingual children; in particular we  
17 investigate how the use of Left Dislocations (LDs) is affected by prior discourse context and  
18 by amount of language exposure.  
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30 LDs typically include a constituent that appears to the left periphery of a main clause  
31 that is co-referential with a resumptive element as in (5) in which the noun phrase *le lion* and  
32 the strong pronoun *lui* are both co-indexed with the subject clitic *il*.  
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40 (5) Le zébre et le lion courent dans la savanne.

41 The zebra and the lion run in the savannah

42 ‘The zebra and the lion run in the savannah’.

43 Maintenant, le lion<sub>i</sub>, lui, il<sub>i</sub> se repose pendant que le zébre se baigne.

44 Now the lion<sub>i</sub>, him, he<sub>i</sub> rests while the zebra REFL bathes

45 ‘The lion rests while the zebra has a bath’  
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54 LDs are an interesting test case, as they appear to be strong candidates for CLI  
55 (Hervé, 2014; Notley, van der Linden, & Hulk, 2007). There is partial overlap in the way in  
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3 which topicality is encoded in French and in English. LDs mark topics in both languages;  
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5 however, only French strongly relies on their use as about 20% of utterances in spoken  
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7 French contain a dislocation (Barnes, 1985; De Cat, 2002; Lambrecht, 1981, 2001). In  
8  
9 English, topics are largely encoded by the canonical SV(O) word order and topic dislocation,  
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11 though possible, is not at all frequent as only 1% of utterances contain one (Donaldson, 2011;  
12  
13 Geluykens, 1992). LDs are syntactically and pragmatically less constrained in French than in  
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15 English (i.e. nature of dislocated and resumptive elements, discourse functions). In both  
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17 languages, about 70% of LDs are associated with the subject of the main clause (Blasco-  
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19 Dulbecco, 1999; Snider & Zaenen, 2006). Although a variety of grammatical elements can be  
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21 dislocated, LD elements typically correspond to full NPs or strong pronouns (Blasco-  
22  
23 Dulbecco, 1999; Geluykens, 1992). The fundamental difference between French and English  
24  
25 lies in the accessibility of the LD element. In Prince's (1981) terms, LD elements are  
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27 predominantly discourse old or inferable (i.e. extra-linguistic) referents in French (Barnes,  
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29 1985; Delais-Roussarie, Doetjes, & Sleeman, 2004; Lambrecht, 2001). In contrast, LDs  
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31 principally introduce discourse-new or inferable referents in English (Donaldson, 2011;  
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33 Gregory & Michaelis, 2001; Ochs-Keenan & Schieffelin, 1976). Finally, LDs are used for a  
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35 greater variety of discourse functions in French than in English.  
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### *Aims of the present study and predictions*

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45 The existence of cross-linguistic syntactic priming suggests that bilinguals share  
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47 syntactic representations across languages since hearing a construction in language A primes  
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49 the same construction in language B (Hartsuiker et al., 2004; Vasilyeva et al., 2010; Hsin et  
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51 al., 2013). Moreover, the asymmetric relationship observed by Vasilyeva et al. suggests that  
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53 cross-linguistic priming is in some way also mediated by the respective frequency of the  
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3 target syntactic structure in the two languages and potentially by bilinguals' relative exposure  
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5 to their two languages.  
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7 In the present elicitation studies, the aim was to explore children's sensitivity to the  
8 language-specific encoding of topical subjects in English and French at the sentence-level,  
9 and to investigate the role of language exposure on the likelihood of CLI. The relationship  
10 between the bilingual children's representation of topics was examined in two within-  
11 language elicited production experiments, one in French (study 1) and one in English (study  
12 2) in order to answer the following questions:  
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- 20 1. What is the effect of input manipulation on the probability of producing a left  
21 dislocation in French (study 1) and in English (study 2)?  
22
- 23 2. What is the role of language exposure on the probability of producing a left  
24 dislocation in French (1) and in English (2)?  
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34 Previous research has shown that topics are obligatorily dislocated to create a topical  
35 contrast in French when they are not expressed by a weak pronoun (De Cat, 2002;  
36 Lambrecht, 1994). English favours the subject-verb order to mark topicality (Donaldson,  
37 2011). By this rationale, high proportions of LD responses are expected in French regardless  
38 of elicitation condition. Conversely, low proportions of LDs are expected in English given  
39 their relative low frequency in the language as a whole. Nonetheless, it is anticipated that LD  
40 production will be significantly different as a function of input manipulation and context. In  
41 particular, the number of target LDs produced after the modelling of a LD in the elicitation  
42 condition should be higher than the number of those following a NP+VP (SV) description in  
43 the elicitation condition.  
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3 Following earlier research examining the effect of input quantity on CLI (Argyri &  
4 Sorace, 2007; Kupisch, 2007; Serratrice et al., 2011; Sorace et al., 2009), we anticipate that  
5 exposure to French will affect the magnitude of CLI since dislocations are high-frequency  
6 structures in this language. In both experiments, there should be a positive correlation  
7 between the children's exposure to French and the probability that they will produce a LD. In  
8 French, we expect all children regardless language background to use a considerable number  
9 of LDs in the LD condition. We also assume that the monolingual children and the bilingual  
10 children the most exposed to French should be maximally likely to produce LDs while the  
11 bilinguals the least exposed to French should use fewer LDs. In English, the monolingual  
12 children should be the least likely to produce LDs while the bilinguals with the highest  
13 exposure to French should be the most likely to use LDs.

