

RESEARCH

Assessing lexicalism through bimodal eyes

Chiara Branchini¹ and Caterina Donati²

¹ Università Ca' Foscari, Dorsoduro 1075, 30123 Venezia, IT

² Université Paris Diderot, 5 rue Thomas Mann, 75013 Paris, FR

Corresponding author: Chiara Branchini (chiara.branchini@unive.it)

The relation holding between words and syntax is at the core of a lively debate. Two competing proposals have been advanced: the *lexicalist* view, claiming that the lexicon and the syntax are distinct modules of the grammar, and what we shall refer to as the *constructionist* view typically represented by models like Distributed Morphology, advocating for the redundancy of a notion such as the lexicon and arguing for no divide between syntax and word formation. By facing the debate from the privileged point of view of the mixed production of bimodal bilinguals (Italian – Italian Sign Language), namely users of a sign and a vocal language simultaneously produced, we discuss the interaction of the two grammars at play with respect to their word order, morphology and phonology and draw some consequences relevant to the debate.

Keywords: lexicalism; distributed morphology; bimodal bilingualism; code mixing; code blending; Italian Sign Language (LIS); word order

1 Introduction

There are at least two possible views on the relation between words and syntax. Under the Lexicalist hypothesis originating from Chomsky (1970) and Halle (1973), the processes of morphology, producing complex words, and those which construct phrase-level units constitute distinct modules of the grammar – the lexicon and the syntax respectively. There is a clear categorical distinction between words and phrases and a consequent robust divide between the two modules generating members of lexical and phrasal categories respectively. A consequence of this sharp divide is what has been formulated as the ‘Lexical Integrity Principle’ (Di Sciullo & Williams 1987), whereby syntactic processes can manipulate members of lexical categories (*‘words’*) but not their morphological elements. This Principle expresses the traditional view that words are the basic building blocks of syntactic structure. In Minimalist terms, words are bundles of formal features, stored as such in the lexicon and selected in a Numeration driving the syntactic derivation through a feature checking mechanism (also called probing: Chomsky 2000; 2001).

On a separate view, that we might call anti-lexicalist or constructionist, there is no such component as a lexicon and no divide between syntax and word formation: a word is nothing different from a phrase, i.e. a combination of features put together by syntax, and actually phrases are built directly out of morphemes, with no intervening notion of word. Various recent models can be ascribed to this anti-lexicalist view: first of all, Distributed Morphology (cf. Halle & Marantz 1993; Embick & Noyer 2007), but also Borer’s Exoskeletal Model (Borer 2005) and Nanosyntax (Starke 2011).

It is clear that constructionism is the null hypothesis. That is, no one can deny that sentences are built out of morphemes. Lexicalism claims that sentences are built out of morphemes indirectly: you first build words, then build phrases from them. This amounts

to adding something substantive, and possibly wrong, to the null hypothesis. The issue of which hypothesis is correct should thus be seen as an empirical one, and discussed consequently. But the question is sometimes set in recent times as a sort of an ideological choice, with lexicalism seen as the old traditional view to be discarded, and constructionism the new cool thing.

The main area where the two hypotheses make divergent predictions is the status of words.¹ In particular, two questions that arise are a) whether there is evidence for the existence and significance of words dissociated from syntax; b) whether the lexical integrity principle is a pure theoretical assumption or whether it can be proved to be true (see Ackema & Neeleman 2004; Williams 2007; Cecchetto & Donati 2015 for a discussion).

One area in which the two views *do not* differ is on concrete vocabulary insertion: both views are compatible and indeed imply that syntax operates on abstract features, and that access to the material side of expressions is due to a late spell-out operation. What they differ about is the *initial* input of derivation: a bundle of pre-assembled features in the lexicalist view (abstract words); single atomic features in the constructionist view.

The aim of this paper is to discuss these issues from the peculiar angle of bilinguals' mixed productions, and show that they can potentially provide an important piece of evidence for this debate.

Bilinguals are known to be able to keep their two languages apart (Meisel 1994 and the references cited herein) and to produce at the same time so-called mixed utterances (Muysken 2000), namely utterances displaying segments belonging to the two languages they are competent in. Since two languages appear to be involved and interact in building up a mixed utterance, observing where and when mixing can occur can tell us a lot about the significant units of grammar. So for example, whether language mixing below the word level is allowed or not can tell us whether the lexical integrity principle is respected in mixed productions or whether it can be violated: in other words, it can provide a crucial argument in favor of one of the two opposing views. We shall return to this.²

In this paper, we will first review the literature and the facts that are known about code mixing, and claim that none can provide conclusive evidence for the debate. We will indeed argue that the articulatory filter, that forces inhibition of one of the two languages since they compete for the same channel, obscures what really goes on in the bilingual mind, weakening any argument about linguistic competence based on mixing phenomena. The mechanisms underlying language mixing are better and more directly observed in bimodal bilinguals, where such articulatory filter is suspended. Bimodal bilinguals, namely bilinguals who are competent in a sign language and a spoken language, have access to two independent linguistic channels instead of only one. This means that the two languages they are competent in do not compete for articulation and do not have to alternate in production. As a result, bimodals do not necessarily *switch* from one language to the other in mixed production; they can rather produce both of them simultaneously, in what has been called *blending* (Emmorey et al. 2005). This exceptional circumstance, suspending usual articulatory constraints and hence avoiding the inhibition process that is usually at play in bilinguals, makes code blending an extraordinary window into the bilingual competence and the interaction of the two grammars at play.

¹ Other areas are whether word internal syntax and phrase internal syntax obey the same rules and constraints: cf. Ackema & Neeleman (2004); whether categories are inserted by the syntax or are features of words: cf. Cecchetto & Donati (2015).

² Mixed lexical items, such as '*parquear*' in Spanglish, do seem to be attested, but their interpretation is controversial. According to lexicalists (e.g. MacSwan 1999; 2014) these are cases of borrowing, hence the result of the migration of one lexical item from one lexicon into another, and *not* instances of language mixing within the word boundary, which would go against the word-as-a-unit assumption on which lexicalism is based. See den Dikken (2014) and MacSwan (2014) for a discussion.

We will show that code blending can be of at least two very different types, according to the activation and role of the two grammars. Both types will provide arguments that are relevant for the lexicalist vs. constructionist debate. In one case (that we shall call Type 2), the peculiar syntactic, morphological and prosodic properties of the simultaneous language strings involved will be interpreted as stemming from two parallel derivations triggered by two parallel *selections of full lexical items*; as for the other case (Type 1), we will argue that the neat and necessary dissociation of lexical insertion from syntactic derivation that appears to be implied here can be also interpreted as an evidence for lexicalism.

The paper is organized as follows:

- § 2 is a review of the contribution of MacSwan's original lexicalist approach to the literature on code-mixing, which fails to explain some attested data on mismatching mixed DPs that seem to provide evidence for the opposing hypothesis, namely the constructionist view.
- § 3 introduces the reader to code blending, outlining the differences with code switching and describing the bimodal bilingual population (§ 3.1); § 3.2 presents the study object of investigation: the participants, the type of data collected, the setting (§ 3.2.1), the glosses (§ 3.2.2) and provides some morpho-syntactic information on the two languages involved in the study, namely Italian and Italian Sign Language (§ 3.3).
- § 4 presents the data. Two different types of blending are identified and described according to word order possibilities (§ 4.1 and § 4.2) and a summary of a previous interpretation of the data based on a constructionist approach is provided in § 4.3.
- § 5 offers a more detailed description of the data by looking at the morpho-syntactic and prosodic features involved in the two language strings during code blending.
- § 6 describes and analyzes the data coming from the grammaticality judgments of adult bimodals confirming the robust correlation between word order and other abstract features of the two language strings observed in the mixed production of children.
- § 7 a new analysis supporting the lexicalist model to language architecture is proposed to account for the correlations observed in the blending data.
- § 8 presents and describes a third mixing possibility attested in our corpus.
- § 9 discusses the relative frequency of the various types observed trying to draw some conclusions about their status in the bilingual competence.
- § 10 addresses the issue of lexical integrity and discusses some data that are relevant but inconclusive.
- § 11 draws the conclusion and outlines some future research topics.

2 The classical lexicalist view on code mixing and mixed DPs

MacSwan (1999) developed a minimalist account of the phenomenon of language mixing which is both very simple and lexicalist in spirit. The computational system is invariant across all languages and parameters are part of the lexicon, which the computational system uses to build larger structures. What defines bilinguals, he argues, is the fact of having access to two lexicons. This entails that they can select items from both of them, generating a mixed utterance. Each lexical item introduces grammatical features into the derivation, which must be checked. Nothing more than feature compatibility and usual feature checking constraints restricts mixing possibilities. Cantone (2007) extended this

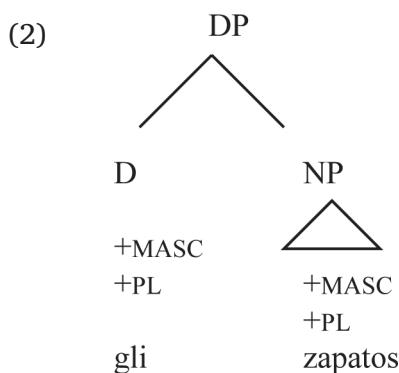
approach to children, showing that mixed utterances in young bilinguals can be analyzed in the same way as adults' language mixing.

