Language dominance in the previously acquired languages modulates rate of third language (L3) development over time: A longitudinal study

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ABSTRACT

This study examines the extent to which extra-linguistic factors such as language dominance, order of acquisition and language of instruction are deterministic for multilingual transfer selection and subsequent development. We test two groups of Catalan-Spanish bilinguals acquiring English as an L3 in a controlled setting. We first examine judgements and interpretations of negative quantifiers and negative polarity items after 16 hours of exposure, establishing their participants own baselines for development. Eleven months later, we test those that continued learning English to explore what factors modulate their development. Data suggest that holistic structural similarity is the most deterministic factor for initial transfer selection. Results of TIME 2 reveal that developmental sequencing, however, is dynamic and non-uniform, differing at the individual level by language-dominance in Catalan or Spanish.

1. Introduction

Determining initial representations for a third language (L3) is of key importance for understanding L3 acquisition overall (Rothman, González Alonso & Puig-Mayenco 2019 *inter alia*). This is so, not least, because only at the initial stages of acquisition can one meaningfully isolate representational transfer from knowledge that stems from L3 learning itself. Knowing what the initial grammatical representations are in L3 acquisition is akin to having blueprints and a solid foundation for the overall integrity of a tall building. In all cases, the investment in the initial steps provides increased assurance that the end result is strong and guided by principles. Nevertheless, there are very few research studies in L3 acquisition that have examined the initial stages and tracked individuals over time, whereby the individual can be used as their own baseline for development. The present study innovates in this necessary methodological approach to understanding L3 acquisition more broadly, doing so with a first of its kind design we explain in detail below.

Why is it important to test L3 learners at the initial stages and track their development over time? Why is this perhaps more important than it would be for L2 acquisition studies? One obvious answer relates to the (potential) distinct nature of L3 and a very well-studied, ubiquitously observed phenomenon in non-native language acquisition: the role of transfer. It is well established that transfer—the effects of representation of previously acquired language on the development of novel language learning—is deterministic in non-native language acquisition. While there is continued discussion on the exact form transfer takes in L2 learning (e.g. full or partial), when transfer takes place in an L2 scenario there is only one potential source: the first language (L1). However, in the case someone learns an additional language after having acquired at least two before, research shows that we cannot take for granted that transfer will always come from an easily predictable source as in L2 acquisition (Puig-Mayenco, González Alonso & Rothman, 2020 for systematic review).

The fact that transfer can, in principle, come from multiple sources has significant implications for mapping out the learning task in multilingualism, much differently than in L2 learning (González Alonso & Rothman, 2017). In all scenarios of language acquisition, that which is transferred itself partially determines the subsequent learning task. A native of French learning Spanish as an L2 is likely to transfer obligatory pronominal subject realization and thus go through stages where their Spanish grammar

is non-target like. However, a French native who had successfully acquired Italian, inclusive of its null subject distribution, and is now learning Spanish may or may not go through the same learning trajectory for Spanish subjects. Why? Unlike the French L2 learners of Spanish, the L3 Spanish learner's parser has two representations from which to choose for transfer. As a result, the initial grammar of the two French natives might be very different for subjects in Spanish and, thus, are obliged to follow qualitatively distinct paths for acquisition of even the same target language.

Where extra-linguistic factors and exposure to the target non-native grammar are properly controlled, if maximally comparable *ab initio* L3 learners and *ab initio* L2 learners demonstrate distinct, systematic knowledge in the same non-native target language, knowledge of an L2 for the L3 learners would be a good candidate to explain the gap. But what if we miss the opportunity to capture this effect? For example, if we tested these same learners for the first time after each had achieved intermediate proficiency in the target language—an L2 for one and L3 for the other— and each had comparable knowledge for a property absent in the L1, but shared in the L2 and L3, we would not be able to adjudicate between at least two scenarios. The observed result could have come from transfer in the L3 case and learning of the domain in question for the L2 one or, conversely, learning could have applied in both cases whereby the L2 for L3 learners provided no initial advantage. We would simply have no way to know which is correct, having missed the window of opportunity where such could be meaningfully teased apart. Missing such an opportunity can have significant cumulative effects. While examining initial L3 interlanguage grammars is particularly useful for determining transfer source itself, it can also play a crucial methodological role for tracking and explaining patterns in L3 development over time.

In light of the above, one might expect there to be a critical mass of studies following on from initial stages data collection; that is, developmental studies that follow learners iteratively after their L3 initial representations are established. However, exceedingly few studies have combined L3 initial stages data with later developmental data (or any type of longitudinal design from whatever point of L3 proficiency data was first collected). Relevant published work is scarce. While great examples of research in the general direction we advocate here, the two existing studies are cross-sectional (Cabrelli Amaro, Amaro & Rothman, 2015; Cabrelli, Iverson, Giancaspro & Halloran González, 2020). For example, Cabrelli Amaro, Amaro & Rothman (2015) examine

raising over dative experiencers in L3 Brazilian Portuguese, bringing together various L3 proficiency levels with the same methodological protocols. The present study is longitudinal, examining a group of Catalan-Spanish bilinguals learning English over an 11-month period, commencing soon after initial exposure in a controlled context.

Although many Catalan-Spanish bilinguals are simultaneous (2L1), our participants are not (see details below). While all are child L2 learners of either Spanish or Catalan and live in a balanced bilingual community, English is an L3 precisely because it is the chronological third linguistic system these bilinguals are acquiring. In the first instance of data collection, the participants are *ab initio* learners of English tested after 16 hours of specifically designed instruction (see below). We follow a subset of this group— those that continued learning the L3 English—, testing them 11 months later. The domain of grammar in focus is the judgements and interpretation of Negative Quantifiers and Negative Polarity Items because in Catalan and Spanish they distribute uniquely and, thus, map distinctly onto the target L3 (see section 2.2).

After establishing what the initial L3 grammars look like for this domain (TIME 1), we retested participants to see how their grammars might have changed over time (TIME 2). To understand if and when particular extra-linguistic variables matter (and their relative weighting) for potential individual differences at the initial transfer stage and over subsequent development, we explored three factors: order of acquisition, language dominance in Catalan and Spanish, as well as "other" language of instruction (see details below). We capitalize on the relatively unique situation that Catalan-Spanish bilingualism affords. Collecting data in rural Catalonia, we were able to test two order of acquisition groups: Catalan L1→ child L2 Spanish and Spanish L1→ child L2 Catalan. Because the environment is so rich with access to and opportunity for using both languages, order of acquisition does not exclusively predict dominance in adulthood (some L1 Catalan tested on the Spanish-dominant side of the scale and vice-versa). As we will explain in detail below, we were thus able to isolate order of acquisition and dominance as separate variables without sacrificing on proficiency in the previous languages— every individual is highly proficient in both. To our knowledge, this study is the first to use a longitudinal design to (a) establish a baseline for transfer at the initial stages with *ab initio* learners, and (b) to examine the developmental trajectories of these same learners, inclusive of the potential factors modulating individual differences. The uniqueness of the method and learner groups come together to permit a greater

understanding of the variables that impact initial L3 interlanguage and subsequent development, similarly and differentially.

2. Background

2.1. L3 acquisition: the initial stages and impact on development

As discussed above, the goal of this paper is to go beyond the typical study of adult L3 morphosyntactic transfer. We do so by first examining the initial stages interlanguage system and using this—comparing learners against themselves with time in between testing—as the baseline for their development. As a result, the present study touches on transfer at the initial stages, which inevitably relates to the models of transfer in the literature, even if testing them *per se* is not the primary focus.

Details aside, these models can essentially be subdivided into two main blocks: models (or positions) that advocate a primacy default transfer effect from a single source: the L1 (e.g., Hermas 2010; Hermas 2015; Na Ranong & Leung 2009) or the L2 (Bardel & Falk 2007, 2012; Bardel & Sánchez 2017; Falk & Bardel 2011) and models that claim transfer can come from either language, the L1 or L2 based on typological/structural proximity. In the latter set, models are subdivided by those arguing for wholesale versus property-by-property transfer. The Typological Primacy Model (Rothman 2011, 2015; Rothman, González Alonso & Puig-Mayenco, 2019) claims complete-system transfer based on overall structural proximity between the L1 or L2 to the L3 after a period of initial exposure, whereas the Linguistic Proximity Model (Westergaard et al. 2017; Westergaard, 2020) rejects wholesale transfer in favor of more conservative transfer over time from either the L1 or L2 depending on the structural proximity of the L3 domain in question.

