

Chapter 3

How different types of complexity can account for difficult structures in bilingual and monolingual language acquisition

Esther Rinke^a, Cristina Flores^b & Jacopo Torregrossa^a

^aGoethe University Frankfurt ^bUniversidade do Minho

Certain linguistic structures are more challenging than others for bilingual speakers. This is true across different languages and language combinations. In this paper, we propose an account in terms of different types of linguistic complexity. Our argumentation derives from the results of a study based on a cloze test including 40 different linguistic structures of European Portuguese (EP). 180 children participated, all of them acquiring EP as a heritage language in Switzerland with different environmental languages (60 French-EP, 60 (Swiss) German-EP, and 60 Italian-EP bilinguals). The results show that the structures with the lowest accuracy rates are the same across the three groups. We single out four of these structures, namely, (i) *que* as a subject relative pronoun and as a consecutive conjunction, (ii) third person clitic pronouns in different forms and syntactic constellations, (iii) simple and contracted forms of prepositions, and (iv) the inflected infinitive in a concessive construction. We show that the difficulty of these structures reflects different forms of linguistic complexity: derivational complexity, memory-based learning, context dependency of rules and multiple form-function mappings. These forms of complexity cause difficulties also in monolingual acquisition.



1 Introduction

In this paper, we address the question whether and in which way the difficulties that heritage speakers (HSs) show with certain linguistic structures can be related to different types of linguistic complexity.

As a starting point, we provide the results of a study based on a cloze test focussing on a number of different structures of European Portuguese (EP) (Torregrossa et al. 2023). The test was completed by 180 bilingual children in the age span between 8 to 16 years with EP as their heritage language (HL) and different environmental languages (French, German, Italian).¹ The results show that certain structures are particularly difficult for the bilingual children, whereas others are unproblematic.

Because we find a very similar *hierarchy of difficulty* across the different language combination groups, we assume that the difficulties encountered by the child HSs are, in general, independent of the environmental language. The results of the abovementioned study challenge previous accounts which assign great importance to cross-linguistic influence as a factor determining deviances in bilingual production (see van Dijk et al. 2022 for a recent meta-analysis on cross-linguistic influences in bilingual morphosyntactic acquisition of diverse language pairs).²

Although we know that individual children's general proficiency is dependent on age and the amount of input that they receive in their HL (in terms of "quantity of language exposure"), it is still an open question why certain structures are more difficult to stabilize than others among bilingual as well as monolingual children.

¹Throughout the paper, we use the terms (simultaneous or early) bilingual children and heritage speakers to refer to the participants in our study. By "simultaneous bilinguals", we refer to the acquisition type, by "heritage speakers" we refer to the socio-political context of acquisition. HLs are minority languages spoken within families with a migration background. HLs are, thus, acquired in a bilingual context where another language is the official language of the society (majority/societal/environment language). Normally, as consequence of the acquisition setting, the majority language becomes the HSs' dominant language, but this is not always the case, i.e. language (im)balance is not taken as criterion to classify HSs.

²Note that this is not to say that CLI does not play any role in bilingual language acquisition. The argument goes the other way around: if we show that the same structures are complex and difficult for monolinguals and bilinguals with different language combinations, it becomes rather unlikely that CLI is the (one and only) relevant factor determining the difficulties in the acquisition of these structures by bilinguals. In any case, if CLI is argued to be a determining factor in HL development, this has to be unequivocally shown. It does not suffice to point to typological differences between the two languages of a bilingual speaker.

3 How different types of complexity in language acquisition

We argue that the complexity of the target syntactic structures is crucially involved in defining the above-mentioned hierarchy of difficulty. However, it is very difficult to define what linguistic complexity actually means, because different notions and understandings of complexity exist in the literature. In order to approach our hypothesis, we will consider the four structures that caused the most difficulties for the children tested in Torregrossa et al.'s (2023) study when completing the cloze test in their HL. In particular, we will focus on i) *que* as a relative pronoun and consecutive conjunction, ii) clitic pronouns in different forms and syntactic constellations, iii) simple and contracted forms of prepositions and iv) the inflected infinitive in concessive sentences.

In order to show that the difficulty for the bilingual children indeed lies in the complexity of the structures (and is not related to bilingualism per se or cross-linguistic influence), we will first demonstrate that the respective structures that are difficult for bilingual children are also difficult for monolingual ones. In particular, we assume that lateness of a linguistic phenomenon in monolingual acquisition indicates its complexity for the learning/acquisition process. Based on previous proposals about complexity in monolingual language acquisition, we argue that complexity is a multifaceted notion. Our data allow us to identify the following types of complexity:

- i. derivational complexity (layers of embedding, number of movement operations, instances of merge, e.g., in relative clauses)
- ii. irregular and lexical forms that are memory-based (and not rule-based, e.g., lexically determined selection of “verb+preposition”)
- iii. context dependent rules (integration of syntactic and discourse knowledge, allomorphy dependent on phonological context, e.g., clitic allomorphy depending on the phonological context, contracted forms of prepositions in combination with definite articles)
- iv. multiple form-function mappings (e.g., different functions of *que*, *por*, the use of the inflected infinitive in certain concessive clauses)

2 Empirical data: A hierarchy of difficulty in heritage EP

It is a well known fact that certain linguistic structures cause more difficulties for bilingual speakers than others, particularly in their non-dominant language (which is often, though not always, the HL). For example, bilinguals may show

more problems than monolingual speakers with phenomena like gender assignment and agreement (Montrul et al. 2008), case marking (Polinsky 2006, 2008), pronoun realization and omission (Torregrossa et al. 2019, 2021), clitic allomorphs (Rinke & Flores 2014), subjunctive (Flores et al. 2017), and article realization (Montrul & Ionin 2010), just to mention a few.