This view represents a severe departure from a long tradition of studies, which tried to formulate specific code mixing constraints (The Free Morpheme Constraint; The Equivalence Constraint: Poplack 1980; The Government Constraint: Di Sciullo, Muysken, & Singh 1986; The Functional Head Constraint; The Word-Grammar Integrity Corollary: Belazi, Rubin & Toribio 1994) whose theoretical status and empirical validity have been criticized (Romaine 1989; MacSwan 1999, among others). Moreover, MacSwan's approach has the great merit of turning language mixing phenomena from being marginal and peculiar behaviors of bilingual individuals, into central linguistic facts relevant for language theorizing.

There are, however, phenomena that can be observed in language mixing that do not fall easily under such an approach. This is not the place where to address a systematic survey of these phenomena. Let us simply mention just one of them, which appears problematic for MacSwan specifically in its lexicalist component. This has to do with mixed DPs. Nominal expressions are a syntactic domain where mixing is very frequent with D belonging to language A and NP belonging to language B (Meisel 1994; Köppe & Meisel 1995; Spradlin et al. 2003; Kupish 2006). A checking approach would predict this to be possible only when the features of D and N match and the mixed derivation succeeds. A case that can be explained along these lines is given for example in (1), discussed by Pierantozzi et al. (2007) and Pierantozzi (2012), a mixed DP produced by a Spanish-Italian bilingual child.

- (1) *Italian/Spanish* (Pierantozzi et al. 2007)
 gli zapatos (Lucia 2;00)
 the.MASC.PL shoes.MASC.PL
 'the shoes'

This production is predicted under the simple view just discussed: (1) can be argued to derive from a unique mixed numeration. It is grammatical, because the grammatical features involved in agreement/checking match: the two words, although belonging to two different lexicons, agree in gender and number: (2).



The problem is that there are other cases that would be predicted to be impossible, due to feature mismatch, but that are also attested. Look at (3), again from the same child corpus (Pierantozzi et al. 2007; Pierantozzi 2012).

- (3) *Italian/Spanish* (Pierantozzi et al. 2007)
 Le zapatos (Lucia 2;00)
 the.FEM.PL shoes.MASC.PL
 'the shoes'

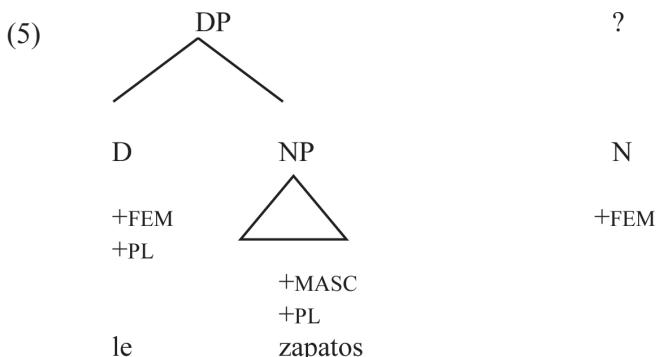
In (3) there is a clear mismatch in features between the determiner (which is feminine) and the noun (which is masculine). Why is (3) acceptable? Pierantozzi et al. (2007) show that the gender feature on the determiner surfacing in these mismatching DPs is not accidental but systematically correlates with the gender feature associated to the equivalent noun in the inhibited language (here Italian). Since *scarpe* ('shoes') is feminine in Italian, the Italian determiner displays a feminine gender, in overt mismatch with the noun in Spanish, *zapatos*, which is masculine.

While this is only an option in language pairs like Spanish and Italian, displaying similar morphological systems, it is the only possibility in other language pairs, such as, say, English and French. When a French determiner merges with an English noun, it cannot possibly agree with it in gender. MacSwan would thus predict mixed DPs with a French determiner and an English noun to be impossible, but they are instead widely attested. This is illustrated in (4) with an example produced by another child, taken from CHILDES.

- (4) French/English (Genesee et al. 1995)
 La (maison. FEM) (Oliver 2;06)
 the.FEM house
 'the house'

Here, the French determiner needs to value its unvalued gender feature on a noun, and it does so with the gender feature of the "inhibited" French noun, *maison* ('house', feminine). Pierantozzi (2012) shows that this is systematically the case in language pairs involving a missing feature, such as gender in English nouns in the case discussed above (see Kupisch et al. 2013 on gender assignment in adult bilinguals).

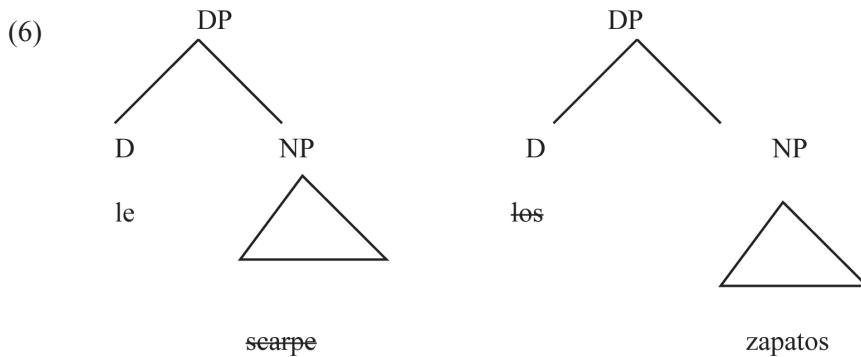
Trying to represent a mismatching mixed DP of this kind, the challenge of its very existence becomes patent. Look at (5), an attempt at representing (3).



Here a feature seems to be accessible and involved in the computation (a gender nominal feature, depicted on the right in 5) that is not included in the lexical items assembled in the mixed production. This seems to be problematic for a lexicalist approach, and on the contrary directly compatible with the hypothesis that features enter or drive derivations independently from the lexical component. If each formal feature corresponds to an atomic element that is combined by syntax, nothing forbids a bilingual from picking the gender feature from the list of morphemes of language A (here Italian) and the vocabulary item from language B (Spanish). This type of mixed DPs can thus be interpreted as strong evidence in favor of a constructionist approach à la Distributed Morphology.³

³ A Distributed Morphology account for (5) does not seem to be entirely straightforward however, because here vocabulary insertion appears to violate the Subset Principle (Harley & Noyer 2009: 8) the vocabulary item *zapatos*, a masculine noun, does not match the feature matrix created by the syntactic derivation, that involves here a feminine feature. We thank an anonymous *Glossa* reviewer for pointing this to us.

There is however another possible interpretation of these data that does not necessarily go against lexicalist tenets. Suppose, indeed, that what bilinguals (can) do is more than just selecting single items from two separate lexicons forming a mixed numeration on which to build a mixed derivation. Suppose bilinguals can also run two parallel derivations stemming from two parallel numerations both of them monolingual, as shown in (6).



From (6), the articulatory filter, forcing the two languages to compete for articulation, will result in a selective inhibition of the elements to be sequentially spelled out: one option (in addition to the two monolingual ones corresponding to *los zapatos* and *le scarpe*) is that corresponding to the *apparently* mismatching DP in (3), where the determiner of the Italian structure and the noun of the Spanish one are spelled out, while the noun of the Italian structure and the determiner of the Spanish one are inhibited (this is represented in (6) by strikethrough). Crucially, given (6), the uttered form *le scarpe los zapatos* does not involve any agreement between the two mismatching items (which should lead to ungrammaticality), nor any agreement with a “disembodied” gender feature: *le* and *zapatos* do not even belong to the same syntactic representation.⁴

The idea of two parallel representations in bilingual production is not as extravagant as it might seem, especially given a lexicalist stand. Multiple studies have shown that bilinguals reading or hearing words in one language systematically activate their translation equivalents in the other language (Morford et al. 2011). We shall return on this important point later (§ 7).

The data on unimodal bilinguals do not seem to be able to cut across these two interpretations of the facts: the articulatory filter, selecting what is eventually produced, hides the underlying processes. This is where bimodal bilinguals become relevant. As we mentioned, bimodal bilinguals are basically free from the articulatory constraint imposing inhibition of one of the two languages since they have two articulatory channels available, one for each modality/language, and are thus not forced to successively alternate the languages. If the hypothesis just introduced in (6) is on the right track, and two parallel representations are indeed possible for bilinguals, we predict that bimodals will be able to produce two simultaneously full-fledged language strings.