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Finally, we do not expect to observe a significant interaction between elicitation condition and language exposure in French due to the pervasive use of LDs in this language. Conversely, the proportion of LDs should be significantly higher in the LD condition than in the NP+VP condition in English for children with the highest amount of French exposure

## Methods

### *Participants*

A total of 78 children were recruited from six schools in the UK and in France (40 girls, 38 boys): 19 French-English children (mean age 5;5, age range 5;4-6;4) in two bilingual schools in London; 19 French-English children (mean age 5;9, age range 5;4-6;7) in two bilingual schools in the Paris area; 20 English monolingual children (mean age 6;00, age range 5;07-6;04) in a school in Manchester and 20 French monolingual children (mean age = 5;9, age range 5;4-6;4) in a school in Paris. There was no significant difference in age between the bilingual groups ( $M = 5.9$ ,  $SD = 3.90$ ) and the French monolingual group ( $M =$

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3 5.95, SD = 3.42);  $t(52) = -0.69, p = .49$ ) nor between the bilingual groups (M = 5.90, SD =  
4  
5 3.90) and the English monolingual group (M = 6.05, SD = 2.37);  $t(54) = -1.04, p = .058$ ).

6  
7 Ethical approval was obtained from the first two authors' university research ethics  
8  
9 committee; parents were asked to sign an informed consent form.

10  
11 The two bilingual groups took part in both the French and the English experiments  
12  
13 while the English-speaking and the French-speaking monolinguals only took part in their  
14  
15 respective language. The monolingual children were recruited in schools situated in upper-  
16  
17 middle class neighbourhoods in order to match the socio-economic status of the children  
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19 attending the private bilingual schools. All our bilingual participants were exposed  
20  
21 simultaneously to English and French from birth or soon after. They were either the offspring  
22  
23 of mixed French-English couples (N=29), or of French couples living in the UK (N=5), or of  
24  
25 English-speaking couples living in France (N=4). The parents were asked to report about  
26  
27 their child's language background using Cattani, Abbot-Smith, Farag, Krott, Arreckx,  
28  
29 Dennis, Foccia's (2014) questionnaire which provides an estimate of the child's language  
30  
31 exposure. The questionnaire requested information about (i) the average number of hours  
32  
33 spent by the child in the bilingual school/with a childminder; (ii) the language(s) spoken by  
34  
35 each parent in the home; (iii) the weekly number of hours spent by the child alone with each  
36  
37 parent; (iv) whether the parents engaged equally with their child; and (v) an evaluation of the  
38  
39 number of hours of the child's sleep in a typical day. Following Cattani et al. (2014), we  
40  
41 defined 60% of exposure to a language as the cut-off point for establishing the majority input  
42  
43 language. The questionnaire data revealed very different patterns of language exposure  
44  
45 among the children in London and in Paris. Contrary to what had been assumed in previous  
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47 research (e.g. Argyri & Sorace, 2007, Sorace et al., 2009), the children were not necessarily  
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49 predominantly exposed to the language of the local environment (see Table 1).  
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<Insert Table 1 about here>

The bilingual group in Paris includes a larger number of balanced bilinguals (N=13) compared to the London group (N=6). Overall, it is in London that the bilinguals were the most dominant in French (N=9). Across the two groups, there is nearly the same number of English dominant children (Paris N=3; London N=4). Finally, the children recruited in the monolingual schools in Paris and in London were strictly monolinguals.

### ***Materials and design***

For each experiment, we had two elicitation conditions: LD and NP+VP in which the children heard a prompt that contained either LDs or NP+VP (SV) to describe a scene. The materials consisted of 40 sets of pictures for the French and for the English experiment respectively, 20 for each elicitation condition (NP+VP, Left Dislocation). The picture sets were based on popular children's cartoons such as *Rio*, and *Dora the Explorer* for the French study, and on *Madagascar* and *Toy Story 3* for the English study. Different cartoons were used for each condition in order to ensure we would have a sufficient number of different picture sets in all the testing conditions. The pictures consisted of screenshots of these films and were compiled into PowerPoint presentations. Each picture was only used once.

In order to create a target context in which the pragmatically appropriate form to identify a referent would be a LD, we followed De Cat's (2009) experimental design. The first picture of each set created a discourse-pragmatic context in which two animate referents engaged in the same action were introduced and established as topics by the use of a LD (6.a). The description was followed by a prompt question containing a LD that maintained the topical status of the referents (6.b)<sup>1</sup>. The target picture to be described by the child re-introduced the two topical referents side by side but engaged in two different actions (6.c).

This set-up was designed to elicit a *topical contrast* requiring a LD in spoken French as the two previously mentioned referents needed to be distinguished from each other.

