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Alignment of code switching varies with proficiency in second language learning dialogue

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ABSTRACT

Speakers in dialogue tend to adopt the language patterns of the other, aligning their language to their interlocutor. This can happen at many levels of communication, including the tendency to code switch (CS), or change to another language. Alignment has often been considered the result of an unconscious automatic process that facilitates speakers' mutual understanding. In dialogues with a second language (L2) learner, alignment is constrained by the proficiency of the learner, and additional non-automatic processes will be at play, namely the individual pedagogical goals of learner and tutor. In this study, we investigate alignment in dialogues between Spanish/Catalan learners of English and their tutors. We analyse CS incidence, whether code switching can be explained as automatic alignment between speakers, and whether this is independent of other, non-automatic factors related to speakers' goals. We find that alignment of code switching is present, varies with learner proficiency, and that code switching can additionally be triggered by lexical overlap and turn taking asymmetry, which we attribute to conscious pedagogical choices on the part of both tutor, at lower levels, and learner, at higher levels of student proficiency.

1. Introduction

Alignment between speakers—the tendency of speakers to reuse the language of their interlocutor, resulting in their language becoming more similar—is a common phenomenon in dialogic interaction. In this study, we analyse alignment patterns in the context of second language learning dialogues. Different underlying processes may lead to alignment, including automatic priming mechanisms and non-automatic, conscious decisions to entrain. The Interactive Alignment Model (Pickering & Garrod, 2004) explains alignment as an automatic priming mechanism (leading to the repetition of words or syntactic structures) which allows speakers in a dialogue to achieve conceptual alignment, or improved shared understanding and communication. Costa et al. (2008) put forward some hypotheses about how priming-driven alignment can be affected in the context of second language (L2) dialogue, namely that alignment of both speakers will be affected by the speakers' levels of proficiency, whether equal or asymmetric. In the asymmetric case of L2 instruction, learner proficiency has subsequently been found to affect lexical alignment levels between learner and tutor (Sinclair et al., 2018). Costa et al. (2008) also propose that, in addition to priming, conscious decisions on the part of the learner can influence alignment. For example, some learners may decide to deliberately re-use language of their more proficient interlocutor as a learning strategy, or some may avoid using certain more complex structures or words due to a fear of making mistakes. In L2 learning contexts specifically, alignment has also been found to be influenced by the communication strategy, or technique, employed by both tutor and

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learner (Macaro, 2005; Modupeola, 2013).

In L2 learning dialogue, as in dialogue between bilingual speakers, it is very common to find instances of code switching, that is, the switching between two languages or codes mid-conversation or even mid-sentence. It is not yet well understood how alignment operates in these settings, how it relates to code switching, or what the pedagogical implications of this relationship are. For example, factors known to influence priming in regular conversations between participants speaking their native language have been found to predict the occurrence of code switching in spontaneous discourse between bilinguals (Fricke & Kootstra, 2016). However, automatic alignment of code switching in L2 learner dialogue is less well understood. From a different perspective, Kerr (2014) considers that code switching to the first language (L1) of the student in L2 teaching might be strategically used by the tutor, showing the tutor is on the student's side and adapts to the student's needs. Under this view, patterns of code switching, from both speakers, are expected to change with learner proficiency, as the pedagogical needs of the learner change. From a pedagogical perspective, switching to the student's L1 is often used as a resource to achieve both the learner and tutor's pedagogical goals (Cheng, 2013). However, strategies vary: on the one hand, teachers are sometimes encouraged to avoid code switching and remain within the target language (Makulloluwa, 2013), or, on the other, encouraged to adopt a multilingual approach, such as *translanguaging* (Duarte, 2020). The latter is motivated by findings showing that switching to the L1 of the student can provide useful contextual translations and be used effectively to repair communicative breakdowns (Greggio & Gil, 2007), improving the language used in the subsequent return to the target L2, and generally improving learning of the target language (Pan & Pan, 2010).

In light of these findings, the current study investigates, via corpus analysis of L2 learning dialogues, how automatic alignment occurs with respect to the incidence of code switching itself, whether a speaker's choice to change code is influenced by their interlocutor. It also explores to what extent this is influenced by learner proficiency: whether this influences the use of the L1, and whether the choice to code switch is driven by lexical overlap and turn taking imbalances in the dialogue preceding a switch. We hypothesise that code switching, and L1 incidence, can be explained by a combination of both priming effects and pedagogic strategy.

2. Theoretical background

Before describing our study, we first provide an overview of some key elements of research on code switching; its occurrence in bilingual dialogue; the use of L1 in second language teaching; and alignment, which we draw upon in order to answer our overarching question of how alignment and code switching interact with one another in second language learning dialogue.

2.1. Code switching

Code switching (CS) occurs when a speaker alternates between two or more languages in the context of a single conversation or situation. This can occur for multiple reasons and is community and context specific (Myers-Scotton, 1993). Inter-sentential switching occurs outside the sentence (or in the case of dialogue, utterance level; for example, a tutor asking a question in English and a student answering in Spanish: T: how old are you?, S: [no sé].) Intra-sentential switching occurs within a sentence or a clause (Muysken et al., 2000; Myers-Scotton, 1989), e.g., S: two [lavabos]. Intra-sentential CS is common in language by bilingual speakers (Kootstra et al., 2020; Sitaram et al., 2019a). In this study, we analyse inter-utterance CS, the alternational use of the student's L1 and the target L2 across turns, since this is more prevalent in the second language instruction setting where code switching is often used as a pedagogic tool (Moore, 2002).