More precisely, mixed utterances in bimodal bilinguals are predicted to be very different depending on whether they stem from a mixed numeration, as in the hypothesis discussed

⁴ Notice that parallel derivations/representations similar to (6) are independently needed in monolinguals as well, to account for cases in which two phrases are merged together (cf. Cecchetto & Donati 2015 for a recent discussion). The only peculiarities of a representation as (6) are (i) the fact that the two representations stem from two separate language systems and (ii) the fact that they do not end up merged together. We might speculate that this represents the essence of what it means to be bilingual.

in (2), or from two separate numerations, as in the hypothesis represented in (6). A mixed enumeration should yield an utterance scattered along both strings, hence not radically different from (1). Two parallel separate numerations as in (6), on the other hand, should yield two parallel language strings, whose predicted formal properties depend on the lexicon debate. If initial numerations contain abstract but *pre-assembled lexical items*, hence rigid bundles of formal features, the two parallel strings stemming from them are predicted to be language specific and language coherent. If the initial enumeration driving computation only contains atomic features, assembled in the derivation, the two parallel strings are predicted to be more porous and permeable, with many more combinations possible. We will look at bimodals' productions with this in mind.

3 Code blending

3.1 Blending vs. switching

As anticipated, bimodal bilinguals are competent users of two languages expressed in different modalities: a spoken language, belonging to the acoustic-vocal modality and a sign language, belonging to the visual-gestural modality. The two languages are therefore produced and perceived by two different sensory-motor systems that are independent from one another.

We will here adopt a restrictive definition of bilinguals only including early bilinguals, who have been exposed to both languages from early infancy. We will consequently consider only hearing individuals belonging to deaf families: so-called Codas.⁵

Although much younger than the research work carried out on bilingualism, studies on bimodals are rapidly growing and yielding some interesting results often crucial in shedding light into some long-debated theoretical issues concerning the architecture of language.

The availability and autonomy of two articulatory channels provides bimodals with an unusual option: when producing mixed utterances, they are virtually able to either sequentially alternate the two languages, or to simultaneously produce them, in what has been defined code-blending (see Emmorey et al. 2003; 2005; 2008). Studies carried out in many language pairs, English/American Sign Language bimodals (ASL: Emmorey et al. 2003; 2005; Bishop & Hicks 2005, a.o.), French/Québec Sign Language (LSQ: Petitto et al. 2001), Dutch/Dutch Sign Language (NGT: van den Bogaerde & Baker 2006), Portuguese/Brasilian Sign Language (LIBRAS: Lillo-Martin & Müller de Quadros 2009), clearly show that the strategy bimodals by large opt for is code-blending, namely, they take advantage of the independence of the two linguistic channels to sign and speak simultaneously. Notice that this behavior is a strong confirmation that what is costly for bimodals is inhibition of one of their languages, not activation of both of them: as soon as articulatory constraints allow for a double activation, this is systematically the preferred option (see Emmorey et al. 2005 for a discussion). Since bimodals do not code-switch, while bilinguals do, it is reasonable to assume that code-blending is what code-switching looks like when the usual articulatory constraint imposing just one channel is suspended.

⁵ Deaf individuals do not have direct access to the spoken language, unless they are trained to speak through explicit teaching sessions often lasting many years. This is why the spoken language cannot be considered a first language and deaf individuals will not be considered early bimodals even if their competence in the written oral language might be in some cases very solid. Since our study focuses on the oral production, such competence will not be taken into account in our study. Bimodal children of deaf parents are commonly referred to as KODA (Kids of Deaf Adults) while adults are identified as CODA (Children of Deaf Adults), other deaf members of the family are often their siblings.

3.2 Our study

Our experimental subjects are six Italian/Italian Sign Language (LIS) KODAs aged 6–10. They all belong to deaf families who are very active in the local deaf community and have deaf signing parents. Two of them also have deaf siblings. They come from the central regions of Italy, specifically from the cities of Rome, Rimini, Pesaro and Senigallia.

They are balanced bilinguals exposed to the sign and to the spoken language from early infancy, using Italian at school, with hearing family members and with friends, and LIS at home, with deaf friends, and, for some of them going to bilingual (LIS/Italian) schools, at school.

We first collected naturalistic data meant to provide the research questions and guide the inquiry. We collected a total of 10 recordings of about 2 hours each across subjects during irregular meetings over 3 years. Naturalistic data mainly consist of spontaneous conversations, commenting and retelling a fairy tale previously shown in LIS on a DVD, and story-telling using illustrated cards. Children were left free to use both languages during all tasks and during spontaneous conversations. Besides collecting naturalistic data, we administered two formal tasks: an elicited repetition task in which children were asked to repeat a mixed bimodal utterance, aiming at verifying whether some spontaneous data we had collected were consistent or only episodic; and a comprehension task, to check if the interpretation we had assigned to some of the children's productions collected during spontaneous conversations was correct.

Our decision to direct the analysis towards the production of bimodal children (KODAs) rather than adults (CODAs) was driven by two considerations: on the one hand, children are reported to be more prone than adults to produce mixed utterances in any language pair (Meisel 1989), and on the other hand, they are less exposed and less sensitive to the social stigma prohibiting the use of mixed utterances. This was particularly important given the LIS/Italian contact situation, where LIS is often perceived as “inferior” and bad in most social contexts and there is thus a strong pressure against using and mixing it with Italian. We were not interested in developmental phenomena, though, and this is why we opted for relatively old children. But in order to be sure that the patterns we observed with children were not amenable to some maturational phenomenon due to an imperfect acquisition of one of the two languages, we integrated our main database with other data coming from adult bimodal bilinguals. We gathered grammatical judgments and elicited production data from two trained Italian/LIS CODA informants. Grammaticality categorical judgments enabled us to check whether the patterns observed in naturalistic data were confirmed and resisted negative evidence. Bilingual speakers are known to have indeed clear intuitions about the acceptability or unacceptability of mixed utterances (González-Vilbazo et al. 2012).

3.2.1 The setting

Naturalistic data were collected by two adults: a hearing person and a deaf person competent in both languages. Both would continuously switch from one modality to the other, thus encouraging language mixing. Both deaf and hearing individuals belonging to the children's family or group of friends attended the meetings, and this appeared to provide a bilingual environment favoring language mixing. Given the age of the informants, the meetings took place in a familiar location, either their house or the house of a friend (also bimodal). Children were recorded through digital video cameras.

3.2.2 Coding and transcription

The video-recorded data have been captured through iMovie and transcribed using ELAN (Eudico Linguistic Annotator) a tool developed at the Max Planck Institute for

Psycholinguistics in Nijmegen for the analysis of spoken language, sign language and gesture (Crasborn & Sloetjes 2008).

We adopt the standard notational convention within sign language research of representing signs with capitalized English words. We follow the tradition in using the citation forms for the glosses translating signs for verbs. This, however, does not mean that LIS verbs lack agreement. However, agreement and co-reference shall not be signaled in the glosses when not directly relevant to the discussion.

In glossing code blendings, the spoken Italian utterance is transcribed above the signed string and it is always preceded by the abbreviation *It*, while the utterance in Italian Sign Language is always signaled by the abbreviation *LIS*. We tried to reproduce the timing of the production of the two linguistic strings by writing co-occurring signs and words in column.

When relevant, the LIS glosses also signal the relevant Non-Manual Marking (NMM), which are simultaneously produced with the manual component and are represented by a line over the sign language glosses. NMMs are obligatory markers of many syntactic structures in sign languages. They are often the only means signaling the force of the sentence, as in polar questions (7b) which differ from declarative sentences (7a) in LIS only for the presence of raised eyebrows and of a forward body lean spreading over the entire sentence, glossed as ‘y/n’.

- (7) *LIS*
- a. ANNA COMPUTER BUY
‘Anna buys a/the computer.’
 - y/n
 - b. ANNA COMPUTER BUY
‘Does Anna buy a/the computer?’

Finally, we adopt the gloss ‘IX-LOC’ to signal spatial indexical pronominal signs.

3.3 Brief observations on the languages

The blending production of Italian-Italian Sign Language (LIS) bimodals is particularly interesting as the two languages involved belong to typological extremes as far as word order and morphology are concerned. Italian is a coherent head-initial language, while LIS is a coherent head-final language: the verb precedes the object in Italian (8a), while it follows it in LIS (8b); negation is pre-verbal in Italian (9a) and post-verbal in LIS (9b); wh-elements are sentence-initial in Italian (10a) and sentence-final in LIS (10b). As shown in the LIS glosses, negative and wh-questions in LIS are obligatorily marked by specific non-manual markings respectively glossed ‘NEG’ and ‘WH’ occurring over negation and wh-phrases respectively.⁶

- (8) *Italian*
- a. Anna compera la macchina
Anna buy.3SG the car
 - b. *LIS*
ANNA CAR BUY
‘Anna buys the car.’

⁶ See Geraci (2006) and Cecchetto, Geraci & Zucchi (2009) for a detailed description of the distribution of negative and wh-interrogative non-manual marking in LIS.

(9) *Italian*

- a. Anna non compera la macchina
 Anna NEG buy.3SG the car

- b. *LIS*

NEG
 ANNA CAR BUY NOT
 'Anna doesn't buy the car.'