(6) a. Blue et Linda, ils se lavent les dents. Prompt description

Blue and Linda they REFL wash the teeth

‘Blue and Linda, they are washing the teeth.’

b. Blue et Linda, que font-ils maintenant? Prompt question

Blue and Linda what do they now

‘Blue and Linda, what are they doing now?’

c. Blue, il lit un livre. Linda, elle parle au téléphone. Target description

Blue he reads a book Linda she speaks to-the telephone

‘Blue, he is reading a book. Linda, she is speaking on the phone.’

In the NP+VP condition, the picture sets differed slightly in order to de-emphasise the notion of establishing a topical contrast between the two referents. When the NP+VP construction was elicited, the prompt picture introduced two animals/characters involved in the same activity by using a NP+VP construction (7.a). The prompt description was followed by a prompt question in which the two subject NPs were repeated (7.b), the child was then presented with two successive target pictures in which the two referents were presented individually. The rationale for the separate presentation of the two referents was to set up a context that would optimally require the use of NP+VP in French.

(7) a. Le zèbre et le lion courent. Prompt description

the zebra and the lion run

‘The zebra and the lion run.’

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3 b. Que font le zèbre et le lion maintenant? Prompt question

4  
5 what do the zebra and the lion now

6  
7 ‘What are the zebra and the lion doing now?’

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9  
10 c. Le zèbre boit de la limonade. Le lion joue au foot. Target description

11  
12 the zebra drinks some the lemonade the lion plays at-the football

13  
14 ‘The zebra is drinking lemonade. The lion is playing football.’

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19 The English materials followed the same pattern as the French materials in their use  
20 of LDs and NP+VP prompt descriptions and in the pragmatic contexts of the target pictures,  
21 although the actual picture stimuli were different as they were taken from stories that were  
22 different from the French set. We used different materials to avoid a practice effect across  
23 languages as the bilingual children were tested over two consecutive days (see the Appendix  
24 for a full list of experimental sentences in French and in English).  
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32 Crucially, LDs were used in the prompt descriptions to depict contrastive topics in  
33 English, a linguistic choice that was deliberately pragmatically sub-optimal. The rationale for  
34 this input manipulation was to test whether French-English bilingual children, who have both  
35 LDs and NP+VP structures available for topicality marking (i.e. LDs in French and NP+VP  
36 in English), would be more likely than monolingual English-speaking children to re-use LDs  
37 in their own description of contrastive topics.  
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#### 48 *Procedure*

49 In both the French and the English experiment, elicitation condition (NP+VP; LD)  
50 was manipulated within subjects, and language exposure was treated as a continuous  
51 predictor. Half of the bilingual children took part in the French experiment first; the language  
52 of the experiment (French, English) and elicitation condition presentation order (NP+VP  
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3 first; LD first) were counterbalanced throughout the experiments in order to diminish  
4  
5 possible carry-over effects. For each study, the children were tested on consecutive school  
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7 days with a different elicitation condition on each day (e.g. day 1: NP+VP day 2: LD).  
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9 Children were seen individually on school premises and verbal consent to take part was  
10  
11 obtained by the experimenter; only children whose parents had previously given their consent  
12  
13 in writing were asked to participate. The children were told that they would play a game with  
14  
15 the computer where they would take turns with the computer at describing pictures. They  
16  
17 would have to listen to a prompt description of a picture (i.e. PowerPoint slide) that was  
18  
19 audio-recorded by native-speakers of French and English before describing the second  
20  
21 picture themselves. At the beginning of each testing session, the first author demonstrated the  
22  
23 aim of the game in a practice item where she listened to the pre-recorded sentences and then  
24  
25 proceeded to describe a target picture by way of example. Each testing-condition lasted no  
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27 longer than 10 minutes; the sessions were audio-recorded for transcription and coding  
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29 purposes.  
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### 36 **Coding**

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38 Children's responses were transcribed and coded by the first author, a native speaker  
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40 of French and advanced speaker of English. Target responses were coded as NP+VP (e.g. *The*  
41  
42 *zebra is dancing*), LD (e.g. *Velma, she is eating two biscuits*), Pronoun+Verb (e.g. *He is*  
43  
44 *eating a cake*) and Other (e.g. *0 calling somebody*). Subject-less utterances and expletives  
45  
46 (i.e. *il y a/there is*) were classified as Other and were included in the analyses. Utterances  
47  
48 with missing participles or complements such as in *Alex is (holding) an umbrella* or *Woody,*  
49  
50 *he is looking in the (toy box)* were included as valid responses.  
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55 In order to examine the effect of elicitation condition, we then categorized each  
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57 response as either being an instance of LD (1) or not (0).  
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## Results

Analyses were conducted using the lme4 package in R 3.0.2 (Bates, Maechler, Bolker, & Walker, 2013; R Core Team, 2013). For each experiment, we conducted a Generalized Linear Mixed Model (GLMM) fit by maximum likelihood in order to examine the probability of producing a LD as a function of elicitation condition and to investigate the role of language exposure on the probability of producing a LD. We treated LD production as the dependent variable; elicitation condition and exposure to English were treated as fixed factors; the intercept, the elicitation condition, and their correlation were allowed to vary randomly by participants. Elicitation conditions varied within participants and exposure to English varied between participants. We centred the exposure to English predictor in order to avoid collinearity; 50% corresponding to hypothetical ‘perfectly’ balanced bilingual. Consequently, -50% corresponded to English monolinguals while +50% corresponded to French monolinguals. The model included both elicitation condition and exposure to English as fixed effects.