In order to develop a proficiency assessment instrument for EP as HL, we constructed a cloze test, presented in detail in Torregrossa et al. (2023). In general, cloze-tests are considered to be integrative assessment tools, because the participants have to access their linguistic knowledge to reconstruct the missing gap in the test (Chung & Ahn 2019).

The study was conducted in Switzerland, with bilingual children with different language combinations (Portuguese-French, Portuguese-German and Portuguese-Italian), as depending on the Swiss canton of residence.

2.1 Participants

The study included 180 child HSs, 60 children for each language combination. Most of the children were born in Switzerland or emigrated there early in life. All participants acquired Portuguese from birth and the environmental language as a second first or early second language. Their age ranged from 8;6 to 16 years (M: 11;7; SD: 1;10). The study was conducted in cooperation with the *Camões* Institute, where all participants attended HL classes weekly. The cloze test was conducted as an untimed written task during a HL class.

Switzerland is an ideal place to conduct this type of study, because there lives a fairly large community of Portuguese-speaking migrant families. Their children acquire the heritage language, EP, in the context of three different dominant environmental languages: French/German/Italian. In addition, Switzerland has a tight network of Portuguese HL classes, offered by the Portuguese Institute for the maintenance and development of Portuguese abroad (*Instituto Camões*, see de Lourdes Gonçalves & Vinzentin 2021).

In addition to the data presented in Torregrossa et al. (2023), we collected data from 23 monolingual Portuguese children in the ages of 12-13 years (M: 12;3; SD: 0;5) for the sake of the present discussion. They completed an online version of the same cloze test.

2.2 Test and coding methodology

The cloze-test is based on a short narrative modelled after the B3 story of the Edmonton Narrative Norms Instrument (ENNI; Bongartz & Torregrossa 2020,

3 How different types of complexity in language acquisition

Schneider et al. 2005). The test includes 40 gaps with a variety of structures tapping into different linguistic domains: nominal morphology, verbal morphology, (contracted and non-contracted) prepositions, different types of complementizers, (clitic) pronouns in different syntactic constellations, definite and indefinite articles, and lexical knowledge. For functional words, we deleted the whole word or provided the initial letter in order to facilitate completion and restrict the number of possible answers. For content words, we provided the first half of the word (as is usually done in c-tests) for the same reasons. The results were coded according to the following four options: correct, incorrect, missing, or not expected but correct. For the analysis, we considered the correct and unexpected (but correct) answers as “correct” (1) and the incorrect and missing answers as “incorrect” (0).

Needless to say, different structures can be difficult for different reasons. In order to be able to differentiate between structure-related factors and other causes, we also collected information on the language background of the children (age of onset to the second language, quantity of input, length of attendance of HL classes, etc.). Concerning the relevance of these factors we refer the reader to Torregrossa et al. (2023).

2.3 Results

In Table 1 we report the overall results for monolingual and bilingual children. Since the data collection method is different (online vs. in paper form) and the monolingual children’s age range is more limited, the results have to be interpreted with caution. Nonetheless, they provide us with additional evidence related to a hierarchy of difficult structures, which we argue to hold for all children, independently of their being monolingual or bilingual.

Table 1: Accuracy rates of monolingual and bilingual children

	Bilinguals	Monolinguals
Overall accuracy rate	4635/7200 (64.4%)	843/920 (91.6%)
Max	170/180 (94.4%)	23/23 (100.0%)
Min	51/180 (28.3%)	9/23 (39.1%)

Across all 40 target structures, the 180 bilingual children show an accuracy rate of 64.4% (4635/7200; max. 170/180 (94.4%)/min. 51/180 (28.3%)). The accuracy rate of the monolinguals is 91.6% (843/920; max. 23/23 (100%)/min. 9/23 (39.1%)).

A closer look at the results reveals that some of the structures are indeed particularly challenging for the children. The following structures received the lowest accuracy rates:

2.3.1 *que* as a relative pronoun and consecutive conjunction

The element *que* has a number of different functions in EP and occurs in different types of subordinating constructions. It may serve as a complementizer introducing a complement clause (1a), a relative pronoun (1b) or a consecutive adverbial conjunction (1c).

- (1) a. [item 18]
Ele pensa **que** pode ir buscar um balão para a sua amiga.
he thinks that can go bring a balloon for the his friend
'He thinks that he can bring a balloon for his friend.'
- b. [item 12]
Mas sem querer, o coelhinho larga o balão, **que** voa
but without wanting the rabbit releases the balloon that flies
para longe.
to far away
'Without wanting it, the rabbit releases the balloon that flies away.'
- c. [item 14]
A cadelinha está tão zangada **que** começa a gritar (...).
the little dog is so angry that starts to shout
'The little dog is so angry that she starts to shout (...).'

Table 2 shows that the constructions mentioned in (1b) and (1c) received low accuracy rates in the bilinguals' cloze test, which indicates that they are difficult for the children.

2.3.2 Third person clitic pronouns in different forms and syntactic constellations

Clitic pronouns in EP are marked for a number of different morphological features (e.g. gender/number/case) and can occur as simple clitics (2a) or contracted forms (clitic allomorphs) (2b–c). Clitic allomorphs are allomorphic forms of the clitic pronouns *-o(s)/-a(s)* that change for phonetic reasons due to the ending of the verb form which they attach to. For instance, in examples (2b) and (2c), the clitic *-o* (singular, *-os* plural) changes its form to *-lo(s)* because the verb form ends with the consonant /r/.