We will keep all the above theories in mind as we look at the data in subsequent sections, especially the data from the first time of testing and their implications. That said, the focus of this paper is not to test these models *per se*, but rather to understand and uncover the variables that—the same or distinct ones—impact subsequent development. To this end, we will test specific variables that have been shown to have limited predictive and explanatory adequacy for initial transfer (e.g. such as order of acquisition (L1 versus L2 status) and relative dominance, when this can be teased apart (Puig-Mayenco, Miller & Rothman, 2018). The present goal is to understand if these factors take on new relevance for development, potentially illuminating distinctions in patterns of recovery

from non-facilitative transfer over time (see Cabrelli and Iverson, In prep). Although work exploring developmental trajectories in L3/L*n* acquisition is scarce, a very recent example by Cabrelli et al. (2020) tested two groups of advanced Spanish-English (counterbalancing order of acquisition) learners of L3 Brazilian Portuguese (BP) on Differential Object Marking, comparing them to low proficiency groups of the same language pairings using the same methodology from Giancaspro, Halloran & Iverson (2015). The results from Giancaspro, et al. (2015) indicated robust influence from Spanish irrespective of whether Spanish was an L1 or an L2, yet the advanced groups in Cabrelli et al. (2020) did not perform the same at later stages of BP. The results from advanced proficiency learners showed that those with Spanish as the L2 overcame non-facilitative transfer from Spanish to BP quicker than those learners with Spanish as the L1. In light of these data, Cabrelli and Iverson (in prep) offer the *Cumulative Input Threshold Hypothesis* (CITH). CITH maintains that recovery from initial stages transfer has a proportionality relationship to the total amount of input and subsequent entrenchment one has had for the language that has been transferred, which means it is applicable to all types of bilingualism where such can be measured (not just L1 versus L2 status). We will return to CITH in the discussion section in light of the present data, showing that its insights can be applied to the present data.

2.2. Negative Quantifiers, Negative Polarity Items and Negative Concord Items: Their distribution and interpretation

Related to negation, there are two types of languages. Those that do not allow *a priori* the co-occurrence of two negative elements with a Single Negation reading (such as Dutch, Norwegian, Standard English and Swedish) are often referred to as Double Negation (DN) languages (Zeijlstra 2004) Languages that allow *a priori* the co-occurrence of two negative elements with a Single Negation reading (such as Czech, Greek, Japanese and Spanish) are referred to as Negative Concord (NC) languages (Giannakidou, 2000).

Standard English falls into the category of DN languages, whereas both Catalan and Spanish fall into the category of NC languages. Crucially for our study, however, this is not simply a two-way distinction in that the subset of languages labelled NC languages can be subdivided themselves into Strict versus Non-strict, and Catalan has been classified as being in between these two as we will describe below.

2.2.1. English: Negative Quantifiers and Negative Polarity Items

English is a DN language. This means that the co-occurrence of two negative elements in the same sentence gives rise to double negative readings, as can be appreciated in (1),[1] in which the English Negative Quantifier *nothing* co-occurs with the overt sentential negative operator *not*; thus, the negative semantic meaning of the sentence is cancelled.

(1) #Laura did not say nothing (=It is not the case that Laura did not say anything).

When the sentence does not contain an overt negative operator, the Negative Quantifier is grammatical and expresses a Single Negation reading, as in (2).

(2) Laura said nothing (=It is not the case that Laura said something).

Negative Polarity Items show the opposite pattern from that of the distribution of Negative Quantifiers. The Negative Polarity Items need to be licensed by an overt negative operator to (a) be grammatical and (b) to express a Single Negation meaning (see 3—4).

(3) Lily did not eat anything.
(4) *Lily ate anything.

As it pertains to their licensing in the preverbal position, Negative Quantifiers cannot be licensed by external negation and be grammatical (5); when they do, the sentence only becomes acceptable under a double negation reading.

(5) Nobody is drinking coffee.
(6) #Nobody is not drinking coffee.
(=It is not the case that there is a person who does not drink coffee).

Negative Polarity Items cannot occur in the preverbal position with or without sentential negation (see 7-8).

(7) *Anybody is drinking coffee.
(8) *Anybody is not drinking coffee.
(=It is not the case that there is a person who does not drink coffee).

As discussed by Giannakidou (1998, 2011, amongst others), Negative Polarity Items can also be licensed by other types of operators, namely non-veridical operators (such as

[1] The reader is referred to Puskás (2012) for a more detailed discussion of the conditions that give rise to Double Negation readings.

questions and conditionals). When such an operator licenses one of these lexical items, the Negative Polarity Item receives an existential reading (9). Negative Quantifiers can also occur in such a context, but they are necessarily assigned a negative reading (10).

(9) Call me if Lily eats anything!
(=Call me in the event that Lily eats something).
(10) Call me if Lily eats nothing!
(=Call me in the event that Lily does not eat anything).

2.2.2. Catalan and Spanish

Catalan and Spanish are NC languages; this means that these languages allow for the co-occurrence of two negative elements without triggering a Double Negation reading, at least when the Negative Concord Item is in the post-verbal position (consider 11 and 12):

(11) a. L'Àngel no va dir res. *Catalan*
b. Ángel no dijo nada. *Spanish*
Ángel neg said n-thing
'Àngel did not say anything'

(12) a. *L'Àngel va dir res. *Catalan*
b. *Ángel dijo nada. *Spanish*
Àngel said n-thing
'Àngel said nothing'

All Negative Concord languages behave similarly with regard to the behavior of Negative Concord Items in the post-verbal position, as exemplified above. However, they do differ in terms of their behavior in preverbal position. Some languages, such as Czech, Romanian or Arabic, require these elements to co-occur with an overt negative operator in the same domain; these languages are classified as Strict Negative Concord languages. At the opposite end of the spectrum, we have languages such as Spanish and Italian that do not allow for the co-occurrence of an overt negative operator with a preverbal Negative Concord Item if a Single Negation reading is intended (see the difference between 13 and 14). Languages, like Spanish, with this type of behavior are called Non-strict NC languages.

(13) Nadie está bebiendo café. *Spanish*
Nobody is drinking coffee.
'Nobody is drinking coffee.'

(14) #Nadie no está bebiendo café. *Spanish*

Nobody not is drinking coffee.
'Nobody is not drinking coffee.'
(It is not the case that there is a person who does not drink coffee).

Catalan's behavior sits somewhere in between both ends of the spectrum in that the appearance of a negative operator with preverbal Negative Concord Items is optional. Its appearance does not seem to be modulated by external factors and it is allowed by all speakers. Crucially for the study, its co-occurrence does not usually give rise to double negation readings;[2] see (15):

(15) Ningú (no) està bevent cafè. *Catalan*
Nobody (not) is drinking coffee.
'Nobody is drinking coffee.'

A further difference with regard to the interpretation of these lexical items in Catalan and Spanish is their occurrence with non-veridical operators such as questions or conditionals. Catalan Negative Concord Items can be licensed by these operators and, when they are, they have an existential reading (Espinal, 2000; Vallduví, 1994) as can be seen in (16a). Spanish, unlike Catalan, does not allow for these lexical items to be licensed by these operators, as seen in (16b).

(16) a. Truca'm si la Dolors diu res! *Catalan*
b. *¡Llámame si Dolores dice nada! *Spanish*
Call me if Dolors says n-thing!
"Call me if she says anything!"

Overall, Catalan and Spanish show micro-variation with regard to the licensing of their Negative Concord Items along two dimensions: (i) preverbal Negative Concord Items with sentential negation in the sentence have Single Negation readings in Catalan and Double Negation ones in Spanish, and (ii) Negative Concord Items in contexts such as conditionals are acceptable and have existential readings in Catalan, and are ungrammatical and interpreted with negative readings in Spanish. We will capitalize on these subtle, yet robust differences between Spanish and Catalan (the L1s and L2s of our groups) to tease apart which of the previous languages, if any, are transferred into the beginning stages of L3 interlanguage. Given the facts of the languages as described above,

[2] Whereas it is true that the co-occurence of a pre-verbal NCI and sentential negation in Catalan does not give rise to double negation readings, Déprez et al. (2015) found a small percentages of double negation readings in Catalan. As Prieto et al. (2013) show prosodic cues can explain why some speakers give DN to languages with negative concord.

non-facilitative transfer, in some or another conditions, is expected irrespective of whether Catalan or Spanish transfers. And so, unless TIME 1 data reveal neither language was transferred, we will be able to examine how recovery after initial non-facilitative transfer unfolds. That is, is recovery from transfer conditioned at the individual level by additional factors beyond the formalities of learning task itself (i.e. does it matter if the transferred value is an L1 or L2, what role does dominance play, etc.)?

3. Study

3.1. Research questions and predictions

The present study examines the following interrelated research questions below. R1 deals with setting the baseline, from which we pursue R2 and R3.

⇒ **R1.** What is the baseline (i.e., the transferred representation) at the initial stages of L3?

⇒ **R2.** What are the variables that modulate L3 development from the point of initial transfer?

⇒ **R3.** Are the variables and/or their weighting conditioning developmental trajectories similar to or different from those in initial transfer selection?

Whereas there are very few studies examining L3 morphosyntactic development itself, the past decade and a half has produced a healthy mass of studies examining transfer source (see e.g., Puig-Mayenco, González Alonso & Rothman 2020; Rothman, González Alonso & Puig-Mayenco 2019 for systematic reviews). As a result, our predicted answer to R1 reflects our understanding of the direction in which relevant research overall points. Alternatively, our predictions for R2 and R3 are more exploratory.

We predict transfer will not default to either the L1 or the L2, but rather depend on underlying typological/structural similarity across the three languages. In light of previous studies with Catalan-Spanish bilinguals acquiring English as an L3 that show Catalan transfer (e.g., Gorgone, 2018; Llisterri & Poch-Olivé, 1987; Puig-Mayenco & Marsden, 2018), we expect Catalan transfer across the board. However, such studies have not controlled for or tested the role that individual-level factors might play. It is an open empirical question whether or not transfer selection at the initial stages is also subject to individual-level factors such as language dominance and/or a potential priming effect of

which language was used during L3 instruction or experimentation. We will test some of these variables herein.