(10) *Italian*

- a. Cosa compera Anna?
 what buy.3SG Anna

- b. *LIS*

WH
 ANNA BUY WHAT
 'What does Anna buy?'

Both languages allow for a certain amount of word order variation as far as lexical categories are concerned, and both languages are pro-drop.

As for morphology, Italian is a typical inflectional language, while LIS displays a non-linear agglutinative morphology.

4 Types of blending according to word order

Given the typological properties of LIS and Italian just described above, it was only natural to start our investigation into the mixing possibilities in our corpus by looking at word order, since it is indeed a good indicator of the grammar at play. We found that two very different phenomena could be observed from this point of view. The blending data in the corpus can be classified in two clearly distinct types according to word order:

- type 1: one word order, the one prescribed by either LIS or Italian, imposed to both strings;
- type 2: two word orders, the ones prescribed by the two languages, each governing the corresponding string.

Both types are widely attested in our corpus, with some individual variation. In the following sections, the two types are discussed in more detail.

4.1 Type 1: One order

This type of blending involves the production of two simultaneous language strings both following the word order prescribed by either LIS or Italian.

In (11), both strings follow the word order prescribed by Italian Sign Language: the verb (*live*) follows the locative (*Rome*), as prescribed in LIS, but contrary to what Italian prescribes, namely that the verb precede the locative.

(11) *Italian/LIS*

- It: Zio zia vero Roma abita
 uncle aunt actually Rome live.3SG
 LIS: UNCLE AUNT REAL ROME LIVE
 'My uncle and aunt actually live in Rome.'

As an alternative, both language strings may follow the word order prescribed by Italian, as in (12), where the verb ('go') precedes the locative ('zoo') in both strings, as prescribed by Italian, but not by LIS.

(12) *Italian/LIS*

It:	Una bambina	va	allo	zoo
	a child	go.3SG	to.the	zoo
LIS:	GIRL	GO		ZOO

'A girl goes to the zoo.'

What is important to underline here is that both in (11) and in (12) one of the two simultaneous language strings would be ungrammatical if uttered in isolation, in a monolingual setting. This was also confirmed explicitly by our adult informants.

Although we are not interested in a quantitative analysis of the data, we can observe that this type of blending is very frequent in our corpus, roughly twice as much as Type 2.

4.2 Type 2: Two orders

This type of blending involves the simultaneous production of two language strings displaying two different word orders, the ones prescribed by the two languages, each governing the corresponding string.

In (13), negation is pre-verbal in the Italian string, and post-verbal in the LIS string. The LIS string is also marked by the required negative non-manual markings produced over the sign for negation and consisting of a left-to-right headshake and frowned forehead.

(13) *Italian/LIS*

It:	Non ho	capito
	not have.1SG	understand.PTCP
		<u>NEG</u>
LIS:	UNDERSTAND	NOT

'I don't understand.'

In (14), the wh-element is sentence-initial in the Italian string, while it is sentence-final in the LIS string. The LIS string is marked by the required wh- non-manual marking consisting of frowned forehead and lowered eyebrows. This difference in word order restrictions in the two languages implies a mismatching alignment of words and signs in the two strings.

(14) *Italian/LIS*

It:	Cosa ha	mangiato	la	rana?
	what have.3SG	eat-PTCP	the	frog
				<u>WH</u>
LIS:	FROG EAT			WHAT

'What did the frog eat?'

(15) *Italian/LIS*

It:	Io, sempre	puntuale
	I always	on.time
LIS:	ALWAYS ON-TIME	IX-1

'As for me, I am always on time.'

In (15), the subject is in sentence-initial position in the Italian string, while it occupies the sentence-final position in LIS. We might speculate that the absence of the copular verb in the Italian string is due to the topicalization of the subject, leading to an ellipsis of the copula. In the LIS string the sentence-final position of the subject might be due to either its extraposition, or to movement of the VP to the left of the sentence.

What is interesting in these data is that here, in sharp contrast with Type 1 above, both simultaneous language strings are acceptable and would be even if uttered in isolation in a monolingual setting. This was directly confirmed by our adult informants.

As observed above, this type of blending is less frequently attested in our corpus. Type 2 blendings, except for very few cases like (15) above, typically involve a functional element in the form of negation or wh-phrases: elements that have a very rigid (and divergent) position in the two languages. Moreover, type 2 utterances are overall shorter in length than those belonging to Type 1. In order to verify that this type of blending was not just “an accident” in our corpus, we checked their robustness with adult bimodals, who judged them fully grammatical. We then video-recorded 32 Type 2 blended utterances produced by two adult bimodals as stimuli for an elicited repetition task we administered to three bimodal children. The Type 2 blendings used in the elicited repetition task always involved either a wh-phrase (16a) or negation (16b).

(16) *Italian/LIS*

- a. It: Perchè gli insetti hanno paura?
why the insects have.3PL fear
WH
LIS: INSECT SCARE WHY
'Why are the insects scared?'
- b. It: Nessuno cammina nel bosco
nobody walk.3SG in.the woods
LIS: WOODS WALK NOBODY
'Nobody walks in the woods'.

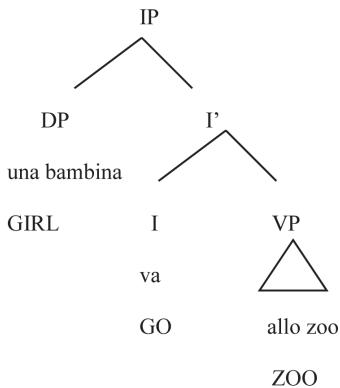
During the elicited repetition task, children produced Type 2 blending utterances effortlessly and flawlessly, thus confirming their consistence and robustness in the corpus.

4.3 Word order types and the proper grammar model

In a previous paper (Donati & Branchini 2013) we interpreted the existence of these two types of mixed utterances in bimodal bilinguals as strong evidence in favor of a constructionist approach if coupled with the assumption that word order is a late phenomenon akin to a linearization algorithm (Kayne 1994). In both types, we claimed, what is derived is a mixed representation, made up of features taken from the two language systems: a possibility that is readily available in a constructionist model, where features are freely assembled by syntax only. In both types, spell-out happens twice due to the availability of the two articulatory channels and the consequent lack of inhibition. Then, the two types diverge as a result of two possible linearization strategies when spell-out takes place. A first possibility is that only one linearization algorithm is applied, and the result is Type 1: the simultaneous production of matching pairs of words and signs.

A possible representation of Type 1 is proposed here as (17), corresponding to (12).

(17)

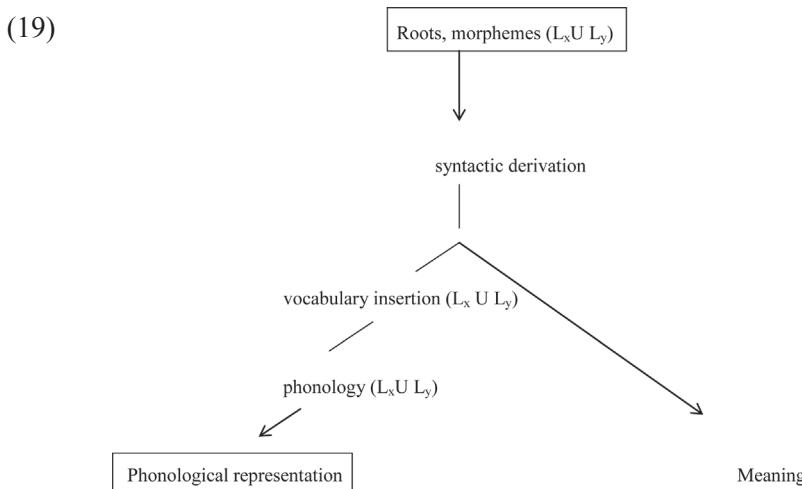


'A girl goes to the zoo'

A second possibility is that two divergent linearization algorithms are applied to the abstract representation at spell-out: one encoding *head* precedence for Italian vocabulary items; one, for LIS vocabulary insertion, encoding *complement* precedence. The result is Type 2: the simultaneous production of mismatching pairs of words and signs. A tentative representation of the analysis of Donati & Branchini (2013) is proposed in (18), where c-commanding relations are simply represented as vertical dominance and the two divergent linearization algorithms for the two parallel vocabulary insertions are represented respectively as ‘>’ (c-command = precedence, yielding Italian word order) and ‘<’ (c-command = succession, yielding LIS word order).

(18)	WH C WH I V WH	WH > C > I > V Chi ha telefonato 'Who called?'	WH < C < I < V CALL DONE WHO
------	---	--	---------------------------------

This description of the facts crucially relies on the assumption that both types of blending correspond to a single derivation, assembling a single, though possibly mixed, set of roots and morphemes. In recent works by Lillo-Martin et al. (2012) and Koulidobrova (2014) this kind of approach has been explicitly couched on constructionist terms, in what has been called the Bilingual language synthesis model, schematized in (19).