### *Experiment 1: French results*

Figures 1 and 2 report the proportion of responses of LDs in the NP+VP and LD conditions respectively. The figures indicate that monolingual and bilingual children used a considerable number of LDs in both elicitation conditions. Bilingual children tended to produce fewer LDs than monolinguals. In the LD condition, monolinguals used LDs 64% (232/360) of the time while the French dominant children produced LDs 57% (126/220) of the time, balanced bilinguals 43% (154/360) and English dominant only 39% (55/140). A similar pattern is observed in the NP+VP condition. Monolinguals used LDs 56% (202/360) of the time against 50% (111/220) for the French dominant bilinguals, 27% (96/360) for the



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3 balanced bilinguals and 36% (51/140) for the English dominant bilinguals. These findings  
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5 suggest that French monolingual children are more likely to use LDs than bilinguals  
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7 regardless of the elicitation condition. Moreover, LD production is affected by the children's  
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9 language background and by the amount of exposure to English.  
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14 <Insert Figures 1 and 2 about here>  
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19 The GLMM indicated that all children were more likely to use a dislocation as a  
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21 function of input manipulation in French ( $\beta=1.59$ ,  $SE(\beta)=0.44$ ,  $z=3.56$ ,  $p<.001$ ). The children  
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23 were 4.90 times ( $e^{1.59}$ ) more likely to produce a LD in the description of the target after  
24  
25 hearing a LD in the prompt description. The analysis also showed a main effect of exposure  
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27 to French on LD production ( $\beta=0.05$ ,  $SE(\beta)=0.02$ ,  $z=2.95$ ,  $p=.003$ ) confirming that the use of  
28  
29 LDs in French varies as a function of language exposure. For every percentage point increase  
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31 in exposure to French, the likelihood of producing a LD rose by 1.05 ( $e^{0.05}$ ). This result  
32  
33 implies that reduced input to LDs in French made the participants less likely to use this  
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35 construction. Finally, there was no interaction between elicitation condition and exposure to  
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37 English suggesting that participants with more exposure to French were simply more likely to  
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39 produce LDs regardless of context.  
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45 <Insert Table 2 about here>  
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## 50 *Discussion*

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53 All children produced significantly more LDs in the LD condition than in the NP+VP  
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55 condition regardless of their language background. Although LDs were also very frequent in  
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57 the NP+VP condition, the analysis reported that LDs were significantly more frequent in the  
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3 LD condition. LDs were successfully elicited as a function of discourse-context and input  
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5 manipulation when topics were identified by a LD in the prompt description and question.  
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7 More interestingly in terms of potential CLI, LD production varied as a function of language  
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9 exposure. For every additional point of exposure to French, the likelihood of producing a LD  
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11 increased. Hence, the routine processing of LDs in French affected the children's likelihood  
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13 of producing this construction. Children exposed to reduced French input were less likely to  
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15 use LDs in discourse-pragmatically optimal contexts. In fact, the bilingual children used a  
16  
17 considerable percentage of NP+VP structures, which corresponds to the English preferred  
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19 structure. These findings lend support to the role of input quantity on children's use of  
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21 pragmatically optimal syntactic constructions. The data show that the choice of grammatical  
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23 structures was directly related to bilingual children's exposure to their two languages.  
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### 30 *Experiment 2: English results*

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32 Figures 3 and 4 summarize the participants' responses in the NP+VP and LD  
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34 condition respectively. In the LD condition, the English monolingual children did not  
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36 produce any LDs, unlike the bilingual children who did use some LDs in this condition. The  
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38 English dominant group produced LDs only 1% (1/140) of the time against 3% of the time  
39  
40 for the balanced bilinguals (9/340). The French dominant children appeared to be the most  
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42 responsive to the LD condition as they produced LDs 11% (24/220) of the time. In the  
43  
44 NP+VP condition, LDs were largely absent in the children's elicited descriptions; English  
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46 monolinguals used a trivial number of LDs (0% – 1/400) while the three groups of bilinguals  
47  
48 produced LDs 1% of the time (i.e. English dominant: 1/140; balanced: 3/340; French  
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50 dominant: 2/220). As in the French experiment, these findings indicate that the use of LDs is,  
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52 at least partly, mediated by the bilinguals' language experience and relative exposure to  
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54 French.  
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5 <Insert Figures 3 and 4 about here>  
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10 The GLMM showed no significant main effect on the likelihood of producing a LD as  
11 a function of elicitation condition ( $\beta=-0.05$ ,  $SE(\beta)=0.58$ ,  $z=0.08$ ,  $p=.93$ ) despite the fact that  
12 the balanced and French dominant bilinguals used a non-negligible number of LDs in the LD  
13 condition. The analysis also indicated a significant effect of exposure to English on LD  
14 production ( $\beta=-0.03$ ,  $SE(\beta)=0.01$ ,  $z=-2.56$ ,  $p=.011$ ) across all participants. For every  
15 percentage point increase in exposure to English, the likelihood of producing a LD decreased  
16 by 0.97 ( $e^{-0.03}$ ). There was a marginal interaction between LD production and exposure to  
17 English ( $\beta=-0.04$ ,  $SE(\beta)=0.02$ ,  $z=-1.86$ ,  $p=.063$ ) suggesting that exposure to English made the  
18 participants less likely to use a LD in general. This implies that the greater the exposure to  
19 French the higher the likelihood that children would use a LD.  
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34 <Insert Table 3 about here>  
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### 39 *Discussion*