While few studies have focused on L3 development trajectories, these few studies give some nice insights. Recall that Cabrelli et al. (2020) show that overcoming transfer from the L2 is easier than doing so from the L1. Based on their results, one could predict that overcoming non-facilitation will be easier for the learners that (a) transferred their L2 initially and/or (b) from the less dominant language. However, the present situation differs significantly from what Cabrelli and colleagues discuss in terms of the timing and extent of the L2 statuses. Recall that while our participants are L2ers of Spanish and Catalan, they are child L2ers and are at the time of testing extremely proficient in both languages, which are supported in their daily life and societal communities. This is quite distinct from the case of adult additive L2 acquisition. As such, we predict that L2 status will not matter as such, but rather relative dominance in either previously acquired language might. We hypothesize that the variables that condition initial transfer and developmental sequencing will only partially overlap, not the least because of the inherently distinct natures of the two constructs. For example, whereas typological/structural considerations, albeit to a different extent, might be relevant for both transfer and development, language dominance should matter less for initial transfer. After all, transfer selection and recovery from it sit at distinct levels of the learning task. The former relates to the onset of forming representations of the initial interlanguage grammar, whereas the latter relates to what it takes (e.g., the thresholds of parsing failures) to abandon an entrenched representation now forming part of the L3 grammar itself.

4. Methodology

4.1. The L3 Input and context

Although much research in L3 acquisition has used low proficiency as an inclusion criterion to investigate morphosyntactic transfer, low proficiency as measured via standardized tests is not necessarily equal to being at the initial stages of acquisition (Puig-Mayenco & Rothman, 2019). Recall that determining initial stages transfer as the baseline for how individuals develop over time is one of our primary goals. And so, we avoided potentially confounding transfer effects from learning effects by designing a two-month course for true *ab initio* learners of English delivered specifically for this study.

This allowed us to (a) ensure that our learners had not been exposed to formal instruction in English previously, and (b) to control for several factors that cannot be controlled when examining learners in other contexts of instruction.

Having designed and delivered the course ourselves also made testing *ab initio* learners feasible, not the least because of where we undertook the course and the subjects we targeted. Although English is a ubiquitous second language in Europe, it is not the case that it is truly omni-present in every corner. Doing our study in Northeast Catalonia, English is not a language commonly spoken by all and was not a typical language of instruction in previous generations (differently from the present-day landscape for children and adolescents in school). And so, we focused on individuals above 50—because they would not have had the option of English in schooling—and only the subset for which English was never otherwise taken up. Targeting this age group had an additional advantage. Given that migration from Southern (monolingual) Spain to Catalonia was more common in previous generations, this facilitated the likelihood of finding Spanish L1 child L2-Catalan speakers in the desired numbers (Illamola, 2015). Administering and devising the course allowed for control of input exposure in crucial ways. Firstly, we could ensure that the learners were familiar with the lexical items to which they would be exposed in the testing phase. We controlled for the frequency of exposure to all the items received. For the participants to be able to perform our tasks and have reliable results, they needed to be familiar with three different sentence frames. As one should expect, we did not provide any explicit instruction regarding the domain/object of inquiry: the distribution of Negative Polarity Items (NPI) and Negative Quantifiers (NQ) in English. However, from the first lesson onwards they were exposed orally and in writing to the below sentence frames devoid of the crucial NPIs and NQs so that they would be familiar with the structures we would later use in testing. Instruction was aided with visual cues so that learners would be familiar with the lexical items and these three sentence frames:

a) Subject+Verb+Object: The girl is drinking coffee.
b) Subject+ NOT+Verb+Object: The girl is not drinking coffee.
c) Conditional: Mary will call me if Peter drinks coffee.

Another important point in the course was to trigger the mapping of NQs 'nothing, nobody' and NPIs 'anything, anybody' without introducing potential biases or noise that would make tapping into the transferred representation more difficult. After all, they

would need to know the lexical items themselves for any meaningful testing of how they are represented in the L3, whether reflecting transfer or not. To accomplish this, we presented the Negative Quantifiers and Negative Polarity Items in two contexts that met the three following requirements:

(i) The contexts would not be targeted in the experiment,
(ii) the contexts were grammatical in the three languages, and
(iii) there were no differences amongst the three languages.

These two contexts were answers to Wh-questions for the Negative Quantifiers as in (17ab), and objects of single negated clauses for Negative Polarity Items as in (18ab):

(17) a. What is Mary eating? Nothing.
b. Who is Mary speaking with? Nobody.
(18) a. Mary is not eating anything.
b. Mary is not speaking with anyone.

Throughout the course, the instructor tried to use as much English as possible to communicate with the learners. However, due to the fact that they were *ab initio* learners some L1/L2 use was unavoidable. We manipulated this in that some of the learners received instructions in Catalan and others in Spanish. The language other than English that was used in the class was decided prior— as there were multiple sections to keep each cohort manageable with a cap of 16 students per class. Spanish or Catalan use was counter-balanced by group (6 groups; 3 used Catalan and 3 Spanish as other language when needed) so that we could later factor this into the analysis.

4.2. Factors under consideration

We mainly discuss three factors (variables in the statistical modelling) that might be deterministic for transfer selection in L3/Ln acquisition:

1. **Order of acquisition of the L1 and L2**. We employed mirror-image methodology in that we targeted participants who had been exposed to Catalan at home and Spanish when entering the schooling system (L1-Cat-L2-Sp), and participants who had only been exposed to Spanish at home, children of people from southern Spain who had moved to the area in which the data collection took place thus beginning to learn Catalan at school (L1-Sp-L2-Cat).

2. **Language dominance.** Amongst many other variables, language dominance might be a factor conditioning the selection of L3 transfer. The role that language dominance plays is inconclusive due to the lack of studies testing it (see Fallah, Jabbari & Fazilatfar 2016; Fallah & Jabbari 2018; Lloyd-Smith et al. (2017); Puig-Mayenco, Miller & Rothman 2018). A main limitation of all these studies is the fact that language dominance is treated as a categorical variable, entailing that one is dominant in one or the other language. Such an approach can be extremely informative for some questions; however, it might be underestimating nuances implicit to the dynamic nature of what it means to be dominant in one or another language (see Silva-Corvalán & Treffers-Daller 2015). Therefore, in this study, we treat language dominance as a variable along a continuum. To this end, we used the Bilingualism Language Profile (Birdsong, Gertken, & Amengual, 2012) that allowed us to have such a continuum, giving us a score from -218 to +218. In our coding system, a score ranging from -218 to 0 implied that the participant was Spanish dominant and a score ranging from 0 to +218 implied that the participant was Catalan dominant. Of course, such a continuum also captures the fact that one participant might be more balanced than another; this can be observed with a score that sits around 0.

3. **Other-Language Used in Instruction.** When necessary, Catalan or Spanish was used in the classroom in a systematic way. Which language was used was coded binarily: Catalan-used in instruction versus Spanish instruction, meaning that those in the Catalan-used group always received basic instructions in Catalan; those in the Spanish-used group in Spanish.

4.3. Participants

Participants were residents of and tested in Osona (Spain), divided into two groups that differed in the order of acquisition of Catalan and Spanish. The first group consisted of L1 speakers of Catalan who were child L2 learners of Spanish, while the opposite was the case for the second group. The inclusion criteria for the study were the following:

(i) they were speakers of Catalan and Spanish who were born and raised in Osona,
(ii) they were *ab initio* learners of English (no previous exposure to English),

(iii) they had completed the task in the three languages, showing distinct representations with regard to the two experimental conditions under consideration in Catalan and Spanish (Catalan and Spanish tested after the L3 and in a counterbalanced manner),[3]

(iv) they had 80% accuracy in the distractors of the experimental task in the L3 experiment (ensuring they could perform the task itself).

Overall, of the 73 participants who agreed to attend the testing sessions, 33 (45.21% of the entire sample) had to be excluded for one (or more) of the reasons listed above. These 33 participants were distributed across the four inclusion criteria as described above, and a participant could be excluded for more than one of the four reasons. A large portion of the participants (n=19) were excluded due to fact that they were not true *ab initio* learners, but rather low proficiency learners with 12- 48 months of previous instruction in English. Of the 40 participants who were finally included in the analysis, 18 continued to take English lessons in either a tutored or classroom setting. These participants were tested again 11 months after the first testing session to explore for developmental trajectories in L3 acquisition. The following table contains the information about the participants who were included in the final analysis:

Table 1 Information about the participants (Mean and SD for continuous variables)

Details	**L1Cat-L2Sp (N=22)**	**L1Sp-L2Cat (N=18)**
Age	51.4 (7.5)	50.1 (4.11)
Sex	M=5; F=17	M=7, F=11
L3 Proficiency[4]	5.4 (1.8) out of 60	5.2 (1.2) out of 60
Language Dominance[5]	81.7 (85.6)	-8.16 (103.6)
N in the Cat-Ins group	10/22	9/18
N in the Sp-Ins group:	12/22	9/18
N of participant tested longitudinally	12/22	6/18

[3] We looked at the individual Catalan and Spanish data for each speaker to make sure they treated Catalan NCIs and Spanish NCIs as expected from the theoretical descriptions.

[4] Although the participants were all *ab initio*, we still decided to control for their proficiency in English after the two-month course. They took part in the Oxford Quick Placement Test. The participants were instructed to stop when they felt they did not understand something.