Notice, crucially, that vocabulary insertion in this model is only conceived as a late phenomenon, possibly doubled in bimodal bilinguals thanks to the availability of two separate articulatory channels. We have already mentioned (§ 2) however that comprehension studies show that lexical access can be double and parallel even in unimodal bilinguals (Morford et al. 2011). We will go back to this important point in § 7.

In this section we have summarized the first observations that we made on our corpus, concluding that two very distinct types of blending are attested, both of which easily derivable under a constructionist approach to the bilingual competence.

5 Types of blending involve more than just word order

The conclusion reached in the previous section needs however to be revised at the light of a closer observation of the data. The blending productions of the corpus differ indeed greatly from the point of view of their morpho-syntactic make-up: while in some cases the language strings appear both to be well-formed and target-like, in other cases clear deficiencies in agreement and functional words appear. Interestingly, this variation is not randomly distributed, but strongly correlates with the word order-based typology described in the previous section. More precisely

- Type 1 – one word order: only the string corresponding to the language dictating the word order is full-fledged. The other one is morphologically impoverished;
- Type 2 – two word orders: the two strings are full-fledged and well-formed and no morphological impoverishment emerges.

Starting from Type 1, look for example at (20) and (21).

(20) *Italian/LIS*

It:	Vero	io	tocca	niente
	actually	1SG	touch.3SG	nothing
LIS:	REAL	IX-LOC	TOUCH	NOTHING
'I actually haven't touched anything.'				

(21) *Italian/LIS*

It:	Zio	zia	vero	Roma	abita
	uncle	aunt	actually	Rome	live.3SG
LIS:	UNCLE	AUNT	REALLY	ROME	LIVE
'My uncles actually live in Rome.'					

(20) and (21) are Type 1 blending utterances governed by LIS word order,⁷ showing the morphological impoverishment of the Italian string. More specifically, in both examples, the Italian string displays subject-verb agreement violation and a third person singular default inflection on the verb; in (20), moreover, the Italian string displays no negative concord, as required by the LIS syntax but in violation of Italian grammar, while in (21) the Italian string exhibits a preverbal locative which is ungrammatical in Italian but standard in LIS.

On the other hand, (22) shows the morphological impoverishment of the LIS string in a Type 1 blending utterance governed by Italian word order. While the Italian string is morphologically full-fledged, the LIS string shows no spatial agreement between the verb ('hide') and the pronominal spatial sign (*IX-LOC*) required by LIS morpho-syntactic as well as some lexical impoverishment, since the modal is missing and the locative is paired with an indexical sign with no lexical content.

(22) *Italian/LIS*

It:	Dice	che	deve	nascondere	nel	bosco
	say.3SG	that	must.3SG	hide.INF	in.the	woods
	deve	scappare				
	must.3SG	run.away.INF				
LIS:	SAY		HIDE			IX-LOC
	RUN-AWAY					

'He says she must hide in the woods and run away.'

⁷ In (20) the post-verbal position of the negative quantifier corresponds to the required position for all negative words in LIS (see Geraci 2006).

This kind of morphological impoverishment never shows up in either language string in Type 2, where two independent word orders are displayed by the two simultaneous strings.

The correlation between word order type and formal aspects of the strings also extends to prosody. If only one word order is selected, not only the morphology, but also the phonology of the language string whose word order has been selected is full-fledged. If, on the other hand, a given string does not follow the word order prescribed by its own language, then not only its morphology but also its phonology is impoverished. To illustrate, in sentences like (21), where LIS word order is imposed to both strings, the LIS string is phonologically fluent and follows a normal rhythm, while the Italian string displays a *disrupted prosody and what has been called the deaf voice*. The deaf voice is a distinctive feature of bimodals' vocalizations that has been described in the literature (Bishop & Hicks 2008), which makes them similar to the vocalizations of deaf people when they produce the spoken language. More precisely, the deaf voice includes a pervasive nasalization, a distortion of the prosody towards the extremes of highs and lows, and strong assimilation processes leading to a loss of syllables.⁸

Recall that bimodals are hearing native speakers of a spoken language, and are thus perfectly able to speak normally. Their use of the deaf voice has been described as restricted to mixed utterances (Bishop & Hicks 2005). In our corpus, we observe that among mixed utterances, the activation of this feature does not distribute randomly. The deaf voice is only found in Type 1 blending utterances where both language strings follow LIS word order, suggesting it is one more feature of the general impoverishment of the Italian string in LIS-governed Type 1 blending utterances. In Type 2 blending utterances, where the two strings appear as autonomous both in word order and morphology, the deaf voice never appears.

Table 1 summarizes the correlations just described.

This strong correlation between word order and other formal properties of the language strings posits a challenge for the hypothesis advanced by Donati & Branchini (2013) or by the Bilingual Language Synthesis model, both crucially assuming that only one grammatical derivation is involved in language mixing. But before getting to discuss this point, let us briefly turn to the grammaticality judgments we obtained from the adult participants, in order to double check whether this correlation is as robust as it seems.

6 Grammaticality judgments

Adult bimodals have been interviewed to check whether the types of blending we observed in children were consistent and reflected their own judgments and production. Elicited and judgment data from adults confirm the correlation found in bimodal children.

Consider the Italian string in (23a).

Type 1	Type 2
One word order	Two word orders
One full-fledged morphological string	Two full-fledged morphological strings
One intact prosody	Two intact prosodies

Table 1: Correlations observed between word order types, morphology and prosody of the language strings in blending utterances within the corpus.

⁸ One reviewer points out that the presence of the deaf voice in Type 1 LIS-dominant blendings is similar to the whispering in ASL-dominant code-blending reported in Petroj et al. (2014). However, while whispering in ASL-dominant code-blending is described just as voice lowering of otherwise phonetically standard spoken English, the deaf voice in our corpus involves strong assimilation processes and distortions. On the other hand, Petroj et al. (2014) do claim that in ASL-dominant sentences the whispered English string is somehow grammatically degraded: while they do not provide clear examples for a degraded morphosyntax, this observation might suggest that there is something similar going on.

(23) *Italian*

- a. *Telefonato chi?
phone.PTCP who
- b. Chi ha telefonato?
who have.3SG phone.PTCP
'Who has phoned?'

As shown in the translation, the Italian monolingual string in (23a) is ungrammatical, its grammatical counterpart being (23b) with the wh-element (*chi*) in sentence-initial position and the auxiliary *ha* 'has'.

However, the adult bilinguals we interviewed rate the same morphologically impoverished string in (23a) as acceptable when inserted in a Type 1 blending utterance following the LIS word order, like in (24).

(24) *Italian/LIS*

- It: Telefonato chi?
phone-PTCP who
-
- LIS: PHONE WHO
'Who has phoned?'

The same impoverished Italian string cannot, however, be inserted in a Type 1 blending utterance following the Italian word order, as shown in (25), which is rejected as ungrammatical.

(25) *Italian/LIS*

- *It: Chi telefonato?
who phone-PTCP
-
- LIS: WHO PHONE
'Who has phoned?'

In (25) the Italian string follows the word order prescribed by Italian (the wh-element sits in sentence-initial position), but it lacks the auxiliary (*ha*, 'has'): this makes the mixed production ungrammatical. Generalizing, it is ungrammatical to have an impoverished string following its own word order, both in a Type 1 Italian-oriented utterance, as in (25), and in a Type 2 blending utterance, as in (26).

(26) *Italian/LIS*

- *It: Chi telefonato
who phone.PTCP
-
- LIS: PHONE WHO
'Who has phoned?'

Similarly to morphology, the disrupted prosody (CODA voice or deaf voice) of the Italian string is accepted in a Type 1 LIS governed utterance, but ungrammatical in a Type 1 Italian governed or in a Type 2 utterance.

Adults also confirm that it is ungrammatical to have two full-fledged strings following only one word order (Type 1). In (27), both strings follow LIS word order and the Italian string displays a full morphology. The result is ungrammatical.

(27) Italian/LIS

*It:	Ha	telefonato	chi
	have.3SG.PRS	phone.PTCP	who
_____ WH			
LIS: PHONE WHO			
‘Who has phoned?’			

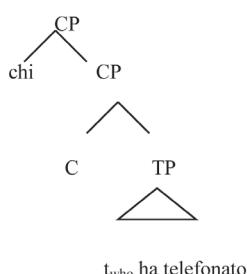
Finally, it is ungrammatical to have two impoverished strings, no matter whether they display one or two word orders.

These findings suggest that the impoverishment phenomena we observe in our corpus are not due to some imperfect acquisition in children. They are not developmental phenomena, since they emerge as well in the stable competence of adult bilinguals. Also, their systematic distribution and their correlation with word order confirms that these phenomena have nothing to do with telegraphic speech or any other *emergency strategy*.