3 How different types of complexity in language acquisition

Table 2: Accuracy rates of constructions with different types of que-subordinators

Example with gap	expected item	grammatical category	accuracy (bilingual's)
Mas sem querer, o coelhinho larga o balão, ___ voa para longe. (see 1b)	[que]	subject relative pronoun	28.3% (51/180)
A cadelinha está tão zangada ___ começa a gritar e a discutir em voz alta com o seu amigo. (see 1c)	[que]	adverbial consecutive conjunction	49.4% (89/180)

- (2) a. [item 15]
 Assustado, este ouve-a a gritar.
 scared this-one hears-her to cry
 'Scared, he hears her crying.'
- b. [item 7]
 O coelhinho quer tirá-lo.
 the little rabbit wants take-it
 'The little rabbit wants to take it.'
- c. [item 33]
 e pergunta-lhe, se poderia ajudá-los.
 and asks-him if could help-them
 'And he asks him whether he could help them.'

Table 3 (p. 51) shows the accuracy rates associated with the mentioned structures.

2.3.3 Simple and contracted forms of prepositions

Many Portuguese prepositions can occur in a contracted form with a definite determiner. Examples are the prepositions *em* + *a/o* (in + the fem./the masc.) = *na/no* and *por* + *a/o* (for/through + the fem./the masc.) = *pela/pelo* (3a). Besides prepositional phrases with an adverbial contribution, the preposition *por* marks the agent of a passive verb in EP, as shown in (3b). Prepositions in combination with verbs can also lead to a new verb meaning, which is semantically opaque, in the sense that it does not derive compositionally from the meaning of the verb

and the one of the preposition. In example (3c), the combination of the verbs *ir* and *ter* (go + have) with the preposition *com* (with) leads to the interpretation ‘go to see’.

- (3) a. [item 2]
decidem ir passear **pela** floresta
decide go walking through-the forest
‘They decide to go for a walk through the forest.’
- b. [item 34]
A mãe ouve com atenção o relato feito **por** ele
the mother listens with attention the report made by him
‘The mother listens with attention to his report.’
- c. [item 35]
vai ter **com** o coelho vendedor, e pergunta-lhe pelo preço
goes have with the rabbit salesman and asks-him for-the price
do balão.
of-the balloon
‘He goes to see the salesman rabbit and asks him for the price of the balloon.’

Table 4 shows that prepositions are difficult for the bilingual children, in particular in contexts like (3a) and (3b).

2.3.4 Inflected infinitives in concessive constructions

EP possesses a special syntactic construction: the inflected infinitive. The construction is relatively frequent, especially in final clauses introduced by the preposition *para* as in (4a). The inflected infinitive occurs also in concessive clauses introduced by *apesar de* (‘although’, as in 4b).

- (4) a. Os pais foram à livraria **para comprarem** os livros
the parents went to+the book store to buy+3PPI the school
escolares novos.
books new
‘The parents went to the book store to buy the new school books.’
- b. [item 28]
Apesar de eles **pedirem** com muita educação, ...
despite of they ask+3PPI with much education, ...
‘Although they asked delicately, ...’

3 How different types of complexity in language acquisition

Table 3: Accuracy rates of (clitic) pronouns in different forms and syntactic constellations

Example with gap	expected item	grammatical category	accuracy (bilingual's)
Assustado, este ouve- _ a gritar. (see 2a)	[a]	clitic pronoun (feminine, singular, accusative)	40% (72/180)
O coelhinho quer tirá- __ (see 2b)	[lo]	clitic pronoun (allomorph, masculine, singular, accusative)	38.8% (70/180)
e pergunta-lhe se poderia ajudá- __ (see 2c)	[los]	clitic pronoun (allomorph, masculine, plural, accusative)	44.4% (80/180)

Table 4: Accuracy rates of (simple and contracted forms of) prepositions

Example with gap	expected item	grammatical category	accuracy (bilingual's)
decidem ir passear p __ floresta (see 3a)	[pela]	preposition (contraction: <i>por + a</i>)	40% (72/180)
A mãe ouve com atenção o relato feito __ ele, (see 3b)	[por]	preposition (passive agent)	42.7% (77/180)
vai ter __ o coelho vendedor, e pergunta-lhe pelo preço do balão. (see 3c)	[com]	preposition (in fixed verbal expression)	53.3% (96/180)

Table 5 shows that the inflected infinitive in concessive constructions also belongs to the difficult structures, with less than 50% accuracy.

Table 5: Accuracy rates of the inflected infinitive in concessive constructions

Example with gap	expected item	grammatical category	accuracy (bilingual's)
Apesar de eles pedir__ com muita educação, (see 4b)	[pedirem]	inflected infinitive 3P Plural	47.2% (85/180)

Taking into account the results per language combination, we find that the abovementioned structures are associated with low accuracy rates across the three groups considered in this paper, as shown in Table 6.

Table 7 reports for each language combination group, the 12 structures with the lowest accuracy rates in the cloze-test. We highlighted in bold the structures that were common across the three language combination groups. Notably, 11 out of the 12 structures were the same for the three groups. The Portuguese-German and Portuguese-Italian children share all 12 structures, even if in a slightly different order of accuracy. The list of structures related to the Portuguese-French children included the irregular plural noun phrase *balões* ('balloons'), instead of the preposition *com* ('with').

Table 7 shows that the structures that are most difficult for the bilingual children in this study are very similar across the three language combination groups. The fact that the nine linguistic structures discussed here (see i-iv above) belong to the 12 most difficult structures independently from the contact language suggests that the bilingual children's difficulties with these structures are unlikely due to cross-linguistic influence. If it is true that these structures are associated with a complex learning task, they should be difficult for monolingual children, too.