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42 In English, monolingual and bilingual children did not produce significantly more  
43 LDs after hearing a LD than a NP+VP. Despite the lack of a significant main effect of  
44 elicitation condition, language exposure affected the likelihood of producing LDs. Children  
45 with more exposure to English were less likely to produce LDs; this is unsurprising for  
46 monolingual children, but has interesting implications for bilingual children. The less a  
47 French-English bilingual child is exposed to English, and hence the more she is exposed to  
48 French, the more likely she is to use LDs. The fact that the children with the largest exposure  
49 to French were more likely to use LDs in English is consistent with the hypothesis that the  
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3 likelihood and magnitude of CLI is affected, at least partly, by the input. Despite LDs being  
4  
5 optimal to mark topicality in French only, French dominant children's use of LDs in English  
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7 after hearing a pragmatically sub-optimal LD indicates that bilingual children's sensitivity to  
8  
9 discourse-pragmatic appropriateness at the sentence level can be skewed by exposure to sub-  
10  
11 optimal structures in the input.  
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14 These results imply that input quality, i.e. possible exposure to an attrited or non-  
15  
16 native form of input resulting from potential CLI, may have important implications for  
17  
18 bilingual children's acquisition and use of grammatical constructions. Exposure to contact-  
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20 modified input may lead bilingual children to use certain optimal structures less frequently  
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22 due to a lack of regular exposure to them and to resort to less discourse-pragmatically  
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24 appropriate constructions, in this case LD to mark topicality in English.  
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### 30 **General discussion**