Code-switched speech and language processing has garnered much research interest and various metrics for quantifying and predicting CS have been proposed. This line of research has found that use of CS can follow predictable patterns and serve valuable communicative functions for bilinguals (Sitaram et al., 2019b). Predictors of CS such as sentence length indicate that the complexity of the language can influence speakers' tendency to switch, i.e. if the context is particularly complex lexically or syntactically, this high cognitive effort could be reduced through the switch to the speakers mother tongue (Calvillo et al., 2020). Complementary to this, one view of CS behaviour is that it occurs to compensate for lack of language proficiency in one of the speakers' languages (Heredia & Altarriba, 2001). This implies that CS in addition to its communicative or social functions facilitates a speaker's production, that is, sometimes switching to another language can make it easier for a speaker to communicate.

2.2. Code switching in second language education

In second language conversational practice, the relationship between learner and tutor is asymmetric in terms of both language proficiency and social role. As learners gain proficiency, this asymmetry decreases, yet never is completely absent due to the tutor's role of remaining within the learner's zone of proximal development (Dunn & Lantolf, 1998), which necessitates their continual adaptation to the learner, in order to keep pushing them to learn, while maintaining conditions for their autonomy (Benson, 2013).

In a second language learning setting, CS can be the result of communicative strategy (Cohen, 1998), with learners falling back on L1-based strategies when their target language proficiency is not sufficient (Wannaruk, 2003). However, this is not the only strategy employed by learners. Code switching may also be used for clarification, or to avoid conversational gaps (Rusmawaty, 2018). The use of CS can vary across proficiency levels and can be affected by other factors, such as the influence of teaching strategy (Gallardo-del Puerto et al., 2020). Communication strategies of learner and tutor vary with context, and are affected by learner agency, the feeling of ownership and control that learners have over their own learning (Gao, 2010): tutor strategy can be influenced by adaptation to the learners' zone of proximal development (Dunn & Lantolf, 1998); and learner strategy influenced by their own proficiency (Costa et al., 2008) as well as other contextual factors such as personality and self-efficacy (Rebecca & Oxford, 2003), which influence their ability

to learn.

Tutors' use of the mother tongue of the students in the classroom can provide an important function for their teaching practice. It can serve a repetitive function (for scaffolding — helping to learn — knowledge or boosting the self-efficacy of the learner) and facilitate task management in the delivery of the lesson: allowing tutors to keep learners on track with the goal of the interaction (Cipriani et al., 2001; Greggio & Gil, 2007).

Use of the L1 of the student also has the more social purpose of establishing and building rapport — positive communication — in addition to being used as a clarification mechanism (Ahmad & Juso, 2009; Selamat, 2014; Paker & Karaagac, 2015). CS patterns in L2 instruction can be an indication of social membership (Auer, 2005), and have been shown to reduce social distance in the classroom (Camilleri, 1996). Finally, it serves the function of triggering student participation (Moore, 2002).

2.3. Alignment in code switching

The Interactive Alignment Model (Pickering & Garrod, 2004, 2021) has provided a theoretical framework with which to study CS behaviour (Kootstra, 2012). Alignment of CS has been found to occur in spontaneous bilingual dialogue at both the syntactic (Fricke & Kootstra, 2016) and lexical level (Kootstra et al., 2012, 2020). Fricke and Kootstra (2016) find via corpus evaluation that the tendency to code switch can be explained through syntactic priming.

A key aspect of considering CS under the framework of interactive alignment (Kootstra, 2012; Pickering & Garrod, 2004) is that it is considered as an automatic, unconscious process. However, as mentioned earlier, this is not the whole story: studies of CS highlight strategic forms of alignment, which can serve a function in the dialogue as well as reflecting the linguistic identity of the speaker (Gardner-Chloros, 2009; Nilep, 2006). Ehrhart (2015) situates multilingual strategies on a continuous scale from more implicit to more explicit language approaches. Additionally, CS and alignment in a teaching context have been found to be highly purposeful and related to pedagogical goals (Eldridge, 1996). As pointed out by Kootstra (2015), varying aspects of the discourse situation (or dialogue context), such as the relative power relations of the speakers, can shed light on the interplay between alignment as a strategic vs. automatic process.

To this end, we investigate alignment in an L2 learning setting, analysing dialogues between tutors and students of varying proficiency levels, where the asymmetry of language proficiency will have an influence on linguistic alignment (Costa et al., 2008), and the incidence of code switching is likely to be influenced by both unconscious and strategic factors (Kerr, 2014; Kootstra, 2012).