As mentioned above, we collected data from 23 monolingually raised children, living in Portugal. The data are not fully comparable, because the cloze test was conducted online (during the COVID-19 restriction period) and included only 12-13 years-old children. As expected, the rate of accuracy was much higher in this group. Nonetheless, even in this case, we identified some difficult structures that did not reach ceiling performance. Table 8 shows the three structures with the lowest accuracy rates, which overlap with the structures listed in Table 7.

3 How different types of complexity in language acquisition

Table 6: Accuracy rates for the most difficult structures across the language combination groups

expected item	grammatical category	Ptg./French mean: 61.5% (1476/2400)	Ptg./German mean: 66.1% (1588/2400)	Ptg./Italian mean: 65.4% (1571/2400)
[que]	subject relative pronoun	15% (9/60)	33.3% (20/60)	36.6% (22/60)
[que]	adverbial consecutive conjunction	38.3% (23/60)	60% (36/60)	50% (30/60)
[lo]	clitic pronoun (allomorph, masculine, singular, accusative)	33.3% (20/60)	43.3% (26/60)	40% (24/60)
[a]	clitic pronoun (feminine, singular, accusative)	38.3% (23/60)	46.6% (28/60)	35% (21/60)
[los]	clitic pronoun (allomorph, masculine, plural, accusative)	33.3% (20/60)	51.6% (31/60)	48.3% (29/60)
[pela]	preposition (contraction: <i>por + a</i>)	42.6% (25/60)	43.3% (26/60)	35% (21/60)
[por]	preposition (passive agent)	38.3% (23/60)	43.3% (26/60)	46.6% (28/60)
[com]	preposition (in fixed verbal expressions)	55% (33/60)	53.3% (32/60)	50% (30/60)
[pedirem]	inflected infinitive, 3P plural	38.3% (23/60)	55% (33/60)	46.6% (28/60)

Table 7: List of the 12 most difficult structures and the associated accuracy scores for each language combination group.

	Ptg./French		Ptg./German ^a		Ptg./Italian	
1	[que] _{SUBJ_REL}	(15%)	[que] _{SUBJ_REL}	(33.33%)	[repara] _{PRES.3.SG.}	(31.67%)
2	[lo]	(33.33%)	[pela]	(43.33%)	[pela]	(35%)
3	[los]	(33.33%)	[lo]	(43.33%)	[a]	(35%)
4	[que] _{_CONS}	(38.33%)	[por]	(43.33%)	[que] _{SUBJ_REL}	(36.67%)
5	[a]	(38.33%)	[a]	(46.67%)	[lo]	(40%)
6	[pedirem]	(38.33%)	[lhe]	(50%)	[lhe]	(41.67%)
7	[por]	(38.33%)	[vem]	(51.67%)	[vem]	(46.67%)
8	[balões]	(38.33%)	[los]	(51.67%)	[por]	(46.67%)
9	[pela]	(41.67%)	[repara] _{PRES.3.SG.}	(53.33%)	[pedirem]	(48.33%)
10	[lhe]	(41.67%)	[pedirem]	(55%)	[los]	(48.33%)
11	[vem]	(55%)	[com]	(55%)	[que] _{_CONS}	(50%)
12	[repara] _{PRES.3.SG.}	(60%)	[que] _{_CONS}	(60%)	[com]	(50%)

^aAt first sight, the Portuguese/German group seems to show higher accuracy rates. However, the statistical analysis in Torregrossa et al. (2023) clearly shows that the language combination did not have any effect on response accuracy.

Table 8: Three most difficult structures for 12/13-years old monolinguals

Portuguese monolinguals		
1	[que] _{SUBJ_REL}	(39.1%)
2	[pela]	(56.5%)
3	[a]	(78.3%)

These data suggest that the structures that are most difficult for bilingual children are also challenging in monolingual acquisition. However, since the data collection method is different and the children’s age range is much more limited, we will support this hypothesis by also relying on existing studies on the L1 acquisition of the phenomena discussed in the next section.

3 A look at monolingual acquisition

In this section, we look briefly at the main findings reported in previous literature on L1 acquisition, in Portuguese (and in other languages), of the target structures,

namely at the acquisition of conjunctions, clitic pronouns, prepositions, and concessive connectors requiring the inflected infinitive.

3.1 Subordinators and subordinate clauses

Amid the various complementizers introducing subordinate clauses, *que* seems to be one of the first to appear in child EP, in complement clauses (see 1a), following the emergence of complement clauses with infinitives (Santos 2017). However, as already mentioned in §2, *que* introduces different types of subordinate clauses and we know that not all of them are acquired at the same time in EP, as in many other languages (Soares 1998).

Research on the acquisition of EP, in particular the study conducted by Soares (1998), has shown that relative clauses are amongst the latest types of subordinate clauses to appear in child speech (see also Vasconcelos 1995). This has been shown also for other languages. For instance, Bloom et al. (1980) and Dromi & Berman (1986) proposed that, in English and Hebrew complement clauses emerge first, followed by adverbial clauses, and lastly, relative clauses (but see Penner 1995 for a different order in Swiss German). Various explanations have been proposed to account for the order of acquisition of different subordinate clauses (Bowerman 1979). Traditionally, it is attributed to different degrees of embedding: The structure that has fewer layers of embedding is less complex and, therefore, easier to acquire. This would be the case of complement clauses, which are selected by the matrix verb in the same fashion as any other verbal complement. Adverbial clauses are not selected directly by the verb, but they involve one layer of embedding. Thus, they emerge later than complement clauses, but earlier than relative clauses, which involve both embedding and movement. Since relative clauses are the most complex structures in terms of embedding, they would be the last structure to emerge. In fact, EP children have difficulties in producing and comprehending relative clauses until school-age (Vasconcelos 1995).