[5] Language dominance is distributed differently for the two groups; the L1-Spanish-L2-Catalan group is more balanced than the L1-Catalan-L2-Spanish group overall. However, given that the score falls within a continuum, we capture individual differences that exist in each group, e.g. L1-Spanish-L2-Catalan speakers that are more Catalan-dominant and vice versa.

4.4. Task

4.4.1. Grammaticality Judgement Task

We administered a Grammaticality Judgement Task (GJT) in each language (English, Catalan and Spanish). In both tasks, there were four contexts and 8 conditions. The first two contexts (*Nobody/Anyone…VERB*; *VERB…nothing/anything*) were two control contexts where no variation was expected because both Catalan and Spanish behave similarly in these contexts. The second two contexts (*Nobody/Anybody…NOT* and *Conditional…nothing/anything*) were the two contexts of interest where variation would be expected depending on transfer source. Table 2 contains the contexts, conditions, and exemplar items.

Table 2. Conditions and exemplar items of the GJT

Context	Condition	Exemplar Item	n=
1 Control	Nobody…V	Nobody speaks Japanese.	4
	Anybody…V	Anybody eats apple.	4
2 Control	V…nothing	The boy eats nothing at the restaurant.	4
	V…anybody	The girl drinks anything at the pub.	4
3 Experimental	Nobody…not	Nobody does not eat pizza.	4
	Anybody…not	Anybody does not drink coffee.	4
4 Experimental	Con…nothing	Call me if the students eat nothing!	4
	Con…anything	Call me if the teachers drink anything!	4

The GJT was a means to validate the findings of the interpretations of the PSM task, not least because the PSM requires parsing of sentences that would be ungrammatical in Spanish and not Catalan which, in principle, could favor Catalan. And so, the GJT data serve to demonstrate grammatical sensitivity stemming from either Catalan or Spanish when it can be teased out. For example, rating sentences in context 3 and 4 as "acceptable" or "unacceptable" would show sensitivity to violations that could only come from Catalan or Spanish respectively. As this is relevant specifically for establishing the baseline, we only present the data from the GJT for TIME 1. In addition to the 32 experimental items, there were 32 distractors. Participants were asked to rate the grammaticality of each token by using a 1-to-4 scale (at both ends of the scale, learners saw "1= not grammatical" and "4= grammatical"). In addition to these four options, they were given a "not sure" option.

4.4.2. Picture-Sentence Matching Task

The experimental task consisted of a Picture-Sentence Matching Task (PM) to tap into how the L3 learners interpreted negative quantifiers and negative polarity items in eight different conditions that can be grouped in the four same contexts used in the GJT, as can be seen in table 3.

Table 3. Contexts, Conditions, Example items and Interpretations.

Context	Condition	Example	Picture A*	Picture B
1	*Nobody…V*	Nobody drinks coffee.	Double	Single
Control	*Anybody…V*	Anybody drinks coffee.	Negation	Negation
2	*V…nothing*	Mary drinks nothing.	Double	Single
Control	*V…anybody*	Mary drinks anything.	Negation	Negation
3	*Nobody…not*	Nobody doesn't drink coffee.	Double	Single
Exper.	*Anybody…not*	Anybody doesn't drink coffee.	Negation	Negation
4	*Con…nothing*	Mary will call us if Peter drinks nothing.	Existential	Negative
Exper.	*Con…anything*	Mary will call us if Peter drinks anything.	Interpretation	Interpretation

Each condition had four experimental items. In addition to the experimental conditions, we added 32 fillers consisting of sentences with the same structures, but without either negative quantifiers or negative polarity items. The sentences were all presented in a random order for each individual and the pictures were also presented pseudo-randomly on either the left- or the right-hand side of the screen. Each test sentence with a set of two pictures appeared individually on the screen (see Figure 1 for a screenshot of an experimental item).

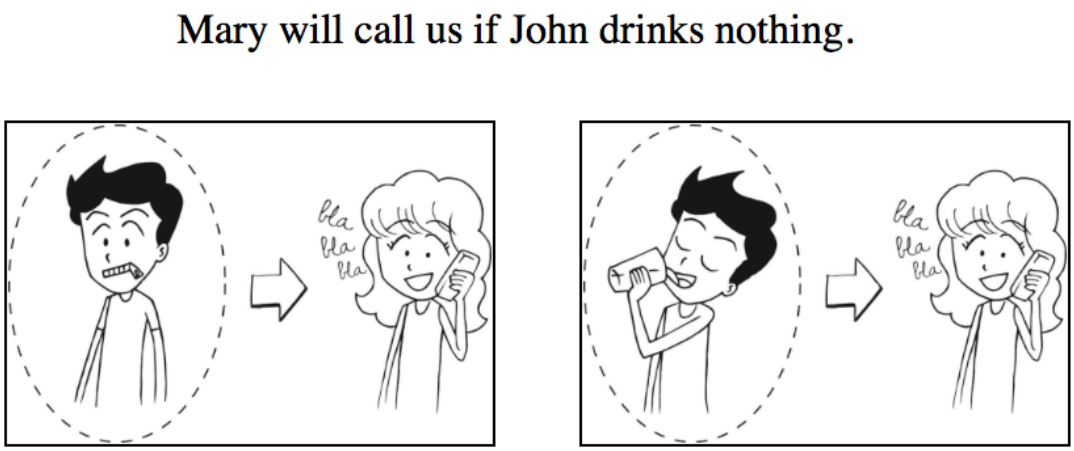

Figure 1 Screenshot of an experimental item

4.4.3. Procedure

All tasks were hosted in the IBEX software and done in a lab-environment. Participants did all L3 tasks (English) first, followed by the Catalan and Spanish versions in different testing sessions with 1-week intervals in-between. Participants were instructed to read the instructions and do four practice items. They were then given the opportunity to ask anything they were unsure of. The tasks were untimed, but participants were told to do them at a normal pace without overthinking their answers. In each testing session, there were four different tasks (we only report on two of them in this study). The tasks were presented to each participant in a pseudo-random order.

4. Results and discussion

4.5. Data analysis

All analyses were run in the statistical software *R* (R Core Team, 2016). Separate models were run for each context within each task. Given that the data across the two experiments are different in nature, distinct modeling was used for each experimental type. Data for the GJT were analyzed using linear mixed effects models with crossed random effects for subject and items (Bayeen, et al. 2008), using the packages *lme4* (Bates, et al., 2013) and *multcomp* (Hothorn, et al., 2004) for planned post hoc comparisons. The models for this task were fit to continuous data (1-to-4) and included fixed effects (specified for each model below) and by-participant and by-item random intercepts.

Data for the PSM were analyzed using Generalized Mixed-Effects Logistic Regression models to explore each time of testing, the first corresponding to initial stages and the second after 11 months of development. Models for this task were fit to the binomial response data. Each model included fixed effects (specified for each model below) and by-participant and by-item random intercepts, by using the lme4 package. Responses were coded as 1 and 0. Recall there were 8 conditions grouped into four contexts. For the two control contexts (*Nobody/Anybody...VERB; VERB...nothing/anything),* 1 was given for the negative interpretation of either the negative quantifier or negative polarity item. For the first critical context (*Nobody/Anybody…NOT*), 1 was given for double negation readings (Spanish-like) and 0 for the Single Negation reading (Catalan-like). For the second critical context (Conditional… nothing/anything), 1 was given for responses capturing a negative reading (Spanish-like) and 0 for the responses capturing an existential reading (Catalan-like).

4.6. Time 1 analysis: Grammaticality Judgement Task (GJT)

In table 4, we present the ratings of acceptance for all the different contexts and conditions in the Grammaticality Judgement Task, presented separately depending on whether the L1 was Catalan or Spanish.

Table 4. Mean (Acceptance) of the Grammaticality Judgement Task of each condition for the learners in TIME 1 of testing.

		L1-Cat (n=22)		L1-SP (n=18)	
Context	CONDITION	Mean	SD	Mean	SD
1[a] Control	Anyone…VERB	3.57	0.78	3.63	0.79
	Nobody…VERB	3.78	0.66	3.59	0.66
2[b] Control	VERB…anything	1.39	0.80	1.74	1.06
	VERB…nothing	1.40	0.77	1.34	0.69
3[c] Experimental	Anyone…NOT	3.43	0.95	3.31	1.09
	Nobody…NOT	3.06	1.01	3.36	0.94
4[d] Experimental	CON...anything	3.32	1.08	3.13	1.07
	CON...nothing	3.01	1.24	3.41	0.95

a. Grammatical in English. Catalan and Spanish; b. Grammatical in English. Ungrammatical in Catalan and Spanish. c. Ungrammatical in English and Spanish. Grammatical in Catalan. d. Grammatical in English and Catalan. Ungrammatical in Spanish.

The statistical models tested the effects and interactions of Condition, Order of Acquisition, Language Dominance and Other-Language Used in Instruction (Catalan or Spanish) on the judgements (1-to-4). A preliminary analysis showed that "Order of Acquisition" was not a significant predictor in any of the contexts, and so it was excluded from the final analysis. Full models can be found in Appendix A. We summarize the outcomes in table 5:

Table 5. Summary of the statistical models in TIME 1 analysis for the Grammaticality Judgement Task.