3. The present study

The present study seeks to explore automatic vs. non-automatic, intentional factors leading to between-speaker alignment of code switching. There are many factors leading to code switching between the first and second language during second language learning dialogue. These factors can be *automatic*, where priming plays a role in the choice to switch between languages, something found to be the case in bilingual speakers (Kootstra et al., 2020). Although the varying agendas of both tutor and learner will differ from those in L2 peer dialogues (Costa et al., 2008), we still expect to find this priming effect of CS in the present setting, under the hypothesis that similar conversational factors such as rapport building play an important role in tutors' employment of the L1, especially with lower learner proficiency. In an educational setting, non-automatic, intentional factors — such as CS as a pedagogical device —will also play a role in the choice to code switch. Tutors may code switch in order to help encourage a learner to engage, connecting within their range of understanding (Cipriani et al., 2001; Greggio & Gil, 2007); and learners may code switch as a communication strategy, depending on their proficiency level amongst other factors (Munoz, 2006). In order to tease apart some of the non-automatic factors which may influence code switching behaviour in L2 learner dialogue, we introduce measures to capture the state of the context immediately preceding a switch in code. These measures are simple and consist of both vocabulary overlap (simple lexical repetition), and turn taking ratio, the share of the preceding utterances belonging to the tutor. We choose vocabulary overlap since lower levels can indicate a lack of sufficient shared vocabulary between speakers (Levow, G. A. 2003), and thus form an indication of a need to code switch. We choose turn taking ratio, specifically the ratio of tutor to student utterances, in order to capture whether the tutor is dominating the dialogue, another indication that the student may be struggling.

Drawing on the literature on bilingual and educational settings, the present study is guided by the following research questions, specifically about how alignment of code-switching behaviour in one-to-one L2 learning dialogues takes place:

1. To what extent is L1 incidence present and varies with learner proficiency in L2 learner dialogue?
2. Are speakers more likely to code switch to the L1 after recent use of code switching by their dialogue partner (i.e., automatic priming), and does this vary with learner proficiency?
3. Are speakers more likely to code switch to the L1 due to intentional factors that are independent from automatic priming, and how does this vary with learner proficiency?

4. Method

4.1. Corpus

4.1.1. Participants

The interactions used in this study were drawn from the Barcelona English Language Corpus (BELC) (Munoz, 2006), consisting of

118 dialogues from an oral interview task. A total of 50 participants took part in the oral interview task (female = 27, male = 23) ranging from 11 to 18 years old. The participants' native language is Spanish and/or Catalan (some learners may be bilingual). The tutor is also proficient in the L1 of the learner.

4.1.2. Oral interactions

The dialogues consist of semi-guided interview-style interaction which begins with questions about the learner's family, daily life and hobbies, but can include related learner-initiated topics. These interviews were intended to make the learners feel more at ease with conversing in the target L2, English, and to elicit as many responses as possible from the learners in as interactive and naturalistic a manner as possible.

The dialogues were gathered at four time points: after 200 h, 416 h, 726 h, and 826 h of English-language instruction (level 1, 2, 3, and 4) respectively. According to the Common European Framework of Reference (CEFR, Council of Europe, 2001), it takes approximately 200 learning hours for students to progress from one CEFR level to the next. This would place the students between A1 and B2 levels of proficiency, taking into account their age and other classroom factors which may reduce the speed of progression (McElwee et al., 2019). The dialogues thus afford a longitudinal picture of interaction style with proficiency in the target language. Of the 118 dialogues, 36 are at level 1, 44 at level 2, 24 at level 3 and 14 at level 4, due to some participants dropping out at later stages of the study. The key descriptive statistics of the corpus can be found in Table 1.

4.2. Utterance level CS

The utterances in the dialogues are labelled as either L1 (Spanish or Catalan) or L2 (English), according to the dominant language used in the utterance. The large majority of utterances consists of the use of a single language, with only occasional mixed L1/L2 utterances. We focus on CS at the utterance level (inter-sentential CS). Given that the dialogues are intended to be carried out in the target L2, we consider utterances labelled as L1 as the code-switching (CS) utterances.

4.3. Data analysis procedure

4.3.1. Measuring L1 incidence

In order to measure L1 incidence, allowing us to answer our first research question, we adopt a simple proportion measure of the degree to which CS is present in the dialogues in line with previous work (Gamback & Das, 2016; Sitaram et al., 2019a). Here we use the term CS to refer to both the act of changing and the degree to which the non-target language (L1) is used. We measure the incidence of CS as the proportion of L1 utterances relative to the total utterances per dialogue. This ratio is further broken down by speaker and level in our results.

$$Proportion\ CS = \frac{L1\ utterances}{total\ utterances}$$

4.3.2. Measuring automatic alignment of code switching

To explore our second research question, we choose to operationalise our measure of alignment, or priming of CS incidence, as repetition decay. That is, if priming is at play, speaker repetition of a code should be more likely directly after its use by their interlocutor. Following work by Reitter et al. (2006), Reitter et al., (2011), and Reitter and Moore (2014), we use a linear mixed effects regression model to explore the effect of recency on speaker code (L1 or L2) repetition. We use the Python package statsmodels's implementation of generalised linear models, equivalent to the R lme4 package[1]. We fit our linear model with a binary response variable, indicating whether a pair of utterances from different speakers are either both L1 or both L2. We take distance between these utterances as a predictor, in order to investigate whether or not recency significantly predicts CS behaviour between speakers. Since we are interested in priming effects, known to decay (Reitter et al., 2006; Reitter & Moore, 2014), we limit distances to a maximum of 20 utterances.