7 Back to lexicalism and to the proper language model

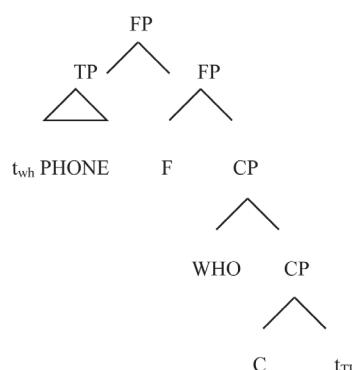
The data discussed so far are clearly relevant for the discussion we introduced in the first part of the paper, and confirm our expectation that the suspension of the articulatory filter proper of bimodal bilingualism makes the mechanisms underlying language mixing directly visible. As for type 2, we can summarize the strong correlation between word order and other morpho-syntactic and prosodic features that we described in § 5 by saying that each string of words is governed by its own consistent grammar. This consistency resists a late linearization approach as the ones discussed in § 4, where the two strings are the result of a late phenomenon of linearization. Rather, they are compatible with that *parallel derivation model* we tentatively postulated as a possible explanation for the mixed agreement facts discussed in § 2. If type 2 blendings stem from two separate full-fledged lexical numerations, each in turn governing a syntactic derivation through the mechanism of feature checking, the strong correlation between word order autonomy and other morphosyntactic features observed follows: we can postulate that the two simultaneous full-fledged language strings involved in Type 2 correspond to two parallel lexical selections (two numerations), driving two grammatical representations, as in (28).⁹

(28) Italian



t_{who} ha telefonato

LIS



⁹ We propose here an antisymmetric (Kayne 1994) analysis of wh-questions in LIS, where the TP moves to the Spec of a functional projection leaving the Wh-element to its right. We are not particularly committed to this analysis. The reason we opted for this representation of the LIS clause is to show that the two language strings correspond to two globally different derivations, involving different formal features and hence different operations and configurations; and not just to two separate linearizations. As for the actual representation of the LIS clause structure, we refer to Cecchetto, Geraci & Zucchi (2009) for convincing arguments that Spec, CP is generated to the right in this and other sign languages.

Notice that the possibility illustrated in (28) of having two parallel but separate representations, that seems to be necessary in order to derive the coherent covariation observed in Type 2 blendings, crucially requires a notion of abstract word belonging to a single language and driving a syntactic derivation checking the formal features associated to it. A simple late access to vocabulary, as in anti-lexicalist approaches, would not give the right result: it might derive a double spell-out (as we shall see later), but not this systematic covariation of prosodic, morphological and syntactic features, that is what words typically are meant to be.

On the other hand, it is easy for a constructionist approach to derive a mixed numeration, where features belonging to one list are combined with features belonging to another list, which are thus merged, as in the schema in (19). However, this kind of approach would predict more possibilities than just the two clearly separate types that we are discussing: going back to the Language Synthesis Model illustrated in (19), any combination of roots and morphemes belonging to the two languages should be possible, and not only those corresponding to coherent monolingual grammars. Productions like (25), repeated here as (29), should for example be possible, as the result of a parallel selection of grammatical morphemes and roots from the various lists available to the speaker.

- (29) *Italian/LIS*

*It: Chi telefonato?
 who phone.PTCP
 WH
 LIS: WHO PHONE
 'Who has phoned?'

However, this is utterly ungrammatical. Its ungrammaticality is explained if what drives the syntactic derivation are complex lexical items already and rigidly endowed with all their formal properties.

An indirect confirmation of the hypothesis that Type 2 involves two separate representations/derivations comes from some admittedly anecdotal observations that we happened to make in our study. In some cases, children produced a slight mismatch in content between the two language strings, as in (30).

- (30) *Italian/LIS*

It:	Le	meduse	non	c'erano	non	c'erano
	the.PL	jellyfish.PL	NEG	there.be.PST.3PL	NEG	there.be.PST.3PL
LIS:	JELLYFISH SEE NOT			THERE-IS-NOT		
It:	'The jellyfishes were not there. They were not there.'					
LIS:	'I didn't see the jellyfishes. They were not there.'					

In (30), which is composed of two utterances, the first one involves a mismatch in content between the two language strings: while the child utters ‘there were no jellyfishes’ in Italian, he simultaneously signs ‘I saw no jellyfishes’ in LIS. The second clause uttered in both languages (‘there were not’) corrects the mismatch by realigning the content of the two strings. Notice that (30) is a Type 2 blending, as shown by the different word order displayed by the two strings: negation precedes the verb in Italian, but it follows it in LIS. The two strings also appear to be both full-fledged, as can be noticed by the plural verbal

inflection in Italian or by the incorporation of the sign for negation in the existential displayed in the LIS string.

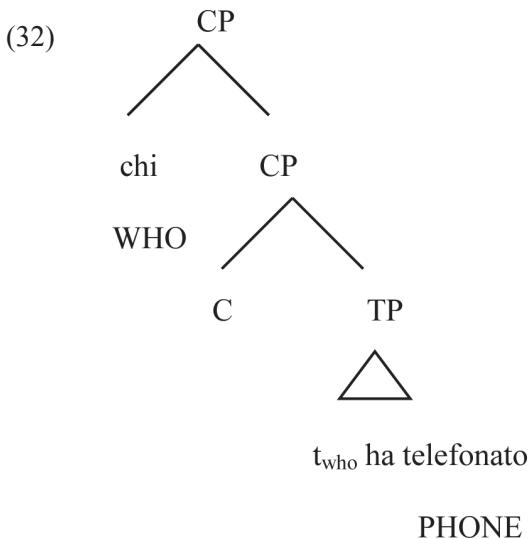
Another interesting example going in the same direction is that of a slip of the tongue that one of the children performed while retelling a story.

(31)	It:	Poi mette la maglietta sopra un'altra	maglietta then put.3SG the shirt over another	maglietta shirt
	LIS:	PUT-CL	UNDER-CL	SHIRT
'Then she puts the shirt over/under another one.'				

Although more data would be needed in order to be able to be conclusive on this, these facts are coherent with the hypothesis we are defending here, namely that in Type 2 mixed utterances, two independent and parallel full-fledged derivations are generated, driven by two lexical numerations. The mismatch we observe here seems to suggest that the mechanisms ensuring a certain parallelism in most cases between the two strings is not linguistic in nature, but rather due to some general cognitive constraint by which it is difficult to perform or think two similar but different tasks together.

On the other hand, and this is again important for the lexicon debate, the parallel lexical items that we need to postulate in order to drive the two parallel derivations in this type of blending can be seen as the direct correlate of the double lexical access that has been observed in many studies on bilinguals' reading and comprehension. Multiple studies have shown that bilinguals reading or hearing words in one language systematically activate their translation equivalents in the other language (Morford et al. 2011). This parallel activation used to be traditionally attributed to something closely related to the phonological input/output: successful understanding of spoken languages involves the activation and retrieval of lexical items that correspond to incoming information. In bilinguals, auditory input might non-selectively activate lexical items across the two languages, and thus explain co-activation. If this were all there is, we could consider double lexical activation as a late phenomenon, close as such to the concrete input/output. However, and crucially, it has been shown that the same effects of cross-language activation are also systematic observed in bimodal bilinguals, where, of course, no appeal to concrete phonological overlap is possible (Ormel et al. 2012; Shook & Marian 2012, among others). This suggests that parallel activation of lexical items is a phenomenon that is more abstract than previously thought. In the framework of the present discussion, we can interpret this as showing that parallel lexical activation can be an early phenomenon. Recall once again that dual lexical access is only possible as a *late* phenomenon given Distributed Morphology and other constructionist approaches (as illustrated by the Language Synthesis Model represented in (19)): lexical items simply do not exist as inputs to a derivation. This is very different from lexicalism, where lexical access can be either *early*, as the starting point of a syntactic derivation (or two), and as a *late* insertion, as a result of spell out.

Let's turn now to Type 1. In Type 1 there is clearly one language governing the grammar of the mixed utterance. This suggests that here only one lexical selection (one enumeration), and only one grammatical representation is generated. Exploiting the availability of the two channels, each terminal node is spelled out twice (as represented in (32)).



If we are on the right track, this analysis shows a clear dissociation between syntactic derivation (which is monolingual here) and spell-out, which takes place twice. This is possible in both models, where spell-out is a post-syntactic operation. Given a constructionist view, where words are accessed as the result of a syntactic derivation, this double spell-out can be seen as the result of a merged lexical list, as in the Language Synthesis Model (19). Given a lexicalist stand, where there is an initial set of abstract words, i.e. bundles of features, that drives the derivation, the strict monolingual grammar at play here stems from the numeration itself, coupled with a late double spell-out.

Here as well, however, antilexicalist models would predict more possibilities than the ones actually observed: in particular, a production like (27) repeated here as (33) should be available, as the result of a possible combination of roots and morphemes.