Armon-Lotem (2005) argues that it is necessary to look not only at the timing of emergence of certain structures, but at the timing of its complete stabilization, since a structure is only completely stabilized in the child's grammar when all the associated features are acquired and the structure is used in all relevant contexts. This explains cross-language differences and further distinctions within each type of subordination considered above. For instance, in EP there are different timings of acquisition of complement clauses due to different timings of acquisition of verbal semantics and verbal mood (Jesus et al. 2019). For relative clauses, it has been shown that right-embedded clauses emerge earlier

than middle-embedded ones (Vasconcelos 1995) and that subject relative clauses are easier to acquire and process than object relative clauses (Costa et al. 2011).

Furthermore, a typical property associated with the acquisition of subordination is the omission of the complementizers, which starts at a pre-conjunctive period, but is prolonged throughout the acquisition process until later stages of acquisition (Armon-Lotem 2005, Soares 1998).

For the purpose of our discussion, the main observation to retain is that, in child EP, complement clauses stabilize earlier than adverbial clauses and these stabilize earlier than relative clauses. A frequent feature of child subordination is the omission of the complementizer.

3.2 Clitic pronouns in different forms and syntactic constellations

It is a well-established fact that EP has a rich pronominal system. In addition to allowing for the use of strong and clitic pronouns, EP is also a null object language. This means that children acquiring EP have to acquire the conditions of use of strong pronouns, clitics or clitic omission, including null objects, VP ellipsis or other types of object omissions. Several studies focusing on the production and comprehension of clitics and null objects by monolingual EP children demonstrate that they go through a prolonged stage of object omission and stabilize knowledge of the pronominal system very late (at school-age; see Costa & Lobo 2007, 2009, Costa et al. 2009, 2012, Flores et al. 2020, among others). It is argued that the overuse of null objects is caused by children's difficulties in assigning the correct interpretation to different types of object omissions available in the target grammar (pro, variable, VP-ellipsis, null object; cf. Costa et al. 2012). Due to the complexity of the pronominal system, EP L1 children omit objects to a higher degree and for a longer period of time than children acquiring other Romance languages that have clitics, or even other null object languages (Varlokosta et al. 2016). Despite this delay, EP children show early pragmatic knowledge of pronoun use (Costa et al. 2009, Flores et al. 2020). This indicates that the prolonged non-adult-like interpretation and production of pronouns lies, on the one hand, in the acquisition of the feature composition of the null objects and, on the other hand, in the acquisition of some syntactic and morphological features of clitics.

A syntactic property of clitics that has been shown to stabilize late in L1 EP is clitic placement. Differently from other clitic languages (and even differently from Brazilian Portuguese), several syntactic constraints determine the pre- or postverbal position of the clitic pronoun in EP. In particular, the preverbal position (proclisis) is stabilized very late in L1 acquisition (by age 7, see Costa et al. 2015).

3 How different types of complexity in language acquisition

In addition to the late acquisition of the properties constraining the realization vs. omission of the object pronoun and its placement, certain morphological features also stabilize only at school-age. A case in point is mesoclitisis, i.e. the occurrence of allomorphic clitic forms in the middle of the verb form (e.g. 1P Sing. future form *eu vê-lo-ei* ‘I will see it/him’) and clitic allomorphy in postverbal (enclitic) position (*tirá-lo* ‘take it’, *ajudá-los* ‘help them’; see 2b and 2c). The target-like use of these structures is sensitive to formal instruction and shows variation in colloquial Portuguese (see Charneca Catalão 2011, Nascimento Santos 2002 and Batalha 2018 for an analysis of Portuguese school-aged children’s knowledge of clitic pronouns).

3.3 Prepositions

Prepositions are a heterogeneous category that includes elements with lexical meaning (e.g. spatial prepositions) and semantically vacuous elements functioning as grammatical markers (e.g. the dative preposition *a*). Lexical prepositions have their own lexical entry, whereas non-lexical prepositions have undergone some form of grammaticalization and have a purely syntactic function or they occur in fixed phrases (Rauh 1993, van Riemsdijk 1990). This split into lexical vs. functional prepositions (or a continuum from more lexical to more functional prepositions) is mirrored in the process of acquisition of languages with a prepositional system. For example, Littlefield (2009) argues that in L1 English, lexical prepositions emerge early and show a steady, relatively rapid increase in child speech over time. Inversely, pure functional prepositions (e.g., ‘of’) emerge later and their production is limited and often not target-like in the first stages of acquisition. The same seems to hold for Portuguese, even though research on the acquisition of prepositions in Portuguese is scarce (Malheiros Teodoro 2020).

A further characteristic of prepositions which is visible across several languages is the contraction of the preposition with other elements, such as pronouns or articles. In Portuguese, the contraction of the preposition with the definite article (see §2.3) is almost categorical, with only a few syntactic contexts representing an exception. In addition to always requiring gender and number marking, there are contractions that change the stem (e.g. *por + a = pela* ‘through-the’) and contractions that involve only the deletion of the final vowel (e.g. *de + a = da* ‘of-the’). Due to the absence of research on the acquisition of prepositional contractions in L1 acquisition of Portuguese, we will resort to studies on L2/L3 research (Brito 2018, Picoral & Carvalho 2020). In a study with Spanish and English native/heritage speakers learning Portuguese as L3, Picoral & Carvalho (2020) show that speakers are more likely to realize contractions with the

preposition *a* and that the contraction of the preposition *por* + definite article is the most difficult to acquire. Furthermore, the acquisition path seems to be independent of the speakers' L1.

As for the preposition *por*, in addition to a spatial meaning, it has also the pure grammatical function of introducing the agent in passive sentences (as *by*-phrase), either in contracted form or not, depending on the presence or absence of a definite article, respectively. It has been argued that *by*-phrases of passive sentences are generally problematic for children (Fox & Grodzinsky 1998). This difficulty may be due to several factors, including the type of passive sentence (e.g., long or short-actional passives; see Armon-Lotem et al. 2016), the agentivity of the predicate (Estrela 2015) and the above-mentioned difficulty for children to use semantically vacuous prepositions.