To analyse the locality effects of L1 and L2 cross-speaker repetition, we first fit one model per language with distance as a predictor, including a random intercept per dialogue. Next, we focus on L1 and fit another model that also includes speaker type (learner/tutor) and proficiency (levels 1, 2, 3, 4) as predictors.

4.3.3. Measuring intentional factors leading to code switching

Finally, in order to explore intentional factors leading to code switching, our final research question, we design two measures to capture the state of the dialogue in the lead up to a switch in code, which we define as different from the code of the preceding utterance. To capture only the context directly preceding an utterance, we define the window as consisting of 6 utterances. We design our measures to capture relative speaker symmetry, and lexical repetition, which we expect to influence both the learner and tutor's decision to switch between languages. While some asymmetry is expected due to the difference in role and proficiency between speakers, asymmetry to too great an extent can indicate communication breakdown or student avoidance. In this circumstance, it is likely that the tutor or the learner will use the L1 as a communicative strategy (Ustunel & Seedhouse, 2005; Lehti-Eklund, 2013;

[1] https://www.statsmodels.org/stable/glm.html.

Table 1
Corpus statistics.

	Full Dialogues		L1	
Total # dialogues	118		108	
Utterances/dialogue	132 (48)		19 (14)	
Words/dialogue	685 (245)		99 (76)	
	Tutor	Learner	Tutor	Learner
Utterance length (words)	6.0 (0.7)	4.2 (1.5)	6.1 (2.9)	4.6 (2.7)
Share of utterances	59%	41%	38%	62%

Note. Except for the total number of dialogues, we report mean (standard deviation) per dialogue. The L1 column describes the portion of the dialogues consisting of language in the L1. Some dialogues do not contain any L1, hence the lower total # dialogues in this column. Share of utterances is calculated as the average percentage of utterances in a dialogue belonging to a specific speaker.

Horasan, 2014). Our measures are the following:

Turn taking (propT) is the proportion of tutor to learner utterances in the preceding dialogue context. This measure captures whether one speaker is dominating the dialogue: We use the proportion of tutor utterances as our unit for this measure, since it is often when the tutor dominates the dialogue (which can also indicate learner avoidance) that CS occurs.

$$propT = \frac{tutor\ utterances}{total\ context\ utterances}$$

Vocabulary overlap (prevVO) is the count of vocabulary shared between the learner and tutor within the preceding dialogue context, divided by the total number of words between them (i.e. the total number of unique words). This measure captures the degree of lexical overlap between speakers, an indication of the level of linguistic alignment, or shared vocabulary between speakers, which, in cases where vocabulary overlap is very low, can indicate communication breakdown.

$$prevVO = \frac{words_{student} \cap words_{tutor}}{words_{student} \cup words_{tutor}}$$

To explore whether these factors can predict CS, we again employ a linear mixed effects regression model, with code switch as a dependent variable, and our measures as independent factors. We define an utterance as a *code switch* in the case where the language (code) of the previous utterance (regardless of speaker) is differently coded. We include distance from previous CS incidence in addition to the above measures in a separate model to predict CS incidence, in order to determine whether these factors are independent of one another.

5. Results

We present our results for each of our research questions. First, we explore to what extent L1 incidence is present and varies with learner proficiency. Second, we investigate automatic alignment of code switching: whether speakers are more likely to code switch to the L1 after recent use of CS by their dialogue partner. Finally, we explore whether speakers are also more likely to code switch due to non-automatic, intentional factors, and if these are independent from automatic priming.

5.1. Incidence of the mother tongue

To gain an understanding of the relative importance of L1 use across levels, we firstly investigate the incidence of use of the L1 in BELC. A total of 10 dialogues in the corpus contain no utterances labelled as L1. These dialogues come from predominantly the higher proficiency groups. One each belongs to level 1 and 2, six belong to level 3, and two to level 4.

The proportion of L1 incidence, broken down by speaker and level, is shown in Fig. 1. This shows that the learner makes more use of CS than the tutor. For example, at level 1, an average of 22% of utterances from the learner are in the L1 compared to the 11% of the tutor. For both speakers, the incidence of L1 decreases with learner proficiency. At level 4, the average incidence of L1 use by the tutor makes up only 0.3% of their utterances, showing a strong preference for their remaining within the target language (L2) with more proficient learners. There is a significant difference for both the learner and tutor between the proportion of L1 use in the higher vs. lower proficiency learners, e.g. comparing levels 2 and 3 using an independent *t*-test, tutor: ($t(66) = 2.75$, $p < 0.01$), learner: ($t(66) = 2.97$, $p < 0.005$)

In most of the dialogues where CS takes place (92%), the L1 is used by both participants. Twenty one dialogues (23%) contain L1 use from only one of the speakers. In all but one of these dialogues, the speaker resorting to L1 use is the learner. This asymmetrical use of the L1 is again more likely to occur in more proficient learners. Dialogues containing only learner use of the L1 indicate examples where the tutor actively does not match the CS behaviour of the learner. This happens most for more proficient learners.