(33) *Italian/LIS*

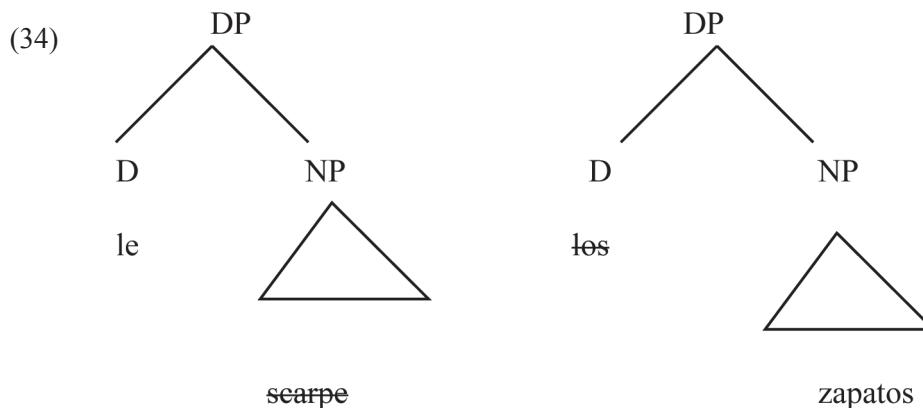
*It:	Ha	telefonato	chi
	have.3SG	phone.PTCP	who
LIS:	<u>WH</u>		
	PHONE WHO		

‘Who has phoned?’

Again, this is deemed ungrammatical by the adult informants we consulted. On the other hand, the ungrammaticality of (33) follows from the lexicalist assumption of a list of lexical items driving the computation: if this list is one and belongs to one language, the result can only be a monolingual utterance, possibly coupled with a double spell-out.

An indirect confirmation of our hypothesis that Type 1 stems from a unique numeration, comes from the data on content mismatching discussed above: as far as we can tell from the few cases we observed in our dataset, a mismatch in content is never possible in this type.

Remember, once again, that bimodals do not code switch, as a tendency. Code blending can thus be considered as language mixing minus the inhibition due to the articulatory filter: if bimodals can do things as different as Type 1 and Type 2, there is no reason to doubt that the same is true for unimodal bilinguals. Going back to the data we started from in § 2, we have reasons to conclude that Type 2 corresponds to the structural hypothesis we put forward for the cases of *mixed-agreement* above, repeated below.



Here, as well as in Type 2 blending utterances, two parallel representations are generated each corresponding to a separate monolingual numeration. This is directly predicted given

- (i) that bilinguals activate in parallel their lexical representations and
- (ii) derivations stem from pre-assembled lexical items (lexicalism).

The only difference is that while bimodals can fully spell out them both simultaneously, unimodal bilinguals have to make a selection due to the articulatory filter and consequent inhibition, and can thus only partially spell out fragments of them.

As for Type 1, it corresponds to those cases of mixing that clearly involve a fragment insertion into a monolingual frame (Muysken 2000), as in (35).

- (35) *Spanish-English* (Pfaff 1979: 296)
- | | | | | |
|--|-----------------------------------|-----|-----|--------|
| Yo | anduve <i>in a state of shock</i> | por | dos | dias |
| 1SG | walk.PST | for | two | day.PL |
| 'I walked in a state of shock for two days.' | | | | |

In this case, lexical access is a late phenomenon, only concerning lexical retrieval, and not affecting the grammatical representation.

What we have not shown in our bimodal corpus so far is the last mixing possibility we discussed in § 2, the one apparently underlying the mixed DP *gli zapatos*: that of a *mixed* numeration generating a single representation. Is this possibility instantiated in bimodal bilinguals? This is what we will discuss in the next and final section.

8 Is there a Type 3?

Some blending productions present in our corpus might constitute a good candidate for Type 3, a mixed production involving only one syntactic derivation, like in Type 1, but starting from a mixed numeration. Consider the following example.

- (36) *Italian/LIS*
- | | | | |
|-------------------------------------|----------|--------|------------|
| It: | parla | con | Biancaneve |
| | talk-3SG | with | Snow White |
| LIS: | TALK | HUNTER | |
| 'The hunter talks with Snow White.' | | | |

In (36), the two simultaneous strings are not autonomous in any sense, but rather contribute together to form a unique utterance. More precisely, while the inflected verb is present in both strings, Italian only provides the indirect object, and LIS only provides

the (postverbal) subject.¹⁰ Notice that neither the morphology nor the phonology of both language strings seems to be impoverished, so (36) doesn't correspond to a Type 1, i.e. a monolingual utterance with two spellouts. On the other hand, there is only one utterance, hence stemming from one numeration, and this is very different from Type 2.

Another, perhaps even clearer, example is given below.

(37) *Italian/LIS*

It: io
1SG

LIS: WIN
'I win.'

In (37) Italian contributes the subject and LIS contributes the predicate. The utterance is complete and meaningful only if the two fragments are integrated.

In (38) below, the Italian string provides the indirect object, while the LIS string provides the verb.

(38) *Italian/LIS*

It: dalla regina cattiva
to.the queen wicked
LIS: GO WICKED
'(He) goes to the wicked queen.'

This is *ceteris paribus* very similar to the case of 'gli zapatos', and might be explained in Lexicalist terms as the output of a unique but mixed numeration triggering a unique mixed derivation. Under a Distributed Morphology approach, where no initial numeration of lexical items constrains the derivation and any combination of Formal Features can go, this kind of production can also be derived as the result of merging roots and morphemes belonging to the two languages (as in the Language Synthesis Model, see (19)).

In our corpus this blending type is mainly produced as an answer to wh-questions on a signed fairy tale previously shown to the children. They are typically simple sentences composed of the predicate and its arguments including both lexical and functional elements. We also observe few cases that appear to be longer and richer and were uttered in response to open questions An example is given in (39).

(39) It: Ha sbattuto nel muro della cucina
have.3SG knock-PTCP in.the wall of.the kitchen
LIS: WALL WOLF KITCHEN
'The wolf has knocked against the kitchen wall.'

As for their frequency in our corpus, Type 3 blending utterances are less frequent than Type 2. Their low frequency might cast some doubt on their grammaticality. To verify it, we did two things. On the one hand, we asked two adult bimodals to judge their grammaticality by isolating the children's production from the discourse context in which they were uttered, and asking them whether they accepted them and what their meaning was. The bimodal adults judged these sentences grammatical and

¹⁰ A reviewer observes that we should consider the possibility that LIS and Italian have different information structure requirements in the expression of the overt subject: while Italian is a pro-drop language, LIS could make use of common nouns for reference maintenance. While this is indeed a possibility, it should be noticed that, despite the pro-drop nature of Italian, the Italian string in (36) cannot be considered felicitous on its own given the context of utterance, as there was no clear antecedent in the discourse licensing the null subject.

their interpretation of the utterances corresponded to our glosses. On the other hand, in order to be sure that this type of blending was part of the children's grammar and that the constituents scattered in the two language strings were integrated within the same sentence, we administered a comprehension task to three children. We showed them 18 Type 3 utterances produced by two adult CODAs previously video-recorded and randomly interspersed with monolingual Italian and LIS sentences, Type 1 and Type 2 blending utterances. We then asked the children some questions to verify their comprehension, specifically concerning the integration in the sentence of the constituents only produced in one modality. Some examples of the Type 3 utterances showed during the comprehension task and the question accompanying them are reported below.

(40) *Italian/LIS*

- a. It: Il lupo ha mangiato nel bosco
the wolf have-3SG eat-PTCP in.the woods
LIS: SHEEP
'The wolf has eaten the sheep in the woods.'
- b. What did the wolf eat in the woods?
Expected answer: 'The sheep.'

(41) *Italian/LIS*

- a. It: Scappa quando vede il cacciatore
run.away.3SG when see-3SG the hunter
LIS: HORSE
'The horse runs away when it sees the hunter.'
- b. Who runs away?
Expected answer: The horse.

(42) *Italian/LIS*

- a. It: La regina Biancaneve
the queen Snow White
LIS: SEE
'The queen sees Snow White.'
- b. What does the queen do?
Expected answer: She sees Snow White.

The children answered the questions correctly and without hesitation.

The adults' acceptability judgments and the correct answers provided by children confirm that this mixing typology is part of the grammatical competence of bimodal bilinguals and not just a performance deviation.

9 Some remarks on the alternation of the blending types

As pointed out above, the three mixing types alternate in our corpus with Type 1 blendings being more frequent than both Type 2 and Type 3. How could we explain such difference? One way to pursue is representational: their different frequency would be connected to our assumption of a cognitively more demanding representation involved in Type 2 and Type 3 utterances with regards to Type 1. In our analysis, while Type 1 involves the full activation of one language and one derivation, both Type 2 and Type 3 involve the full activation of two languages and, at least in Type 2, two parallel derivations.

Another possibly not alternative explanation for the different frequency of the blending types is context-dependent: according to our bimodal adults, the three attested mixing types are not randomly selected, but are directly connected to the interlocutors present during the exchange. Type 1 LIS-dominant utterances are used when both hearing people and competent LIS deaf signers are present; Type 1 Italian-dominant utterances are employed at the presence of both hearing people and deaf people who are not competent in LIS, but use so-called Signed Italian, employing signs that follow the word order of spoken Italian. Within Type 1, the two subtypes are also employed among bimodal bilinguals. On the other hand, Type 2 utterances are produced either when both monolingual LIS signers and monolingual spoken Italian speakers are present or among bimodal bilinguals. Finally, Type 3 utterances are only produced among bimodal bilinguals.