Model		Outcome
Model 1:	Nobody/Anybody…VERB	No significant effects or interactions
Model 2:	VERB…nothing/anything	No significant effects or interactions
Model 3:	Nobody/Anybody…NOT	No significant effects or interactions
Model 4:	Conditional…nothing/anything	No significant effects or interactions

As can be seen from the results, both groups of learners did as we had predicted for the two control contexts. They rated as highly grammatical (3.78 and 3.57, respectively) the sentences in the expected grammatical control context ('Nobody/Anybody…VERB'), recall that this context was grammatical in both Catalan and Spanish. As for the other control context ('VERB…Nothing/Anything'), learners rated these sentences as highly

ungrammatical (1.39 and 1.40, respectively). This is again what we had predicted because these sentences are ungrammatical in both Catalan and Spanish.

Turning to the two contexts where the source of transfer can be teased apart, we see that both groups of learners rated as grammatical sentences in the 'Nobody/Anybody…NOT' context (3.06 and 3.43, respectively), patterning like in Catalan. Recall that these sentences are grammatical in Catalan and ungrammatical in Spanish. As per the sentences in the 'Conditional…nothing/anything' context, learners again rated these sentences patterning like Catalan and not Spanish (3.01 and 3.32, respectively), whereby these sentences are grammatical in Catalan but ungrammatical in Spanish. Overall, the picture suggests that learners rate the grammaticality of these sentences in a Catalan-like pattern for both key conditions.

4.7. TIME 1 analysis: Picture-Sentence Matching Task (PSM)

Table 6 shows the raw counts and percentages for all the different contexts and conditions in the PSM task presented separately depending on whether the L1 was Catalan or Spanish.

Table 6. Raw counts and percentages (%) of the interpretations of each condition for the learners in TIME 1 of testing.

		L1-Cat (n=22)		L1-SP (n=18)	
Context	CONDITION	Raw count	Percentage	Raw count	Percentage
1[a] Control	Anyone…VERB	82/88	93.18	68/72	97.22
	Nobody…VERB	81/88	93.06	70/72	94.44
2[b] Control	VERB…anything	47/88	53.41	52/72	72.22
	VERB…nothing	49/88	55.68	51/72	70.83
3[c] Experimental	Anyone…NOT	11/88	12.5	7/72	9.72
	Nobody…NOT	7/88	7.95	10/72	13.88
4[d] Experimental	CON...anything	7/88	7.95	10/72	13.88
	CON...nothing	9/88	10.22	10/72	13.88

Counts and percentages of: [a] negative interpretations; [b] negative interpretations; [c] DN interpretations; [d] negative readings.

The models for this dataset tested the effects and interactions of Condition, Language Dominance and Other-Language Used in Instruction (Catalan or Spanish) on the interpretations (coded as 1 and 0). As was the case for the GJT data, order of acquisition was excluded from the final model. The full models can be seen in Appendix B. Table 7 provides a summary of the models.

Table 7. Summary of the statistical models in TIME 1 analysis for both the Picture-Sentence Matching task and the Grammaticality Judgement Task

Model		Outcome
Model 5:	Nobody/anybody…VERB	No significant effects or interactions
Model 6:	VERB…nothing/anything	Main effect of Dominance Score (p <.05) Interaction Condition*DomScore (p.<001)
Model 7:	Nobody/Anybody…NOT	No significant effects or interactions
Model 8:	CON…nothing/anything	No significant effects or interactions

In the first control context ('Nobody/Anybody…*VERB*'), all learners had ceiling percentages of negative readings as expected considering that Catalan, Spanish and English behave similarly. With regard to the 'VERB…nothing /anything' context, contrary to our initial predictions, participants did not interpret the sentences with negative readings consistently. Recall that these sentences are ungrammatical in both Catalan and Spanish. Thus, we hypothesized that the participants would rescue the sentences and interpret them with a negative reading due to the inherent negative meaning of the negative concord items. The model showed that there was a main effect of language dominance (p <.05) and a significant interaction of language dominance with condition (p<001). The results indicate that the more dominant a learner was in Catalan, the more likely he or she was to give existential readings for the negative quantifiers and negative polarity items. On closer examination of their responses in the Catalan and Spanish versions of the tasks, we saw that the same effect was seen in the Catalan data.[6] The speakers who were more dominant in Catalan gave the Catalan negative concord item ('*res*') more existential readings than did the speakers who were more dominant in Spanish. For the Spanish data, there was no effect, in that all the participants interpreted the negative concord item ('*nada*') as having a negative meaning. Why would this be so? These sentences are ungrammatical in both Catalan and Spanish; thus, it might be the case that the participants were rescuing the existential interpretation of Catalan negative concord items allowed in other contexts and over-extending it to repair the ungrammatical sentences in this context. Such a process would not be seen in Spanish due to the fact that Spanish does not generally allow for existential readings of negative concord items in other contexts. Irrespective of what the reason for these unexpected interpretations is,

[6] The model on the Catalan data also showed a significant main effect and an interaction between Condition and Language Dominance.

given these participants' performance on the Catalan version of this task, it seems clear that their Catalan-interpretations were transferred into L3 English.

With regard to the two critical contexts that allow for a differentiation between the source of the transfer ('Nobody/Anybody…NOT'; 'Conditional…nothing/anything'), we note that the entire pool of participants had quite consistent interpretations in the two different contexts. In the 'Nobody/Anybody…NOT' context, the participants interpreted the sentences as Single Negation readings (as is expected from transfer from Catalan), they only showed double negative readings for these sentences less than 15% of the time. Recall that, in this context, Spanish would have had a facilitative effect for the Negative Quantifier because both Spanish and English give rise to double negation readings in this context, whereas Catalan does not. The statistical model showed no significant main effect or interaction for any of the factors under consideration. This shows that, irrespective of language dominance and the Other-Language Used in Instruction, Catalan was transferred across the board.

Turning now to the 'Conditional…nothing/anything' context, we note that the participants also had uniform interpretations for the negative quantifiers and negative polarity items in the conditional context. They assigned existential interpretations to both most of the time and there were no significant main effects or interactions. In this case, transfer from Catalan was an instance of non-facilitation for the negative quantifier and an instance of facilitation for the negative polarity item, given the actual target mappings in English.

4.8. TIME 1 analysis: Interpreting the results

It is useful to highlight in summary that data from both tasks converge, that is, the data from GJT and PSM all point in the same direction. This is important, not the least because in the PSM task we are asking for interpretations of sentences where the two transfer source languages differ in grammaticality. Should it be the case that Catalan is somehow preferred as the source for interpretation because all contexts are grammatical in Catalan, then we would not expect the data from the GJT to converge with the data from the PSM. As we saw above, it did. Having established on the basis of these converging data the apparent initial representations of NCIs in the participants L3 English, and thus the baseline for the longitudinal study, we focus exclusively on the PSM in the next sections.

The fact that both groups of L3 learners behaved similarly in both tasks suggests that (a) there is seems to be no privileged, default transfer system for early bilinguals acquiring an additional language in adulthood and (b) none of the additional factors under consideration were deterministic for transfer selection. The data seem to be compatible with the predictions made by the Typological Primacy Model (TPM) insofar as we see transfer from a single source irrespective of participant type and the source language, Catalan, is predicted by the TPM selection hierarchy (Rothman, 2015) to be chosen. And so, why would the parser choose Catalan and not Spanish? The linguistic triad consisted of speakers of two closely related languages acquiring a third, non-genetically related one. Puig-Mayenco and Marsden (2018) applied the TPM hierarchy to this same language triad, arguing that since the lexicon of each is not more similar than the other to English it is necessary to move to the next level in the TPM's hierarchy. At the level of phonotactics/phonology, Catalan is the clear winner given various prosodic features, such as its stress timed status, vowel reduction, final consonant clusters, devoicing of final plosives, phonemic inventory overlapping to name but a mere few just at this level (see González Alonso, Puig-Mayenco, Fábregas & Rothman, 2019).

As we are looking at a single domain of grammar, Negative Concord Items (NCIs), albeit in distinct contexts, our design does not produce data that are able to fairly speak to whole-sale versus property-by-property transfer per se. Because the data seem to suggest an underlying structural motivation for Catalan transfer, they can be compatible with property-by-property models stressing a deterministic role of underlying linguistic structure, such as the LPM, but only in the case the LPM would predict Catalan as the (sole) source of transfer. It is not clear to us if this is indeed the a priori prediction following from the tenets of the LPM. It seems to us that the LPM could equally have expected some transfer from Catalan and some from Spanish, depending on the boundary it conceives for what a "property" is. If a property is for the LPM, as we have defined it here as NCIs, then perhaps a single source is expected by the LPM and it could very well be Catalan. However, in the absence of an LPM-specific selection hierarchy or other articulated heuristics for determining underlying "linguistic proximity" we are left unsure as to what the prediction would be. If, alternatively, the LPM conceives of a property differently, for example, each condition tested would qualify as a separate property then the present data would provide evidence of a single transfer source across several

properties. It would then need to be explained why, as different properties, other available sources (Spanish) were not transferred when it was in this sense more structurally similar.

One could also argue that the dataset is compatible with a recent proposal by Jabbari, Achard-Bayle, and Ablali (2018), which claims that the language used in the society would be transferred. Our design did not allow us to tease apart the predictions of the TPM and the predictions of this proposal. All of our participants lived in a Catalan-dominant area in which Catalan was the main language used in daily interactions in the society (see Illamola 2015, for a sociolinguistic analysis of the area in which our data were collected). It would be interesting to see whether this held true in a much bigger dataset with more speakers in each side of the dominance scale and with participants who live in more Spanish-dominant areas. A question arising from this proposal is why the societal language should be a determining factor for transfer selection. If we take this to be a proxy for language use, activation and entrenchment of the system in the speakers' mental representation, we should also expect to see an effect of language dominance in our study. This, however, was not revealed to be a significant predictor at the initial stages. To the extent that societal language is an influence, its effects are potentially attenuated in societal bilingual contexts such as the present one.