5.2. Automatic alignment of code-switching behaviour

5.2.1. L1 and L2 between-speaker alignment of code switching

To examine whether speakers are more likely to code switch after recent use of code switching by their dialogue partner, we fit a

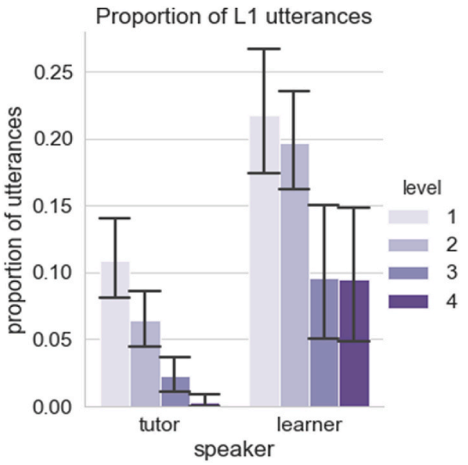

Fig. 1. Proportion of L1 utterances in dialogues at different levels of learner proficiency.

Linear mixed effects regression model for the L1 and L2 separately. The dependent variable is whether or not a pair of utterances are the same code, i.e. a *repetition* of that code. Table 2 shows the results of the model on each language. We measure the effect of distance on L1 cross-speaker repetition, finding a significant negative effect of distance, which indicates the presence of CS priming. No significant effect of distance is found for L2.

5.2.2. Speaker and proficiency effects on alignment of code switching

Focusing now on alignment of code-switching to L1, we further investigate local repetition effects broken down by their interaction with speaker role (tutor vs. learner) and learner proficiency.

Table 3 shows that the local effects of *learner* L1 repetition are the strongest, and that this decreases with learner proficiency. Tutors do not show the same local repetition patterns suggesting they are either less likely to follow the learner's switch to the L1, or that it is the tutor who leads the switch, particularly with the lower proficiency learners.

Fig. 2 visualises the interaction of local effect of distance on cross-speaker code repetition and learner proficiency. From the L1 plot, it can be seen that in proficiency levels 1, 2 and 3, that if a speaker code switches to the L1, the other speaker is most likely to also code switch within the next 5 utterances.

5.3. Intentional factors leading to code switching

5.3.1. Automatic vs. non-automatic alignment of code switching

In order to confirm that the CS priming effects found in the previous section are independent of other features of the dialogue context which may be indicative of intentional factors influencing speakers' decision to switch, we fit a linear mixed effects regression model to explore whether distance remains a significant factor when predicting CS in combination with vocabulary overlap (*prevVO*) and proportion of tutor utterances (*propT*) in the utterances directly preceding an incidence of CS. We find the same significant negative effect of distance on L1 repetition ($B = -0.005$, $p < 0.001$) as before, indicating that automatic alignment of CS is independent of other intentional factors which may lead to speakers choosing to switch code.

5.3.2. Non-automatic intentional factors leading to code switching

We now examine more closely the dialogue context features predictive of a *switch* in code, which we consider to be indicative of intentional factors leading to CS, rather than patterns of code use indicative of automatic alignment. We fit a linear mixed effects regression model with a binary dependent variable capturing whether an utterance is an instance of a code switch. This allows us to investigate whether or not the speaker's choice to code switch can be predicted via the *prevVO* and the *propT* metrics.

Table 2
Linear mixed effects regression results for L1 and L2 portions of the dialogues.

		Formula: repetition ~ distance					
		Estimate	SE	z	p	95% CI	
L1	Intercept	0.153	0.011	13.591	0.000*	0.131	0.176
	distance	−0.004	0.000	−9.746	0.000*	−0.005	−0.004
L2	Intercept	0.859	0.011	78.023	0.000*	0.837	0.881
	distance	−0.000	0.000	−0.815	0.415	−0.000	0.000

Note. Random effects of dialogue were accounted for with an intercept per dialogue included. An asterisk (*) indicates statistical significance.

Table 3
Results of linear mixed effects regression model of between-speaker L1 repetition broken down by level and speaker role.

	Formula: repetition ~ distance: C(level): speaker					
	Estimate	SE	z	p	95% CI	
Intercept	0.178	0.159	1.118	0.264	−0.134	0.490
distance:C(level)[1.0]:speaker[L]	−0.010	0.001	−12.613	0.000*	−0.012	−0.008
distance:C(level)[2.0]:speaker[L]	−0.007	0.001	−10.058	0.000*	−0.009	−0.006
distance:C(level)[3.0]:speaker[L]	−0.007	0.002	−3.750	0.000*	−0.011	−0.004
distance:C(level)[4.0]:speaker[L]	−0.005	0.006	−0.806	0.420	−0.016	0.007
distance:C(level)[1.0]:speaker[T]	0.001	0.001	1.232	0.218	−0.001	0.003
distance:C(level)[2.0]:speaker[T]	0.008	0.001	8.799	0.000*	0.006	0.010
distance:C(level)[3.0]:speaker[T]	0.012	0.003	4.437	0.000*	0.006	0.017
distance:C(level)[4.0]:speaker[T]	−0.003	0.011	−0.329	0.742	−0.024	0.017

Note. C indicates level is used categorically. Dialogue is included as a random effect. L denotes learner, and T tutor for the speaker who is repeating (aligning to) the L1. An asterisk (*) indicates statistical significance.