3.4 Inflected infinitives in concessive constructions

We know from studies on spontaneous child speech that inflected infinitives emerge early in EP (Santos 2017), i.e., by the age of two years. However, at an initial phase, they only occur in final clauses introduced by *para* (Santos et al. 2013). Only later (i.e., by the age of three years), they occur in complements of perception verbs (Santos et al. 2016). This means that even though the inflected infinitive is available to EP children from early on, the different contexts that allow its use are acquired gradually, which depends on both syntactic and lexical constraints. In fact, some contexts requiring the use of an inflected infinitive are acquired very late, i.e. in school age. This is the case for the concessive structure *apesar de* ('although').

According to Costa (2006), the concessive connector *apesar de* is stabilized very late in EP (i.e. only by the age of ten years, similar to the stabilization of *although* or *whereas* in English, see Diessel 2004). Costa (2006) argues that this late acquisition is caused by three different, but interacting factors. The first factor is frequency: The connectors *apesar de* and *embora* are produced significantly less by adults than the adversative connector *mas*. However, frequency per se does not explain the late acquisition of this structure. The late stabilization of concessive connectors may be related to the fact that they occur only in subordinate clauses and most of them require the use of the subjunctive, which is also stabilized late in EP.

4 The role of linguistic complexity

The discussion in §3 has shown that the different structures under consideration are not only difficult for bilingual children, but are also mastered relatively late by monolinguals. If these structures take time to be acquired in monolingual language acquisition, we expect to find an effect of age in the bilingual group as well. Thus, we ran a statistical analysis to assess the effect of the bilingual children's age on the acquisition of the most difficult structures. We considered the nine structures which are relevant for the present paper (see i–iv in §2). As we mentioned in §1, the age range of the participants is relatively large (i.e., from 8;6 to 16 years; $M: 11;7$; $SD: 1;10$). We ran a binomial logistic regression with accuracy as dependent variable (0 = inaccurate, 1 = accurate) and age as fixed effect. The model showed a significant effect of age ($\beta = 0.64$, $SE = 0.06$, $z = 10.30$, $p < 0.001$). This shows that bilingual children's knowledge of difficult structures improves with age. In this sense, bilinguals behave just like monolinguals, even if they may need more time to acquire difficult structures. In this sense, it is possible that the structures that are not mastered by younger bilingual children are exactly the structures that emerge late in monolingual language acquisition. In other words, these structures are 'complex' for bilinguals and monolinguals alike, as shown by their late timing of acquisition across the board. Since it is often observed that bilinguals show a more protracted development, i.e., they acquire some structures in later age spans than monolinguals, we assume that bilinguals just need some more time to catch up with their monolingual peers (see Schulz & Grimm 2019, Tsimpli 2014 for similar considerations). In the remainder of this paper, we intend to discuss why certain structures are associated with a more complex learning task than others.

4.1 Notions of linguistic complexity

In the literature, complexity in acquisition has been explicitly defined and implicitly assumed in many different ways. From a syntactic perspective, it has been assumed that children initially prefer more syntactically economical structures over less economical ones; i.e. structures involving less layers of embedding over structures involving more layers of embedding, or structures involving less movement operations over structures involving more movement operations (Hamann 2006, Rizzi 1990, 2000). Jakubowicz (2003) proposes that computational complexity affects child language development, leading children to produce less complex structures in a target-like way earlier than more complex structures (see also Jakubowicz & Nash 2001). The author develops the following *Derivational Complexity Metric*.

- (5) Derivational Complexity Metric (DCM, Jakubowicz 2011)
- Merging α_i n times gives rise to a less complex derivation than merging α_i $(n + 1)$ times.
 - Internal Merge of α gives rise to a less complex derivation than Internal Merge of $\alpha + \beta$.

For example, with respect to wh-questions, the DCM predicts, “that the child is sensitive to the number of times that a copy of the wh-element must be merged to satisfy a computational requirement and to the number of constituents that may (or must) undergo Internal Merge (here under: IM)” (Jakubowicz 2011: 340; see also Soares 2003 with respect to the acquisition of wh-questions in EP).

The notion of complexity presented so far is motivated syntactically. Another way of defining complexity is more morphologically oriented and based on the observation that children tend to overregularize morphological endings. Clahsen et al. (2002) argue for a dual-mechanism model between rule-based (regular) and memory-based (irregular) representations for morphologically complex words. In their study, children acquiring Spanish verb morphology overapply regular paradigms to verbs that require irregular forms but not vice versa. The authors argue that “... the onset of overregularizations is syntactically triggered, by the requirement to generate a fully specified finite verb form in every sentence, in conjunction with lexical gaps or retrieval failures for irregulars. Overregularizations gradually decrease over time when children get older and memory traces for irregulars are becoming stronger and the children’s ability to retrieve them is becoming more reliable” (Clahsen et al. 2002: 618). Coming back to the issue of complexity in acquisition, these results suggest that regular syntactic or morphological rules are less complex than irregular forms, which have to be memorized and stored in the lexicon based on individual forms (and their frequency) in the input. Hence, the acquisition of rules that are applied regularly seems to be less costly than memory-based lexical learning.

The morphological rule mentioned in the previous example is based on a syntactic requirement (namely to generate a fully specified finite verb form) that applies independently of the context (i.e., the situation in which the sentence is uttered) and, in principle, concerns every sentence. However, this is not the case for each morphological or syntactic rule. We would like to add another type of complexity which lies in-between rule-based regular and memory-based irregular representations, namely cases in which a rule is applied depending on a specific (discourse or phonological) context. We suggest that this also involves a two-step learning/acquisition process: acquiring the rule and understanding in which context it applies and in which context it does not.