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33 The overall aim of the present studies was to make a contribution to the current  
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35 understanding of the role of processing mechanisms, discourse context, and language  
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37 exposure on the phenomenon of CLI in sentential contexts. We investigated the expression of  
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39 topicality in French and English in the wider framework of sentence-level constructions, thus  
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41 taking the study of CLI beyond the level of individual referential expressions. We used an  
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43 elicitation task to address the issue of syntactic choice in child bilingual speakers; specifically  
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45 we explored the extent to which exposure to constructions where the mapping between  
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47 syntax and discourse-pragmatics is sub-optimal, affects children's own uptake and production  
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49 of these constructions. Finally, we considered the role of input in two different ways: firstly  
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51 by conducting two within-language experiments where we included constructions that  
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53 replicated instances of attrited/non-native input that bilingual children may be exposed to;  
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3 secondly, by estimating children's relative exposure to their two languages and factoring in  
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5 this proxy for language dominance to predict the likelihood of LD use.  
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7 The first main finding is that, in French, both monolingual and bilingual children  
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9 predominantly produced LDs, while in English LDs were very infrequent overall and non-  
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11 existent in the monolingual group. The obvious pattern emerging from these results is that the  
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13 absolute frequency of the construction in the language matters. Although LDs are in principle  
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15 available in both French and English, it is only in the former that they are used pervasively to  
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17 mark topicality, therefore it does not come as a surprise that both monolingual and bilingual  
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19 children should produce more LDs in French than in English. This finding is yet another  
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21 confirmation that the actual frequency of a construction in the input matters when it comes to  
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23 language use.  
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27 Although in French there was a significant effect of elicitation condition, a somewhat  
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29 unexpected finding was the substantial proportion of LDs even when the prompt descriptions  
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31 included a NP+VP construction and the experimental contexts did not explicitly call for a  
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33 topical contrast requiring a LD. A potential explanation for the children's behaviour in this  
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35 condition is that our stimulus presentation may not have been as pragmatically felicitous as  
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37 we intended it to be. Although we did only use NP+VP structures in the prompt descriptions  
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39 and questions and we presented the two referents in separate and subsequent target pictures, it  
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41 appears that the children did not view this context as sufficiently different from that of the  
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43 LD elicitation condition in which the referents were presented side by side in one single  
44  
45 target picture and were preceded by two LDs.  
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49 The second main finding is that, despite the non-trivial proportion of LDs after  
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51 NP+VP primes, the effect of elicitation condition was significant in French. In English we  
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53 did not find such a main effect. Although there were some LDs produced after LD prompt  
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55 descriptions and no LDs produced after NP+VP prompt descriptions, overall the number was  
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3 too small to be significant. During the course of the English experiment, 20 presentations of  
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5 LD constructions alongside 20 presentations of NP+VP constructions were not sufficient to  
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7 skew the production of LDs. Taken at face value this suggests two things; firstly, that the  
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9 children in our study were sensitive to the overall frequency of LDs in the English input,  
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11 which we can assume to be very low, at least in the case of the English monolingual children.  
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13 Secondly, and more interestingly, this result suggests that, aside from the low frequency of  
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15 LD constructions, the fact that they are pragmatically sub-optimal in English is likely to have  
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17 contributed to the monolingual children's resistance to use LDs. Some studies that have used  
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19 the syntactic priming paradigm rather than just an elicitation study, as was the case here, have  
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21 indeed shown that the likelihood of priming can be modulated by the semantic  
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23 appropriateness of the primed construction (Messenger, Branigan, McLean, & Sorace, 2012;  
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25 Skarabela & Serratrice, 2009). Our finding in an elicitation task suggests that discourse-  
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27 pragmatic appropriateness is also a mediator of the likelihood of syntactic choice.  
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32 The third result, and the one that is key to the argument being made here for the role  
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34 of language processing, discourse context and language exposure on CLI, is that bilingual  
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36 French-English children were sensitive to the elicitation condition and the likelihood of  
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38 producing a LD after hearing a LD increased as a function of their language exposure. The  
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40 more French the children were exposed to, the higher the chance that they would use a LD in  
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42 contexts in which a monolingual would use a NP+VP construction. We interpret this instance  
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44 of CLI to reflect the shared nature of syntactic representations in bilingual children and the  
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46 probabilistic nature of the CLI phenomenon that is at least partly determined by the overall  
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48 frequency of the construction in the input, and by the relative frequency of the input at the  
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50 individual level. Although the analyses treated language exposure as a linear predictor, there  
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52 is some reason to question the notion of a continuous linear relationship between input and  
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54 performance in bilinguals (Paradis et al., 2011; Thordardottir, 2011; Hoff et al.,  
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3 2012). Previous investigations suggest that input quantity may only matter up to a critical  
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5 point where the behaviour of bilinguals begins to match that of monolinguals. While the  
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7 present study provides clear evidence for the direction of the relationship between input and  
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9 performance, it remains an important question for future research to explore in more detail  
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11 the function that maps input to output.  
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14 With regard to language processing, a growing body of research has started to  
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16 consider the role of this variable on CLI (Nicoladis, 2006; Nicoladis, 2012; Nicoladis et al.,  
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18 2010; Pirvulescu et al., 2012; Serratrice et al., 2009; Serratrice et al., 2011; Sorace et al.,  
19  
20 2009). The theoretical motivation comes from research on bilingual adults showing that  
21  
22 processing considerations have real implications for bilinguals' language use (Bernolet,  
23  
24 Hartsuiker & Pickering, 2007; Desmet & Declercq, 2006; Hartsuiker & Pickering, 2008;  
25  
26 Hartsuiker et al., 2004; Schoonbaert et al., 2007). These studies suggested that bilingual  
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28 adults share syntactic representations across languages, and recent experiments demonstrated  
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30 that bilingual children would also have a shared syntax for structures that exist in their two  
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32 languages as well as for those which are only present in one (Vasilyeva et al. 2010; Hsin et  
33  
34 al. 2013). The present elicitation studies provide additional evidence that the mental  
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36 representation of syntactic structures is affected by the simultaneous acquisition of two  
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38 languages. The bilingual children's use of discourse-pragmatic sub-optimal LD constructions  
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40 in English to mark topicality demonstrates that LDs were activated in these children's  
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42 English to a significantly larger degree than for monolinguals; more interestingly, even  
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44 within the bilingual group, the amount of exposure to French was critical in determining the  
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46 likelihood of CLI. Complementary evidence from the French experiment also indicates that  
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48 the bilingual children used more sub-optimal constructions (NP+VP) to mark topicality in  
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50 French than their monolingual peers.  
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3 We used a within-language set up where we presented the children with both optimal  
4 (in French) and sub-optimal (in English) form-meaning pairings to mark topicality. The  
5 rationale for this choice was to replicate the kind of attrited/non-native input that bilingual  
6 children might be exposed to. The assumption that bilingual children's input is only  
7 quantitatively different from monolinguals' is likely to be only partially correct; bilingual  
8 children are likely to have parents who are themselves non-native or attrited bilingual  
9 speakers and this will make their input different from a qualitative point of view too. In  
10 essence, a French-English bilingual child whose parents are either L2 or attrited speakers of  
11 English with French as their other language is likely to hear LDs in English in contexts in  
12 which a monolingual English-speaking adult would use a NP+VP construction. So exposure  
13 to these pragmatically sub-optimal LDs in English, alongside the routine exposure to  
14 pragmatically appropriate LDs in French, would boost the activation of LDs as topicality  
15 markers and increase the chances that they would be used in English more than would be  
16 reasonable to expect in the case of a monolingual child. The daily processing of high  
17 frequency structures such as LDs in French, and the shared syntactic representation of the  
18 form, strengthened by a potentially contact-modified English input exhibiting higher LD rates  
19 than in native English may reinforce the entrenchment of LDs across languages and thus lead  
20 to CLI. Conversely, the opposite effect may be observed with the potential entrenchment of  
21 NP+VP constructions in French to mark topicality when exposed to a contact-modified input  
22 resulting from prolonged exposure to English as a majority language. These findings show  
23 that input manipulation does play a role on the activation of grammatical constructions, in  
24 essence it increases the likelihood of CLI that we know is likely to take place when syntactic  
25 structures. The assumption that cross-linguistic activation is possible of course rests on the  
26 idea that bilinguals do share syntactic representation for isomorphic constructions (Serratrice  
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3 et al., 2011); an idea that has been proposed in the adult bilingual psycholinguistic literature  
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5 and that is starting to gain traction in the child bilingual literature too.  
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7 Our finding of an effect of language dominance on CLI is in line with recent work  
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9 showing that the magnitude of CLI varies as a function of the bilingual children's exposure to  
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11 their languages (Argyri & Sorace, 2007; Serratrice et al., 2009; Serratrice et al., 2011).  
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13 Unlike in previous studies where language dominance was not measured for individual  
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15 children but language of the community was used as a proxy, our results provide a  
16  
17 quantifiable measure of the probability to produce a LD as a function of language exposure at  
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19 the individual level. These findings suggest that dislocations are more or less accessible in  
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21 French-English bilingual children's mental representations as a function of language  
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23 exposure.  
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27 In conclusion, the present elicitation studies provide new evidence supporting the role  
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29 of processing mechanisms on CLI. The existence of shared syntax across languages implies  
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31 that processing high frequency structures in one language can lead to their entrenchment in  
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33 bilinguals' other language, even when the discourse-context is not discourse-pragmatically  
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35 optimal. Measuring language exposure at the level of the individual child we showed that the  
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37 quantity of input matters for the likelihood of CLI; using a within-language experimental  
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39 paradigm we showed that the quality of the input that is addressed to bilingual children also  
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41 has a role to play and that non-native/atrited input may skew the activation of a syntactic  
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43 structure even when it is not the best form-function fit.  
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Table 1. *Bilinguals' exposure to French and English.*