We consider switching from L2 to L1 (L2 → L1) and vice versa separately, since the reasons for doing so in this context differ, and thus we expect different behaviour from both the speaker proportion and vocabulary overlap measures in each setting. The results of our linear mixed-effects model can be seen in Table 4.

When CS takes place and the switch is from the L2 to the L1, we find a significant positive effect of the proportion of tutor utterances (*propT*) on the likelihood of the learner CS to the L1, in other words, when the tutor is dominating the dialogue, it is more likely that the learner will switch to the L1. Examining this further, considering learner proficiency as a categorical variable, we find this effect is strongest for more proficient learners (*propT:C(level)[4]:speaker[L]: β 6.81, $p < 0.05$*) with no significant effect found at the lowest proficiency level.

For the vocabulary overlap (*prevVO*) measure, we find a significant effect on the likelihood of the tutor switching. Low vocabulary overlap captures a more subtle form of communication breakdown, indicating lexical misalignment between speakers, often involving the learner saying very little in response to a tutor's prompts. Examining this further, considering proficiency levels categorically, we find that at the lower proficiency levels, *prevVO* predicts CS in both speakers (*learner 1: β -3.205, $p < 0.05$, learner 2: β -3.090, $p < 0.05$, tutor 1 β -4.341, $p < 0.001$, tutor 2 β -5.931, $p < 0.005$*).

Regarding the switch back to the L2 (L1 → L2), we find that *propT negatively* influences the likelihood of returning to the L2 for both speakers, while *prevVO* has no significant impact. This intuitively complements the finding of the inverse in the switch to L1: when the dialogue is one-sided in the direction of the tutor this provokes a switch to the L1, the easier language of communication for the leaner, and in this case, a more equal, learner dominant context predicts that both speakers will switch back to the L2. Exploring this in more detail, we find this influence of *propT* to be significant across learner proficiency levels, with a much larger effect in high proficiency learners (lowest: β −0.9186, $p < 0.005$*, highest: β −8.2292, $p < 0.001$).

6. Discussion

This study set out to investigate the extent to which L1 incidence, alignment and code switching interact in dialogues between L2 learners and tutors, to what extent this varies with learner proficiency, and whether this alignment is in combination with other, intentional factors affecting speakers' choice to switch. Our experiments suggest that, in answer to our first research question, L1 incidence varies with learner proficiency, as does the purpose of its use. In relation to our second research question, we find that alignment plays a role in the code-switched use of the L1 in L2 learning dialogue, and that this varies with proficiency. Finally, in relation to our third research question, we find that while automatic alignment of code switching is present, this is in addition to other, intentional, factors related to the status of the dialogue in the context directly preceding a switch. We interpret these findings as indicative of the tutor's aim to encourage participation and, in more proficient learners, learners' use of the L1 to support their own dialogue in the L2. In the following, we elaborate on our interpretation of our results.

Initially, to answer our first research question, we explored the incidence of L1 in the dialogues and how this varies with learner proficiency. In our data, speakers are more prone to use the L1 in an L2 practice setting in dialogues with lower proficiency learners. This suggests that L1 is used as a scaffolding support by the tutor, as a communication strategy by the learner, or to build rapport (Paker & Karaagac, 2015; Nguyen, 2007; Sinha & Cassell, 2015). We find L1 use is asymmetric between speakers, with the learner making more use of it than the tutor.

On inspection, the dialogues where only the learner uses the L1 demonstrate some use of the L1 as a learner strategy i.e., *és que no sé expressar me [I don't know how to express myself], no sé cómo decirlo [I don't know how to say it]*. A large proportion of the learner L1 utterances consist of single word yes (*si*) answers, particularly in the lower proficiency dialogues where L1 is only used by the learner. Interestingly, for the most proficient learners, learner use of the L1 includes more conversational aspects, which is *not* repeated by the tutor. e.g. *bueno espera, [well, wait], hm a veces . [hm sometimes], no me acuerdo . [I don't remember], también [as well]*. It seems that with more proficient learners, the tutor is more likely to reply in the target (L2) language.

Our second research question concerned automatic alignment of code-switching behaviour: whether speakers are more likely to code switch after recent use of code switching by their dialogue partner. We defined code switching in this context as switching to the L1 of the student. Our findings provide support for priming-based alignment of code-switching behaviour in a second language