3 *How different types of complexity in language acquisition*

One example that has been mentioned in a number of studies is context dependency of a form which is related to previous discourse. In languages with null and overt pronouns, this concerns, for example, the decision whether a pronoun has to be overtly realized or can remain phonologically null. It has been suggested that in null subject languages, bilingual speakers tend to overrealize pronouns compared to monolingual speakers and may fail to accurately differentiate between the two forms in interpretation tasks. Sorace et al. (2009: 464) argue that this is a result of the complexity of the task: bilinguals have more difficulties in integrating different sources of information. According to Sorace (2011), the differences between monolingual and bilingual populations relate to bilingualism per se and, in particular, to the allocation of general cognitive resources to bilingual processing. However, the complexity of integrating syntactic information and discourse information represents a complex learning task also for young monolinguals (as shown for Portuguese by Lobo & Silva 2016, Rinke & Flores 2018) and may result in a protracted development of such phenomena. For example, Tuller et al. (2011) observe that in French, 3rd person accusative clitics are difficult among young TD (=typically developing) children and AD (atypically developing) speakers after childhood. The authors claim that the

complexity of object clitics is the result of a combination of several properties, the first of which is their non-canonical position. [...] Summarizing, the production of accusative clitics includes the following properties: movement to a non-argument position, clustering with nominative clitics, and reference to a non-local antecedent. Production of a third person accusative clitic involves the following additional properties: establishing non-discourse-dependent reference, agreement in both number and gender, but not animacy, and, potentially, licensing of a null clitic (conditional on both lexical and discourse restrictions). They are thus complex (morpho)syntactically, in terms of movement (whichever analysis of clitic constructions is adopted) and agreement, and mastering their usage (knowing whether they can be null or not) requires adhering to lexical idiosyncrasies and discourse/pragmatic conditions. (Tuller et al. 2011: 427f.)

A similar observation applies to 3rd person object clitics in EP, whose production is associated with the same degree of complexity as ascribed by Tuller et al. (2011) to French clitics. In addition, EP allows for 3rd person null objects in similar syntactic and discourse contexts as clitics. Therefore, the acquisition of the target-like distribution of object clitics and null objects in a null object language

like EP and, hence, of the discourse-appropriate production of clitics is more challenging than the acquisition of clitics in non-null object languages (Costa & Lobo 2007, Flores et al. 2020, Varlokosta et al. 2016).

In addition, EP clitics show allomorphy in certain phonological contexts, as described above. Allomorphic variation represents another form of linguistic complexity. It has been shown, for example, that allomorphic variation of English past tense forms (e.g. “-t for verbs such as *chase*, -d for forms such as *crave* and /əd/ for verbs such as *recite*”) slows down morphological development (O’Grady et al. 2010: 369). O’Grady et al. (2010) also mention homophony as a factor determining morphological development in first language acquisition.

Whereas the word *the* functions only as a determiner in English, the suffix -s can be used to mark any one of three things: plural number in nouns, third person singular in verbs, or possession. The resulting complication in the relationship between form and meaning may impede acquisition.

(O’Grady et al. 2010: 369)

We assume that in general, multiple form-function mappings (e.g. allomorphy, homophony) give rise to complexity in acquisition and may cause difficulties or a slow down in development. To conclude, we identified the following types of linguistic complexity in first language acquisition: i) derivational complexity (layers of embedding, number of movement operations, instances of merge); ii) irregular and lexical forms that are memory-based (and not rule-based); iii) context dependent rules (integration of syntactic and discourse knowledge or allomorphy depending on phonological context) and iv) multiple form-function mappings. In the next section, we will discuss how these notions of complexity apply to the “hierarchy of difficulty” discussed in §2.

4.2 Towards an explanation of the hierarchy of difficulty

In this section, we would like to come back to the phenomena mentioned in §2 and §3 that were the most challenging linguistic structures for the children and explore to what extent their difficulty can be related to the above mentioned notions of linguistic complexity.

As already discussed in §2, the item *que* as a relative pronoun and as a consecutive complementizer belonged to the constructions with the lowest accuracy rates across the different language combination groups. It is interesting to contrast these two structures with the declarative complementizer *que* illustrated in (1a), which is associated with a high accuracy rate of 70.5% (vs. 28.3% for the

3 How different types of complexity in language acquisition

relative pronoun and 49.4% for the consecutive complementizer). As shown in §3, the different accuracy rates for the different types of *que* correspond to the order of acquisition of the different instantiations of *que* in monolingual EP: the declarative complementizer is acquired first in child EP, followed by *que* introducing adverbial clauses, followed in turn by relative clauses, some of which may also emerge at school age. Even the 12–13 years-old monolingual children showed low rates of accuracy in association with the relative pronoun *que*. In §3, we mentioned that the difference between the various types of subordinate clauses (complement clauses selected by the verb, adjoined adverbial clauses and relative clauses) can be accounted for in terms of degrees of derivational complexity, involving, for example, embedding (in concessive clauses) or embedding and movement (e.g., in relative clauses). An additional factor contributing to the complexity of the structures at stake is the multiple form-function mapping of *que* in EP (one form with several functions), namely the homophony of *que* as a conjunction of complement and adverbial clauses, as an interrogative or a relative pronoun or an interrogative determiner.