Language exposure	Paris bilinguals	London bilinguals
Dominant in French (Exp>60%)	2	9
Balanced (60%>Exp>40%)	13	6
Dominant in English (Exp<40%)	3	4
NA	1	–
Total	19	19

For Peer Review

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Table 2. *Model coefficients (in logits) for the likelihood of producing a LD in French.*

Fixed Effect	Estimate	SE	z	Pr(> z )	Random Effect	Variance
<b>Analysis</b>						
Intercept	-1.73897	0.56699	-3.07	0.00216**	Intercept	10.10
Elicit condition	1.59193	0.44718	3.56	0.00037***	Elicit condition	3.65
ExpEng	0.04872	0.01650	2.95	0.00315**		
Elicit vs. ExpEng	-0.00772	0.01268	-0.61	0.54267		

Peer Review

Table 3. *Model coefficients (in logits) for the likelihood of producing a LD in English.*

Fixed Effect	Estimate	SE	z	Pr(> z )	Random Effect	Variance
<b>Analysis</b>						
Intercept	-4.7646	0.2898	-16.44	<2e-16***	Intercept	0.886
Elicit condition	-0.0480	0.5826	-0.08	0.934	Elicit condition	3.709
ExpEng	-0.0278	0.0109	-2.56	0.011*		
Elicit vs. ExpEng	-0.0406	0.0218	-1.86	0.063		

<sup>1</sup> The experimenter's prompts in English and French were pre-recorded by a female native speaker of French and a female native speaker of English to ensure consistency of presentation across all participants.

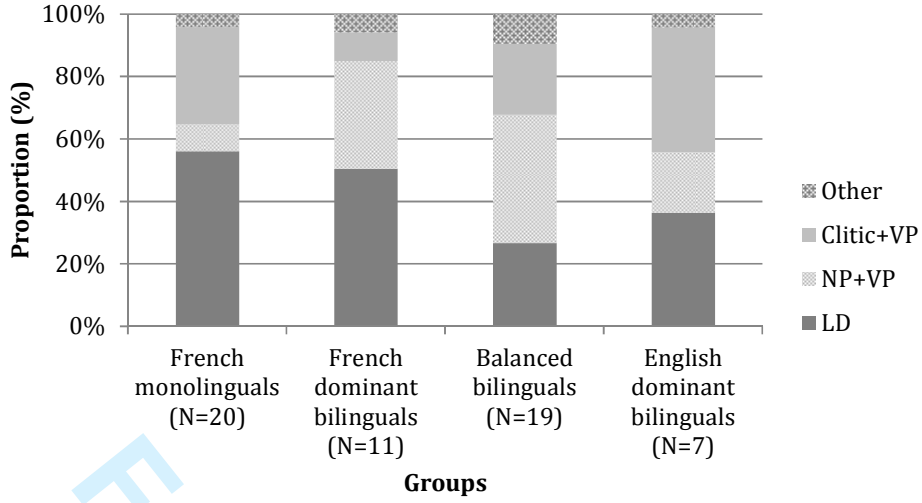


Figure 1. Proportion of responses in the NP+VP condition in French.