4.9. TIME 1 versus TIME 2 analysis: A look at developmental trajectories

Having now established a baseline of transfer in TIME 1 of testing, we can now meaningfully address research question 2 and 3 (repeated below), the most novel and interesting part of this study.

R2. What are the variables that modulate L3 development from the point of initial transfer?

R3. Are the variables and/or their weighting conditioning developmental trajectories similar to or different from those in initial transfer selection?

Of the 40 participants in TIME 1, 18 of them continued to learn English, uninterrupted, in a classroom setting. We tested them 11 months later with the same materials— presented in a distinct pseudo-randomized order— to see whether they had started to acquire the inherent properties of the negative quantifiers and negative polarity items in L3 English. The raw results and percentages are shown in table 8.

Table 8. Raw counts and percentages (%) of the interpretations of each condition for the learners in TIME 1 and TIME 2 of testing.

		TIME 1		TIME 2	
Context	CONDITION	Raw count	Percentage	Raw count	Percentage
1[a] Control	Anyone…VERB	69/72	95.83	70/72	97.22
	Nobody…VERB	67/72	93.06	67/72	93.06
2[b] Control	VERB_anything	47/72	65.27	66/72	91.67
	VERB…nothing	49/72	68.05	67/72	93.06
3[c] Experimental	Anyone…NOT	7/72	9.72	25/72	34.72
	Nobody…NOT	7/72	9.72	26/72	36.11
4[d] Experimental	Conditional...anything	8/72	11.11	39/72	54.17
	Conditional...nothing	12/72	16.67	61/72	84.72

Counts and percentages of: [a]negative interpretations; [b] negative interpretations; [c] DN interpretations; [d] negative readings.

Introducing TIME as a variable into the same analysis one performed in the initial stages study, we compared responses in the four contexts in TIME 1 and in TIME 2 of testing which will indicate if they are now giving more or less English-like interpretations. Firstly, we present the summaries of the omnibus models for the two control contexts ('Nobody/Anybody...VERB'; 'VERB...nothing/anything') in table 9.

Table 9: Generalized mixed-effects models for the *ab initio* learners.[7]

Model: Nobody/Anybody…VERB			
	OR	CI: LL, UL	*p*
Intercept (Ref: VERB...anything, TIME 1)	22.65	6.87; 74.34	<. 001
Condition	2.65	.23; 30.19	= .43
Dominance Score	1.01	.99;1.01	= .91
TIME	1.67	.23;12.09	= .61
Condition*Dominance Score	0.98	.96; 1.01	= .06
Condition*TIME	0.16	.01;3.84	= .26
Dominance Score*TIME	1.01	.99;1.02	= .41
Condition*Dominance Score*TIME	1.02	.98;1.02	= .71
Model: VERB…nobody/anybody			
	OR	CI: LL, UL	*p*
Intercept (Ref: VERB...anything, TIME 1)	1.95	1.77; 3.27	<. 001
Condition	1.16	.55; 2.43	= .693
Dominance Score	.99	.99; 1.01	= .608
TIME	7.35	2.23; 24.23	<. 001

[7] In a first exploratory model "Order of acquisition" was also included. It did not come out as significant and did not improve the model fit. We decided not to include it in the final analysis because (a) it was not explaining any variance in the data and (b) the number of participants with L1 Catalan and L1 Spanish was not balanced.

Condition*Dominance Score	.99	.99;1.01	= .857
Condition*TIME	2.83	.27;29.61	= .383
Dominance Score*TIME	.99	.98; 1.01	=.462
Condition*Dominance Score*TIME	.99	.97; 1.01	= .317

As was expected, the model targeting the 'Nobody/Anybody...VERB' context did not show any significant predictors, and this was no different than in TIME 1. Given the previous languages, this is not a clear context to look for transfer— it was a control condition— because all three languages work the same. And so, we would not expect any change as the target was already attained and no evidence from English as they progress should counter this early facilitation. For 'VERB…nothing/anything' context TIME proved significant. Participants were 7.35 times more likely to interpret both the Negative Quantifiers and the Negative Polarity Items as having negative readings in TIME 2. Recall that, at TIME 1, some of the learners showed unexpected existential readings in this context, and that this was captured in the model by their degree of dominance in Catalan. In TIME 2, the effect of language dominance was no longer evident, and the learners had target-like interpretations in this context.

The summaries of the omnibus models for the two experimental critical contexts ('Nobody/Anybody…NOT'; 'Conditional…nothing/anything') are presented in the table 10.

Table 10: ***Generalized mixed-effects models for the*** **ab initio** ***learners.***

Model: Nobody/Anybody…NOT			
	OR	CI: LL, UL	*p*
Intercept (Ref: NPI...SN; TIME 1)	.05	.01; .19	<. 001
Condition	1.99	.43; 9.32	.382
Dominance Score	1.01	.99; 1.02	.051
TIME	11.71	2.86; 47.73	<. 001
Condition*Dominance Score	.99	.97; 1.01	.141
Condition*TIME	.59	.11; 3.31	.549
Dominance Score*TIME	.98	.97; .99	<. 001
Condition*Dominance Score*TIME	1.01	.98; 1.01	.559
Model: Conditional…nobody/anybody			
	OR	CI: LL, UL	*P*
Intercept (Ref: Con...NPI; TIME 1)	.13	.06; .27	<. 001
Condition	1.58	.59; 4.26	= .358
Dominance Score	.99	.99; 1.01	= .431
TIME	16.21	5.98; 43.86	<. 001
Condition*Dominance Score	0.99	.98; 1.01	= .353

Condition*TIME	4.97	.86; 28.61	= .072
Dominance Score*TIME	.98	.97; .99	<. 05
Condition*Dominance Score*TIME	1.01	.98; 1.01	= .614

The results of the model targeting the first critical context ('Nobody/Anybody…NOT') showed that there was a significant main effect of TIME, indicating that the learners were 11.71 times more likely to have double negation readings of the negative quantifiers and the negative polarity items at TIME 2, and a significant interaction of TIME and language dominance. This effect is shown in Figure 2 below.

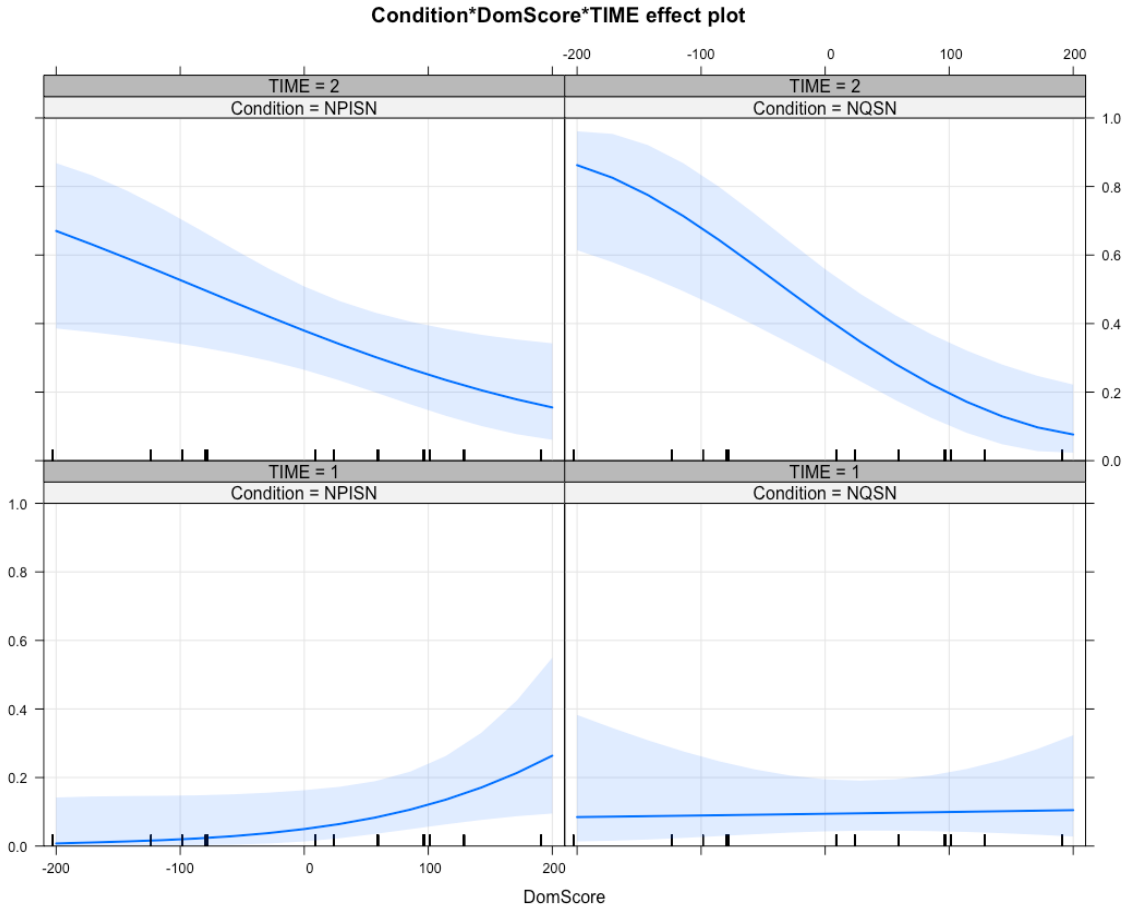

Figure 2 Plot of Interaction of Condition*Dominance Score* Time for the *Nothing/Anything...NOT* conditions.