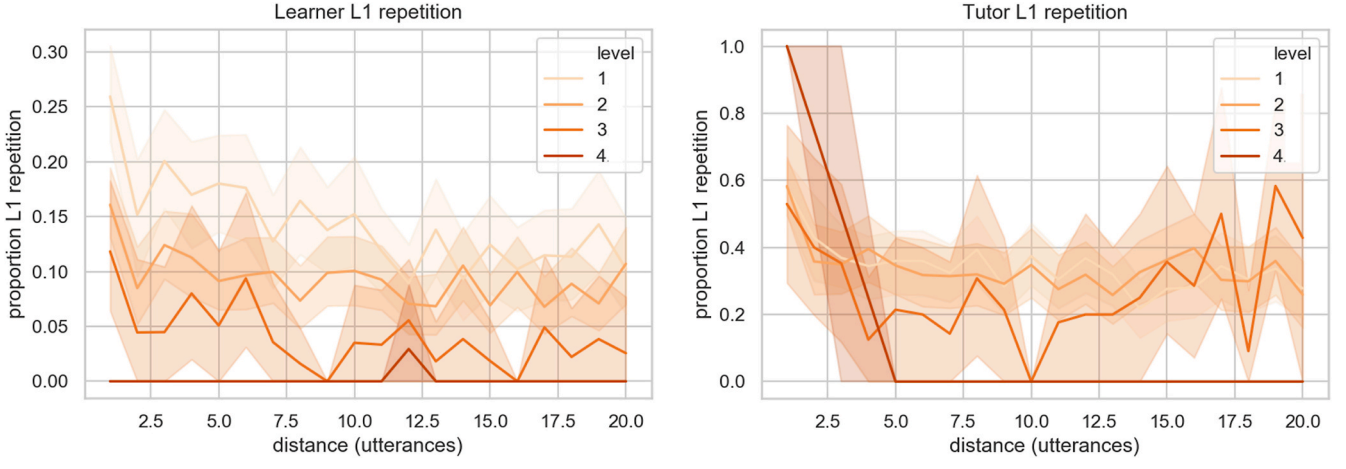

Fig. 2. L1 between-speaker repetition, broken down by speaker. Significant distance effects observed in learner L1 for all except proficiency level 4, no significant effects observed in the tutor.

Table 4
Linear mixed effects regression model results for code switching given our different context symmetry factors broken down by level and speaker role.

Formula: switch ~ propT:level:speaker + prevVO:level:speaker							
		Estimate	SE	z	p	95% CI	
L2 → L1	Intercept	0.639	0.036	17.901	0.000	0.569	0.709
	propT:level:speaker[S]	0.167	0.029	5.670	0.000*	0.109	0.224
	propT:level:speaker[T]	0.079	0.040	1.961	0.050	0.000	0.158
	prevVO:level:speaker[S]	−0.144	0.078	−1.848	0.065	−0.296	0.009
	prevVO:level:speaker[T]	−0.528	0.125	−4.208	0.000*	−0.774	−0.282
		Estimate	SE	z	p	95% CI	
L1 → L2	Intercept	0.174	0.012	14.211	0.000	0.150	0.198
	propT:level:speaker[S]	−0.067	0.008	−7.966	0.000*	−0.084	−0.051
	propT:level:speaker[T]	−0.040	0.009	−4.608	0.000*	−0.057	−0.023
	prevVO:level:speaker[S]	−0.017	0.023	−0.743	0.458	−0.063	0.028
	prevVO:level:speaker[T]	−0.029	0.018	−1.575	0.115	−0.064	0.007

Note. propT indicates the proportion of tutor utterances, and prevVO the vocabulary overlap between speakers in the window leading up to the switch point. An asterisk (*) indicates statistical significance.

learning setting. This is in line with findings on CS alignment in a bilingual setting (Fricke & Kootstra, 2016). We also find that alignment of CS varies with learner proficiency, indicating that while priming effects are present, they may be constrained by learner proficiency, as hypothesised by Costa et al. (2008). Our analysis shows that priming effects are strongest in lower proficiency learner dialogue. In our view, coupled with the greater incidence of the L1 in the lower levels, this indicates the necessity of the L1 as a fallback communication device in order to compensate for the lack of shared mutual understanding in the L2 and achieve speakers' communicative goals (as argued by, e.g., Cheng, 2013). In particular, it is the learners in this study who show the tendency to code switch after a code switch of the tutor. We interpret the decrease in priming effect with learner proficiency as a sign of learners becoming more independent, employing the L1 as a device for clarification to support the dialogue in the L2 (e.g., Greggio & Gil, 2007), taking active control of their own learning (e.g., Gao, 2010), thus overriding the automatic priming effects. For example, a proficient learner may use the L1 to clarify what the desired response to a question is: *hm digo la calle? [do I say the street];* or to check they have correctly understood an instruction: *hm m has dit que et preguntés [hm m did you say that I ask you]*. We interpret the lower priming effect of CS in the tutor in particular as either evidence of the active decision to encourage L2 use, and as such the stronger influence of intentional factors in the decision to switch code. Nevertheless, although these non-automatic, and proficiency-based factors may influence use of the L1, our findings suggest automatic alignment of CS is indeed present.

Our third research question concerned other, more intentional factors which may influence speakers' decision to code switch. Through the exploration of these factors, we show that in addition to automatic priming effects, CS is influenced by relative share of speaker utterances, and the lexical overlap between speakers in the context directly preceding a switch. We hypothesise that the fact that the automatic priming effects of CS usage vary with learner proficiency may additionally be constrained by different speaker goals in the L2 learner setting (Cipriani et al., 2001). According to our linear mixed effects regression model, both measures are independent of the between-speaker priming effects found, which we take as indication that both automatic alignment and non-automatic, intentional factors lead to patterns of CS behaviour.