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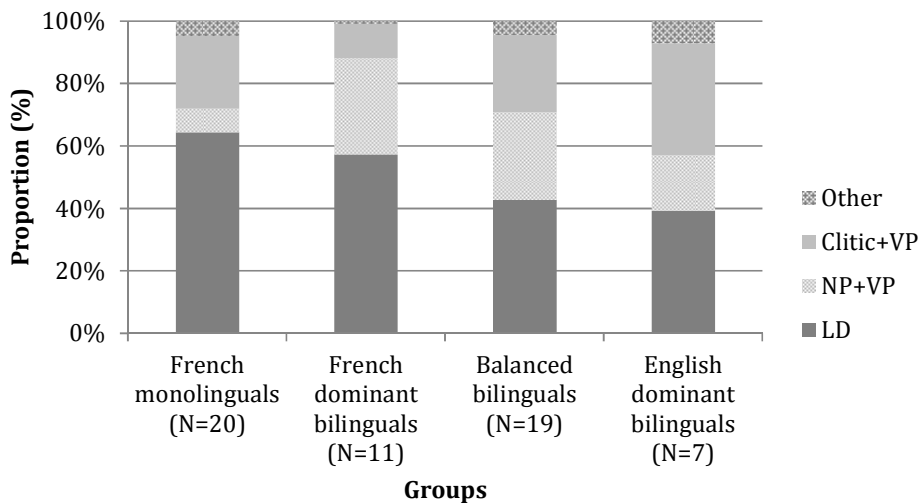


Figure 2. Proportion of responses in the LD condition in French.

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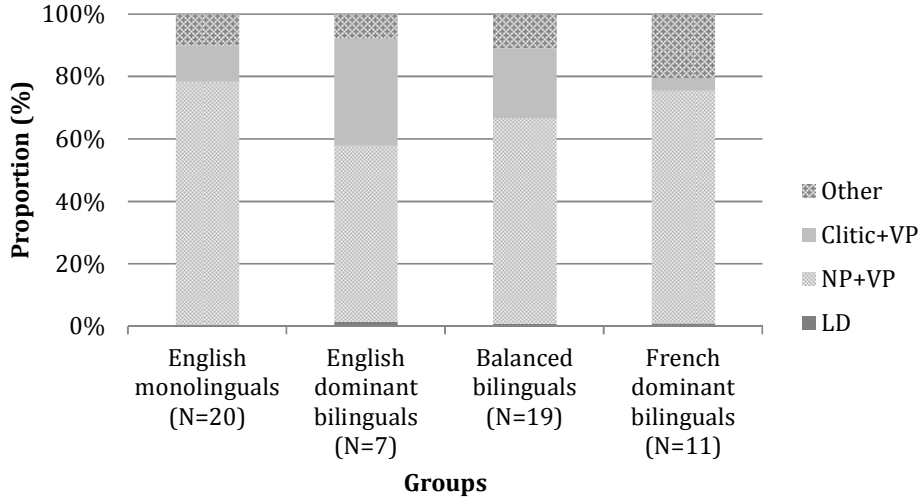


Figure 3. Proportion of responses in the NP+VP condition in English.

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Peer Review

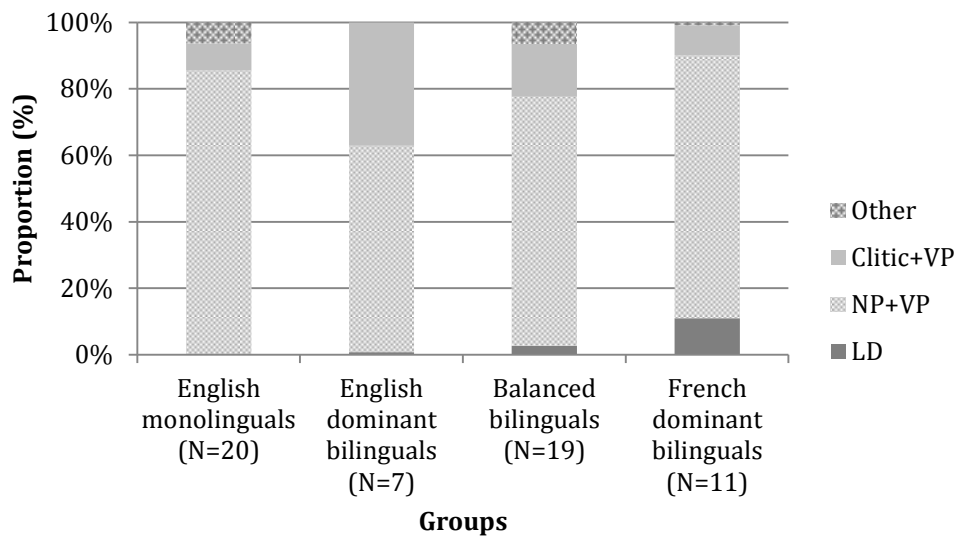


Figure 4. Proportion of responses in the LD condition in English.

Peer Review

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