On the x-axis, we have the score for language dominance (-200 = absolute Spanish dominance; +200 = absolute Catalan dominance, in between scores reflect relativity) and the predicted response of double negation interpretations on the y-axis (1 = Double negation reading, 0= Single Negation reading). We observe that the more dominant someone is in Spanish, the more double negation readings obtained in TIME 2. There was also a main effect of TIME and a significant interaction of TIME with language

dominance in the *Conditional…nothing/anything* context. The effect is plotted in figure 3 below.

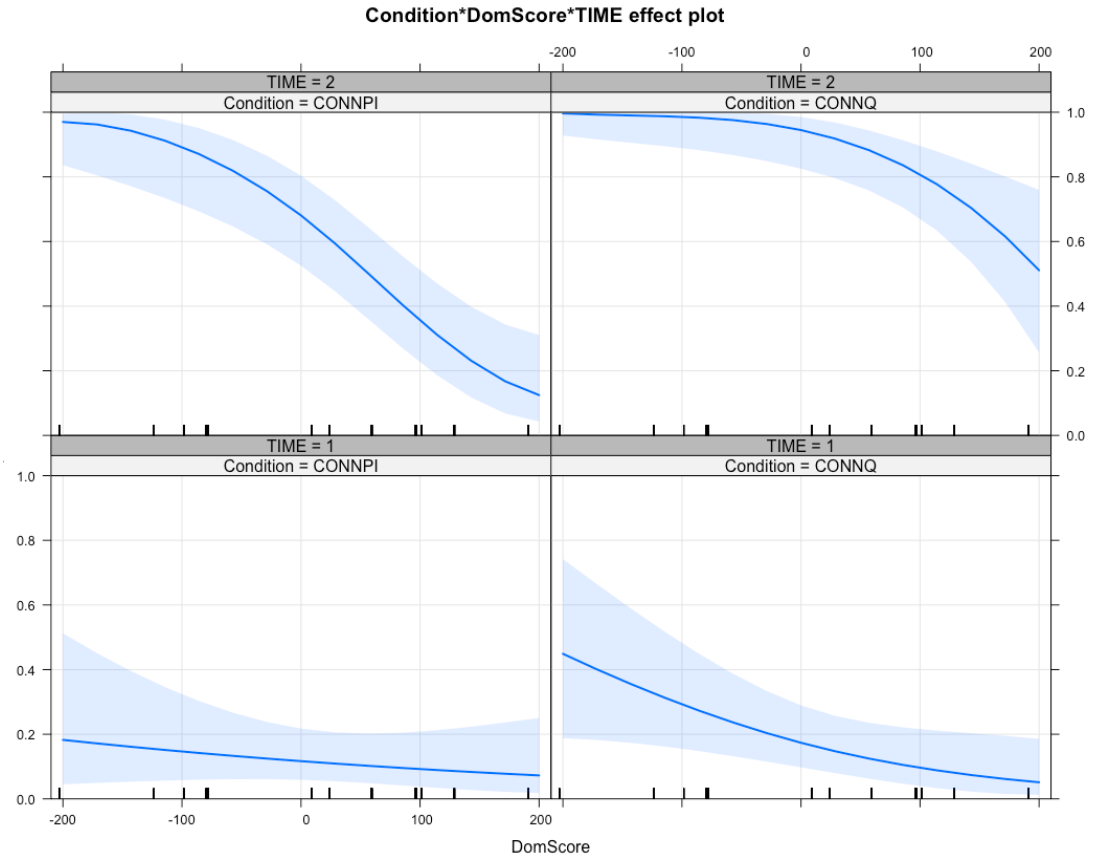

Figure 3 Plot of Interaction of Condition*Dominance Score* Time for the *Conditional...NQ/NPI* conditions.

As above, we have the score for language dominance on the x-axis and the y-axis contains the predicted response for negative interpretations (1 = Negative reading, 0 = Existential reading). What we can conclude from the effect is that the learners were uniformly assigning negative readings to both the negative quantifiers and the negative polarity items in the conditional context at TIME 2 of testing. The effect, however, was modulated by their language dominance score: the more dominant they were in Catalan, the fewer negative interpretations they had for the conditions. For the condition with the negative quantifier, this implies that those who were more dominant in Spanish already had target-like interpretations (i.e., assigning negative readings to negative quantifiers). That is, they had overcome non-facilitation earlier than their counterparts. Even though we saw in TIME 1 that dominance did not modulate Catalan transfer effects early on, it seems that recovery from initial stages transfer— in this case overcoming existential interpretations of the negative quantifier—is more costly (more difficult) with increased dominance.

This is reminiscent of what Cabrelli et al. (2020) show in their work on differential trajectories for recovery from Spanish transferred Differential Object Marking (DOM) in L3 Brazilian Portuguese. Recall, they showed that the status of Spanish, whether it was an L1 or L2, mattered for the rate of acquiring BP. That is, on average it took L1 Spanish individuals longer to get DOM out of their BP grammars. Following up from this work, Cabrelli and Iverson (in prep.) offer a formal hypothesis to cover the data in Cabrelli et al. (2020) and attempt to generalize the effect by considering yet another group, Spanish Heritage speakers. According to their *Cumulative Input Threshold Hypothesis (CITH)*, recovery from transfer is proportional to the amount of input one has had in the language that was transferred. They show that adult L2ers recover faster than native speakers of Spanish who have been exposed since birth to Spanish, be them Heritage Spanish speakers or Spanish-dominant L1 natives learning L3 BP. Since heritage speakers receive significantly less input than dominant-native speakers over time (Montrul, 2008; Rothman, 2009; Polinsky, 2018), the CITH seemingly predicts that heritage speakers would recover more quickly as well. However, these are early days of the hypothesis and it is not clear what the best timing, in terms of either relative proficiency in the L3 or absolute time of exposure to the L3, for capturing expected HS vs. dominant-native L1 differences in transfer recovery. After all, in the case of both HSs and dominant-native L1 speakers we would imagine that representations are significantly and sufficiently entrenched, and to a much closer degree to each other than either would be to an L2. The bottom line is that transfer recovery is not always the same, the more entrenched a property is in the source language the more input needed to abandon the transferred form for the L3 target.

We think this hypothesis is on the right track and in some ways could cover our data, were it not for CITH's claim that dominance as a separate variable brings nothing to bear. They come to this conclusion precisely because in their data HSs, despite being dominant in English like the L2ers, did not yet recover from transfer like their L2 counterparts had. The present data call into question the dismissal of dominance as a separate explanatory variable. Dominance is not always as homogenous as it might be for HSs (although not all HSs are clearly dominant in their L2, see Kupisch & Rothman, (2018)). In our case, by using dominance as a continuous variable, we can tease apart dominance in a more nuanced way. We can do so precisely because our context is one where there is a potential for balanced bilingualism. Additionally, there is a spectrum of

dominance where, like in the case of HSs, L1 does not necessarily default to the dominant language but even when it does not (because for some individuals it does) each individual is always exceedingly highly proficient in the other language and has had a shared experience of education in both languages (so access to literacy and the standard variety). And so, while we agree with the general tenets of *CITH* we suggest that the underlying cause for the differences in development over time might have more to do with dominance *par excellence* than a cumulative (qualitative) threshold to be overcome. This can only be examined where the two do not necessarily coincide. In principle this could be tested in the future in contexts like the Catalan-Spanish learning L3 X scenarios since in such cases, and for millions of speakers who grow up in bilingual societies, relative dominance in one or the other language does not necessarily mean more or less entrenchment in one or the other language.

The answer to R2 has been amply discussed: of the array of variables we have tested for only dominance seems to stand out. The importance of dominance in this case (and the fact that it underlies variation in development due to previous linguistic experience) is compatible with insights brought to the fore by two recent proposals, the Linguistic Proximity Model (Westergaard, et al. 2017) and the Scalpel Model (Slabakova, 2017). Both of these approaches highlight the dynamic nature that variables such as dominance (and yet other factors) add to the learning task in additive multilingualism and, crucially, differences that obtain between various types of bilinguals and language pairings learning the same L3. Recall that R3 asked whether the variables that condition initial transfer are the same or different to those that condition multilingual development. Our data are clear: whereas there was no difference in how initial stages transfer obtained, there are clear and predictable differences in development based on dominance. Above, we discussed a promising explanation that might underlie this in the form of *CITH* (Cabrelli & Iverson, in prep): recovering from non-facilitative transfer might be differentially more or less costly depending, at least, on the type of bilingual one is given the differential experiences with language that tend to be true of distinct types and groups. Future research will show if this is on the right track and, indeed, what other variables might conspire to explain more of the variation in L3/Ln development and ultimate attainment.