This is confirmed in our data: for example, within Type 1 blendings, children employ LIS-dominant utterances when their direct interlocutor is the deaf bimodal adult, and Italian-dominant utterances when addressing the hearing bimodal adult; Type 2 are mainly used among bimodals; while Type 3 utterances are produced only among bimodal bilinguals.

The prevalent frequency of Type 1 utterances in the corpus might thus be due to their being accessible to a wider range of audience and perhaps to the easier computation involved in their production.

Trying to generalize, we might say that, when possible, bilinguals try to avoid two non-congruent syntactic derivations (Type 2) being more demanding, thus resorting to Type 1 involving the alignment of the two language strings. However, this option does not seem to be readily available in the presence of functional elements holding a fixed position in the sentence and thus imposing a rigid word order to each language string. Perhaps discourse context and the sentence internal composition influence each other: since children resort to Type 2 mainly when expressing functional elements and in the presence of both Italian monolingual and LIS monolingual speakers/signers or among bimodals, their frequency in the corpus is lower, as negative and wh interrogative sentences are less frequent than declarative ones and contexts with monolingual users or only bimodal bilinguals were less frequent during data elicitation.

As opposed to Type 2 mixed utterances, Type 3 utterances include syntactic material belonging to both lexical and functional categories and some of Type 3 occurrences are longer. Recall that in our tentative analysis, a possible derivation for Type 3 utterances involves a single mixed numeration, hence a single derivation. If this was the case, it might be easier to add more syntactic material to a single derivation in which both lexical and functional elements can be accommodated.

As far as frequency of Type 3 is concerned, the low frequency of this typology of blendings in the corpus might be connected to their accessibility to bimodal bilinguals only, as monolinguals of spoken Italian would completely miss the simultaneous signed constituents and monolingual LIS signers would have access to the spoken constituents only through lip-reading.

We should also notice that, in our corpus of spontaneous data, children employ Type 3 blendings for the sake of brevity, for example when asked a question to verify the comprehension of a signed fairy tale or during a card competition, namely in contexts where more than one child competes for the answer. So, it might very well be the case that the low frequency of Type 3 utterances in the corpus of spontaneous data is a by-product of the kind of context eliciting them.

10 What about lexical integrity?

Another hot issue in the debate on lexicalism versus constructionism concerns lexical integrity. As we mentioned in the introduction, language mixing is potentially very relevant here: in a nutshell, if no sublexical mixing ever appears in bilinguals, this is a strong

argument in favor of lexical integrity, hence indirectly for lexicalism. But the data are controversial as far as sequential mixing is involved, because it is difficult to distinguish sublexical mixing from (nonce) borrowing. This is another area where bimodal mixing might be crucial to look at. For obvious reasons, no direct lexical borrowing is possible across modalities. This means that if we find sublexical phenomena that pertain to mixing, this could provide clear evidence against a lexicalist view. We could not come up with any clear case of this kind in our small corpus, but one phenomenon potentially relevant in this respect still deserves some discussion here: reduplication.

We find two examples where reduplication appears to be shared across the language strings: in (43) an instance of verbal reduplication in the LIS string conveying habitual aspect is coupled by the simultaneous production of the corresponding verb in the Italian string.¹¹

(43)	It:	La	rana	mangiava	mangiava	mangiava	insetti
		the	frog	eat.IMP.3SG	eat.IMP.3SG	eat.IMP.3SG	insect.PL
		tutti					
		all.PL					
	LIS:	FROG		EAT	EAT	EAT	INSECT
		ALL					
		'The frog was eating all the insects.'					

In (44) we observe an instance of nominal reduplication in the LIS string conveying plurality coupled by the simultaneous production of the corresponding uninflected Italian noun in the Italian string.

(44)	It:	Vince	partita	partita	partita
		win.3SG	match.SG	match.SG	match.SG
	LIS:	WIN TEAM	MATCH	MATCH	MATCH
		'(My) team won many matches.'			

In both cases, a typical feature of LIS, namely reduplication, is also applied to Italian. Depending on the status of reduplication as a grammatical phenomenon, this can be interpreted as a violation of lexical integrity. However, reduplication is notoriously at the boundary between syntax and morphology. If it is to be characterized, in (43), as an aspectual morpheme on the verb, then its use in association with an Italian verb would qualify as violation of the lexical integrity. If, on the other hand, it belongs to a syntactic construction akin to a serial verb construction conveying aspectual information, then it can be acknowledged as another case of Type 1 mixed utterances. The same ambiguous status holds for the plural-by-reduplication rule illustrated in (44): is it a morpheme, or is it a syntactic construction?

We plan to carry out more research on this aspect, also employing elicitation techniques with bimodal adults, in order to explore whether some cross-modality compounding is possible, or the like.

¹¹ We thank an anonymous reviewer who observes that (43) seems to be a bit different from (44): while (44) is clearly a transfer from LIS, as noun reduplication is ungrammatical in Italian, verb reduplication might be an option in Italian narratives as an intensifier conveying duration. Notice however that this verbal reduplication for intensification and duration in Italian narratives is more frequently associated to the present tense (*cammina, cammina, cammina*) than with the imperfective, which already conveys duration in Italian. In (43) the child seems to mix the strategies employed by the two languages to express imperfective aspectual information: the use of the imperfective tense (productive in Italian) and reduplication (productive in LIS). We take this observation, together with the presence of a direct object following LIS word order (with the quantifier following the noun) to be evidence of a transfer from LIS.

11 Conclusion and outlook

The aim of the paper was to look at the mixed production of bilinguals in search of evidence relevant for the lexicalism/antilexicalism debate. We started by reviewing the literature and the facts that are known about code mixing, and claimed that none can provide conclusive evidence for one position or the other. We argued that the articulatory filter, that forces languages to alternate since they compete for the same channel, obscures what really goes on in the bilingual mind, weakening any argument about the linguistic competence based on mixing phenomena. The mechanisms underlying language mixing are better and more directly observed in bimodal bilinguals, where such articulatory filter is suspended. We presented and discussed a number of data belonging to a small corpus of mixed utterances produced by a group of young Italian/Italian Sign Language (LIS) bimodal bilinguals, and supplemented by grammaticality judgments elicited from two adult Codas.

We focused in particular on two issues that are particularly relevant for the lexicon debate. The first concerns what underlies a mixed production, and in particular whether it stems from a mixed numeration, from a monolingual numeration, or from two monolingual numerations. We argued that all the three options are available to bilinguals, and trigger very different types of mixed productions, which are most clearly visible in bimodal bilinguals.

Given the availability of two independent articulatory channels, mixed utterances in bimodal bilinguals are expected to be very different depending on whether they stem from a mixed numeration, or from two separate numerations. A mixed numeration should yield an utterance scattered along both strings. We argued that this is attested in our corpus (in what we labeled Type 3). Two parallel separate numerations, on the other hand, should yield two parallel language strings, whose expected formal properties depend heavily on the lexicon debate. If initial numerations contain abstract but *pre-assembled lexical items*, hence rigid bundles of formal features, the two parallel strings stemming from them are predicted to be language specific and language coherent. If the initial numeration driving computation only contains atomic features that are assembled in the derivation, the two parallel strings are predicted to be more porous and permeable, with many more combinations possible. We showed in the paper that the data we observe (in our Type 2 of mixed utterances) are in line with the predictions of the first model. A third type of mixed productions, where the utterance is clearly monolingual in its grammatical features but contains a double simultaneous lexicalization (Type 1) is ascribed to a late phenomenon of spell-out given a monolingual numeration.

The second issue we discussed in the paper is lexical integrity, a central tenant of traditional lexicalism, by which syntactic processes can manipulate members of lexical categories ('words') but not their morphological elements. Whether language mixing below the word level is allowed or not can tell us whether the lexical integrity principle is respected in mixed productions or whether it can be violated: in other words, it can provide a crucial argument in favor of one of the two opposing views. The data we observe are clearly relevant for this crucial issue, and we discuss them as such, but without being able to reach conclusive claims on their interpretation. This issue will require more investigation, in what we have hoped to have set as a central experimental terrain on the nature and architecture of the language faculty: the formal properties of mixed productions in bimodal bilinguals.

Abbreviations

ASL = American Sign Language, CODA = Children of Deaf Adults, DM = Distributed Morphology, ELAN = Eudico Linguistic Annotator, IMP = imperfect, It = Italian, KODA = Kids of Deaf Adults, LIBRAS = Brasilian Sign Language, LIS = Italian Sign Language,

LSQ = Québec Sign Language, NEG = negation, NGT = Dutch Sign Language, NMM = Non-Manual Marking, PL = plural, PTCP = participle, SG = singular, PST = past.

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Competing Interests

The authors have no competing interests to declare.

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