Third person clitic pronouns represent another area of difficulty in the cloze tests among the bilingual children. As mentioned in §3.2, these structures are also very challenging for EP monolingual children and acquired successfully only at school age. Clitics are difficult for a number of different reasons. In addition to potential (syntactic) derivational complexity (if we assume a movement analysis for clitics), clitics are morphologically complex because they involve allomorphy in EP. Depending on the phonological context, the form of the clitic may change. For example, following the *-r* ending of infinitives, the clitic *-o* (acc. masc. sing.) is realized as *-lo* (see example 2b, c); after the nasal *-m* (e.g., 3rd person plural finite verb forms), *o* surfaces as *-no*. As discussed in the previous section, such rules are complex for different reasons: they are context dependent (therefore involving a two step learning process) and there is no direct form-function mapping (because different forms have the same function and realize the same morphological features). A third factor contributing to the complexity of clitic pronouns is their discourse dependency, since the appropriate use of clitics (as well as null objects and full noun phrases) is dependent on discourse constraints (Flores et al. 2020).

The third phenomenon discussed in §2 and §3 are prepositions in different shapes and constellations. We saw that in the cloze test, bilingual children, but also monolinguals, show low accuracy with contracted forms of prepositions. In addition, the bilingual children have also problems with the preposition *por* introducing passive agents and the lexically selected preposition *com*. First of all, contracted forms of prepositions are derived based on a context-dependent

rule (only in combination with definite articles, not with indefinite ones or bare nouns). Assuming a Distributed Morphology approach, Ximenes (2004) states that contractions of prepositions are the results of a two-step morphological process: “two operations happening in the morphological component: merger followed by fusion.” (Ximenes 2004: 182). As already discussed in §3, *por* as a preposition marking the agent of a passive sentence is generally problematic for younger children and complex, because it is a functional and, hence, a semantically vacuous preposition. The homophony with the lexical preposition *por* marking a spatial meaning leads to multiple form-function mapping and may contribute to the complexity of this preposition as well. The complexity of the preposition *com* in combination with the verb *ter* (see example 3c) has a different source. In this context, the preposition contributes to the formation of a new verb – a process that is very productive in EP (e.g. *acabar de* ‘finish (of)’, *acabar com* ‘destroy’, *acabar por* ‘end up by’). Crucially, the combination of a verb and a preposition is semantically opaque and can only be acquired through a memory-based lexical learning process.

The fourth phenomenon that was associated with some difficulty for the bilingual children in the cloze test was the inflected infinitive in combination with the concessive connector *apesar de*. As mentioned in §3, EP monolingual children do not exhibit any difficulty in the use of inflected infinitives. However, concessive connectors are acquired late and exhibit a similar degree of complexity as other conjunctions introducing adverbial phrases. When introducing a clause, *apesar de* occurs only in combination with inflected and uninflected infinitives. In more formal registers, we find the (more complex) construction *apesar de que*, which introduces finite subordinate clauses that require the indicative or the subjunctive mood, which is another property of EP which is acquired relatively late in L1 acquisition. In addition to these forms that belong to the standard register, we find also the occurrence of *apesar que* in association with the indicative mood in colloquial speech. Furthermore, *apesar de* may also introduce a NP with concessive meaning, instead of a clause (e.g., *Apesar da chuva, eles foram passear*. ‘Despite the rain they went for a walk.’). Hence, the difficulty related to the use of the inflected infinitive in the cloze test does not depend on the structure itself, but results from its combination with the concessive connector *apesar de*, which is acquired late and can introduce different structures. In particular, its alternation with a finite verb in the same context, as in the use of the indicative with the non-standard *apesar que*, may increase the difficulty of the acquisition task. Actually, the most frequent error committed with this item was the replacement of the inflected infinitive with the finite 3rd person plural indicative form *pediram*.

5 Summary and conclusions

The present line of argumentation derives from the observation that some linguistic structures cause more difficulties for bilingual speakers than others, especially in their (non-dominant) HL. We aimed to show that the difficulty of certain structures is related to different types of linguistic complexity. A cloze test conducted with 180 EP heritage children in Switzerland – divided into three groups with 3 different environmental languages (French, German and Italian) – revealed that the children exhibited particular difficulties with some structures, including relative pronouns and consecutive conjunctions, clitic pronouns in different forms and syntactic constellations, some simple and contracted forms of propositions and inflected infinitives in concessive constructions.

Triangulating these findings with the existing literature on the L1 acquisition of the structures at issue, we were able to conclude that the structures that child HSs found the most difficult were exactly the structures that usually emerge late (or very late) in monolingual language acquisition. This was also confirmed by a small scale study conducted on Portuguese monolingual children ranging between 12 and 13 years, based on the same cloze-test as the one administered to the bilinguals. Also for the monolinguals, relative pronouns, contracted prepositions and clitics were associated with the lowest accuracy scores.

Overall, these results suggest that the challenging structures for bilingual children represent a complex learning task also in monolingual language acquisition. In other words, child HSs acquire morphosyntactic structures through the same milestones as their monolingual peers, although they may lag behind in some linguistic domains that require more input to be successfully acquired. Notably, we also found that the accuracy in the use of these structures improved with age, highlighting a developmental trend among the bilinguals. In addition, these results do not sustain the assumption that CLI is the main factor contributing to developmental differences between heritage and monolingual children.

The main contribution of the present paper consists in showing that the difficulties exhibited by the bilingual children cannot be accounted for in terms of a single notion of complexity. Rather, different structures may be complex in acquisition for different reasons. In particular, we identified four main notions of complexity, as related to the different structures analysed in this contribution, i.e., derivational complexity, memory-based lexical forms, rules dependent on phonological or discourse contexts and multiple form-function mappings. In this sense, we moved away from the attempt to provide a single definition of complexity, but rather proposed a multifaceted view of this notion, which matches with extensive research on language acquisition.

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3 How different types of complexity in language acquisition

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