5. Conclusions

Our study has shown that extra-linguistic factors such as language dominance, order of acquisition and the language of instruction were not deterministic for transfer selection in L3/L*n* acquisition. We showed, that irrespective of these factors, structural similarity is the most deterministic factor in the case of early bilinguals acquiring a third language (Rothman et al. 2019; Westergaard, 2019; Westergaard, et al., 2017) in two tasks, a Grammaticality Judgement Task and a Picture-Sentence Matching task. More importantly, the longitudinal nature of our design shifted the focus towards development— the first of its kind— revealing that developmental sequencing after initial stages transfer is dynamic and non-uniform depending on language dominance in the previous acquired languages. This study highlights the fruitful nature of longitudinal design in the emerging field of L3/L*n* acquisition, the principled way variation in the acquisition process takes shape as well as the importance and utility of capturing the baseline of transfer at the initial stages for the creation of developmental theories of L3 acquisition proper.

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Appendix A: Linear Mixed-Effects Models for the GJT dataset

Model 1: Nobody/Anybody…NOT condition			
	Estimate (SE)	**t-value**	**p-value**
(Intercept) Ref: Anything…VERB; Instruction-Cat	3.91 (.07)	52.37	< .001
Condition	-0.01 (.11)	-0.11	= .981
DomScore	.01 (.01)	1.28	= .208
Instruction	.02 (.01)	.14	= .883
Condition*DomScore	-0.01 (.01)	-0.33	= .736
Condition*Instruction	-0.04 (.18)	-0.26	= .794
DomScore*Instruction	-0.01 (.01)	-0.96	= .343
Condition*DomScore*Instruction	0.09 (.01)	.54	= .589
lmer(ScaleResponse ~ Condition * domscore * Instruction + (1|ID) + (1|Item), data=gjtNXV) // Hedges g: 0.305			
Model 2: Verb…Nothing/Anything condition			
	Estimate (SE)	**t-value**	**p-value**
(Intercept) Ref: VERB…anything; Instruction-Cat	1.57 (.16)	8.87	< .001
Condition	.05 (.25)	.23	.822
DomScore	-0.01 (.01)	-1.49	.144
Instruction	.35 (.31)	1.17	.251
Condition*DomScore	.01 (.01)	1.11	.274
Condition*Instruction	-0.65 (.41)	-1.61	.119
DomScore*Instruction	.01 (.01)	0.53	.597
Condition*DomScore*Instruction	-0.01 (.01)	-0.48	.632
lmer(ScaleResponse ~ Condition * domscore * Instruction + (1|ID) + (1|Item), data=gjtVNX) // Hedges g: -0.127			
Model 3: Conditional…Nothing/Anything			
	Estimate (SE)	**t-value**	**p-value**
(Intercept) Ref: Conditional…anything; Instruction-Cat	3.66 (.09)	37.66	< .001
Condition	0.15 (.15)	1.01	= .322
DomScore	-0.01 (.01)	-1.23	= .221
Instruction	.13 (.17)	.73	= .471
Condition*DomScore	.01 (.01)	1.73	= .091
Condition*Instruction	-0.14 (.23)	-0.63	= .538
DomScore*Instruction	.01 (.01)	.81	= .423
Condition*DomScore*Instruction	-0.01 (.01)	-1.68	= .099
lmer(ScaleResponse ~ Condition * domscore * Instruction + (1|ID) + (1|Item), data=gjtCON) // Hedges g: 0.185			
Model 4: Nobody/Anybody…NOT			
	Estimate (SE)	**t-value**	**p-value**
(Intercept) Ref: Anything…NOT; Instruction-Cat	3.63 (.11)	31.82	< .001
Condition	.07(.18)	.39	.692
DomScore	.01 (.01)	1.42	.162
Instruction	.05 (.21)	.24	.805
Condition*DomScore	-0.01 (.01)	-1.63	.112
Condition*Instruction	-0.12 (.27)	-0.41	.686
DomScore*Instruction	-0.02 (.01)	-0.099	.323
Condition*DomScore*Instruction	-04 (.01)	1.71	.096
lmer(ScaleResponse ~ Condition * domscore * Instruction + (1|ID) + (1|Item), data=gjtNXSN) // Hedges g: 0.103			

Appendix A.1: Planned comparisons for the Grammaticality Judgement Task (Other Language of Instruction and Condition)

Comparisons for the Anything/Nothing…VERB condition			
Contrasts	**Estimate (SE)**	**t-value**	**p-value**
NPI-V, Ins-Cat vs. NQ-V, Ins-Cat	.03 (.13)	.25	.994
NPI-V, Ins-ES vs. NQ-V, Ins-ES	.04 (.11)	.33	.982
NPI-V, Ins-Cat vs. NPI-V, Ins-ES	.04 (.11)	.32	.988
NQ-V, Ins-Cat vs. NQ-V, Ins-ES	.04 (.12)	.37	.982
Comparisons for the VERB…anything/nothing condition			
Contrasts	**Estimate (SE)**	**t-value**	**p-value**
V-NPI, Ins-Cat vs. V-NQ, Ins-Cat	-0.19 (.27)	-0.73	.885
V-NPI, Ins-ES vs. V-NQ, Ins-ES	.53 (.25)	2.12	.171
V-NPI, Ins-Cat vs. V-NPI, Ins-ES	-0.43 (.25)	.44	.971
V-NQ, Ins-Cat vs. V-NQ, Ins-ES	.29 (.26)	1.12	.677
Comparisons for the Condition…anything/nothing			
Contrasts	**Estimate (SE)**	**t-value**	**p-value**
CON-NPI, Ins-Cat vs. CON-NQ, Ins-Cat	-0.28 (.16)	-1.75	.313
CON-NPI, Ins-ES vs. CON-NQ, Ins-ES	.03 (.15)	.24	.994
CON-NPI, Ins-Cat vs. CON-NPI, Ins-ES	-0.19 (.15)	-1.31	.567
CON-NQ, Ins-Cat vs. CON-NQ, Ins-ES	.12 (.16)	.77	.867
Comparisons for the Anything(Nothing…NOT condition			
Contrasts	**Estimate (SE)**	**t-value**	**p-value**
NPI-V, Ins-Cat vs. NQ-V, Ins-Cat	-0.28 (.16)	-1.75	.313
NPI-V, Ins-ES vs. NQ-V, Ins-ES	-0.15 (.13)	-1.17	.647
NPI-V, Ins-Cat vs. NPI-V, Ins-ES	-0.19 (.15)	-1.31	.567
NQ-V, Ins-Cat vs. NQ-V, Ins-ES	.12 (.16)	.77	.868

APPENDIX B: Generalized mixed-effects models for the *ab initio* learners in TIME 1 analysis for the PSM.

Model 5: Nobody/Anybody…VERB condition			
	OR	**CI: LL, UL**	p
(Intercept)	0.06	.03; .17	< .001
Ref: Anything…VERB; Instruction-Cat			
Condition	1.25	.38; 16.12	= .39
DomScore	.51	.07; 3.35	= .48
Instruction	1.01	.99; 1.01	= .32
Condition*DomScore	1.01	.06; 15.69	= .99
Condition*Instruction	.99	.98; 1.01	= .91
DomScore*Instruction	.99	.98; 1.01	= .72
Condition*DomScore*Instruction	.99	.99; 1.02	= .57
lmer(ScaleResponse ~ Condition * domscore * Instruction + (1|ID) + (1|Item), data=gjtNXV)			
Model 6: Verb…Nothing/Anything condition			
	OR	**CI: LL, UL**	p
(Intercept)	2.98	.74; 3.75	< . 001
Ref: VERB…anything; Instruction-Cat			
Condition	1.66	.53; 3.92	= .21
DomScore	1.44	1.01; 1.02	= .46
Instruction	1.01	.98; 1.01	= .04
Condition*DomScore	.99	.06; 71	= .12
Condition*Instruction	.21	.98; 1.01	< .01
DomScore*Instruction	99	.98; 1.01	= -31
Condition*DomScore*Instruction	1.01	.99; 1.01	= .99
lmer(ScaleResponse ~ Condition * domscore * Instruction + (1|ID) + (1|Item), data=gjtVNX)			
Model 7: Conditional…Nothing/Anything			
	OR	**CI: LL, UL**	p
(Intercept)	.08	.03; .21	< .001
Ref: Conditional…anything; Instruction-Cat			
Condition	1,37	.47; 4.01	= .56
DomScore	1.79	.57; 5.61	= .32
Instruction	1.01	.99; 1.01	= .69
Condition*DomScore	.88	.17; 3.37	= .73
Condition*Instruction	.99	.98;1.01	= .67
DomScore*Instruction	.99	.98; 1.01	= .22
Condition*DomScore*Instruction	.99	.98; 1.01	= .98
lmer(ScaleResponse ~ Condition * domscore * Instruction + (1|ID) + (1|Item), data=gjtCON)			
Model 8: Nobody/Anybody…NOT			
	OR	**CI: LL, UL**	p
(Intercept)	.06	.02; .18	< .001
Ref: Anything…NOT; Instruction-Cat			
Condition	1.41	.43; 4.57	= .56
DomScore	2.41	.67; 8.51	= -17
Instruction	1.01	.99; 1.01	= .62
Condition*DomScore	.46	.09; 2.33	= .35
Condition*Instruction	.99	.98; 1.01	= .29
DomScore*Instruction	.99	.99; 1.01	= .47
Condition*DomScore*Instruction	1.01	.99; 1.02	= .31
lmer(ScaleResponse ~ Condition * domscore * Instruction + (1|ID) + (1|Item), data=gjtNXSN)			