We find that asymmetry of speaker contribution plays a role in the choice to switch: the switch to L1 and back to the L2 is highly influenced by the proportion of tutor's utterances in the preceding context. This further contributes to our interpretation of tutors' CS to be more intentional, for example, a strong predictor of tutor's CS is *propT*, the degree to which the learner is participating in the dialogue (low proportions of learner utterances in the preceding context window). Tutors may be turning to the L1 as a technique to adapt to the learner's zone of proximal development (Vygotsky, 1978), as they do in terms of the level of complexity of the language used in the L2 (Sinclair et al., 2017). We find that speaker imbalance also affects the learner: when the tutor dominates to too large an extent, with little contribution from the learner, this predicts a switch to L1 in the learner, with stronger effects present in more proficient learners. We think that higher proficiency learners are more likely to switch to L1 when the tutor is dominating the preceding dialogue due to the student using the L1 as a communication strategy, as is suggested by Gallardo-del Puerto et al. (2020). Examining some examples of these switches, it seems that with more proficient learners, the switch is to actively ask for clarification whereas, for less proficient learners, it is more likely to consist of either a simple response to a question (*si [yes]*), or simple indication of non-understanding (*no he entès [I didn't understand]*). When relative speaker contribution is more balanced, with a higher proportion of learner utterances, this is predictive of a switch back to the L2 in both speakers.

In terms of lexical repetition (*prevVO*), we find that lower levels of vocabulary overlap predict a tutor's switch to L1, indicating that lexical misalignment leads to L1 use, particularly in dialogues with low proficiency learners. We interpret this as indicative of tutors' adaptation to the learners' zone of proximal development as argued by, for example, Dunn and Lantolf (1998). There is, however, no significant effect of vocabulary overlap for the switch to L2, implying a different need for the use of the L1, one which, complementary to the automatic priming of CS use, is in compensating for lack of shared understanding within the L2, using the L1 as a fallback strategy (e.g., Wannaruk, 2003). Overall, our results indicate that the symmetry between speakers directly preceding a switch in code both predicts CS and varies with proficiency. We hypothesise from this that tutors vary their use of the L1 according to the needs of the learner as in Ustunel and Seedhouse (2005), and that learner CS is more used as a communicative strategy with increased proficiency, as in Lehti-Eklund (2013) and Horasan (2014).

6.1. Pedagogical implications

This study investigated the effects of learner proficiency on the alignment of the use of the L1 in L2 learning dialogues. Our findings highlight the usefulness of switching to the L1 in this setting, in particular the importance of its clarification use to both speakers. This is in agreement with Duarte (2020)'s argument for the importance of *translanguaging* in an education setting, and with Park (2013)'s discussion of the potential uses of the L1 in L2 teaching. Through qualitative examination of the learner CS L1 utterances, we find that these utterances are typically used as a communication strategy to aid learners' understanding of the L2, such as repeating a translated version of the tutor's question to check their understanding *T: what time did you arrive here? S: [a qué hora vengo aquí ?]*. Additionally, our finding that greater learner engagement (as measured by proportion of learner utterances) triggers their own return to the L2 suggests that this learner-led switching should be encouraged, since this promotes the learner to be more independent and self-regulate their learning, something which has been shown in the educational literature to greatly boost learning gains, and learner self-efficacy as well as engagement (Boekaerts, 1999).

7. Conclusions

To conclude, this study provides empirical evidence of alignment at the level of CS in dialogues between L2 learners and tutors. Additionally, we have proposed new measures to explore the extent to which CS is automatic in this setting. Our results support existing theories of code switching and alignment in L2 learning dialogue, and reveal that both automatic alignment and intentional use of CS varies with student proficiency. Our analyses indicate that in an L2 learning setting, priming effects of CS are stronger for lower proficiency students, and that CS use is more intentional at higher proficiency levels.

Exploring non-automatic factors leading to CS incidence in the context directly preceding a code switch, we find that asymmetry between speakers, in terms of vocabulary and turn taking, is predictive of CS behaviour. We interpret this as an indication that not only is the L1 used as a fall-back strategy by the learner, but also as a possible indication of learners self-regulating their learning, since we note their return to the L2 after a certain level of symmetry is reached. In all, our findings demonstrate important functions of the use of the L1 in learner dialogues through both automatic alignment and other factors indicative of speaker strategy.

There is much scope for future work from our findings. Firstly, this study does not explore intra-utterance code switching behaviour, something which may reveal additional insights into tutoring strategy as well as learner alignment patterns. Secondly, it was beyond the scope of this study to fully translate the L1 component of the dialogues. However, a possible future study could investigate the degree to which CS is employed as a translation strategy by both speakers, something we qualitatively observe in some of the dialogues. We hypothesise that this translation strategy will also vary with learner proficiency, due to the far lower incidence of tutor's use of the L1 in the dialogues with more proficient learners. Finally, Calvillo et al. (2020)'s finding that sentence length, an indicator of linguistic complexity, predicts CS behaviour in bilingual dialogue implies that similar language complexity effects may be true in our setting with L2 learners, and could be combined with our measures to provide additional insights.

CRediT authorship contribution statement

Arabella J. Sinclair: Conceptualization, Investigation, Visualization, Writing – original draft. **Raquel Fernández:** Conceptualization, Writing – review & editing.

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