How and why can explicit instruction about L1 reduce the negative effects of crosslinguistic influence? Evidence from accuracy and reaction time signatures in L1 comprehension

Kevin McManus ✉
Pennsylvania State University, State College, USA
https://orcid.org/0000-0002-7855-6733
kmcmanus@psu.edu

Abstract

This study revisits and extends McManus and Marsden (2019a) to better understand *how* and *why* providing additional explicit information (EI) about learners' first language (L1) alongside EI and comprehension practice in the second language (L2) improved the accuracy, speed, and stability of L2 comprehension of the French *Imparfait*, a functionally complex and late-acquired target feature. Building on previous L2 research that has provided instruction about L1 without analyzing L1 knowledge/use, the current study examines learners' item-by-item comprehension of L1 sentences that was completed during the L2 instruction to better understand the learning mechanisms at play in McManus and Marsden's (2019a) findings. Two groups of English-speaking learners (L2+L1, L2+L1prac; *N* = 36) received the same EI about aspect in French, followed by comprehension practice of French and English sentences. The L2+L1 group received additional EI about aspect in English. Results showed no impact of the instruction on L1 accuracy in either group, but the speed of L1 comprehension changed over time in the L2+L1 group. It is argued that the L2+L1 instruction directed attention to and clarified crosslinguistic differences in how L2 and L1 express the same meanings, which rendered the L2 practice more effective for noticing *Imparfait* and developing appropriate strategies for processing L2 forms. Implications for theory-building and instructional design are discussed.

Keywords: crosslinguistic influence; instructed second language acquisition; comprehension; processing; first language

1. Introduction

Understanding the extent to which explicit instruction can support second language (L2) development by addressing the negative effects of crosslinguistic influence constitutes a long-standing goal of instructed L2 research (McManus, 2022; Spada et al., 2005; VanPatten, 2004). This is because differences in how languages express the same meanings (e.g., aspect, time reference) have been repeatedly shown to negatively and persistently impact L2 learning (Ellis, 2006; Jarvis & Pavlenko, 2008). At the same time, instructional research has shown that providing additional explicit information (EI) about form-meaning mappings in the first language (L1) alongside an instructional core of L2 (e.g., EI, practice) can reduce the negative effects of crosslinguistic influence (Lucas, 2020; McManus, 2019; McManus & Marsden, 2017, 2019a, 2019b). Observations that frequency/exposure and implicit instruction do not adequately support the learning of functionally complex L2 features is an important motivation for this approach (Bardovi-Harlig & Comajoan-Colomé, 2020; Norris & Ortega, 2000).

Despite such progress, however, very little is understood about the learning mechanisms underpinning the effectiveness of this instructional method (McManus, 2021a; McManus & Marsden, 2018). Reasons for this lack of understanding are two-fold, at least. First, L2 studies that include L1 instructional components rarely collect and/or analyze data about L1 knowledge and/or use (e.g., de la Fuente & Goldenberg, 2022; Spada et al., 2005), resulting in unsubstantiated claims that the L1 instruction benefited L2 development because it influenced L1 knowledge/use. Second, few instructional studies satisfactorily describe and motivate their instructional approach, materials, and linguistic focus, thus limiting understanding about the rationale and design of the instruction to support L2 development (see Bardovi-Harlig & Comajoan-Colomé, 2022). To better understand *how* and *why* L1 instructional components delivered as part of L2 instruction can facilitate L2 development, instructional research is needed that (i) analyzes L1 knowledge and/or use and (ii) clearly describes and motivates the instructional method.

The current study addresses this gap by revisiting and extending McManus and Marsden's (2019a) analysis of learners' item-by-item comprehension of L2 sentences completed during an experimental intervention to address learning difficulties caused by crosslinguistic differences (see also McManus, 2019, 2021a, 2022; McManus & Marsden, 2017, 2018, 2019b). In that study, EI was used to direct English-speaking learners' attention to how habituality and ongoingness are expressed in French and English, a well-documented L2 learning difficulty created by L1-L2 form-meaning mapping differences for aspect (Howard, 2005; Labeau, 2009; McManus, 2015), which was followed by comprehension practice of French and English sentences that expressed those aspectual meanings. Critically, however,

even though all learners completed the same comprehension practice of L2 and L1 sentences, different types of pre-practice EI were provided. The L2+L1 group received EI about French *and* English, but the L2+L1prac group received EI about French only. Longitudinal analyses of learners' item-by-item comprehension of the L2 sentences during the instruction showed that increasing amounts of practice led to more accurate and faster L2 comprehension in the L2+L1 group only (i.e., those who received additional EI about L1). McManus and Marsden (2019a) suggested that using EI to direct attention to how the same aspectual meanings are expressed in L2 *and* L1 was critical for addressing the crosslinguistic learning problem, which, when combined with comprehension practice, supported the creation and strengthening of new and more appropriate strategies for L2 processing.

However, because McManus and Marsden (2019a) analyzed L2 comprehension only, the current study seeks to more fully account for the role played by the additional EI about L1 by analyzing L1 comprehension. If, as hypothesized by McManus and Marsden, the EI actually did direct attention to and clarify crosslinguistic differences in how L2 *and* L1 express the same meanings, L1 comprehension performance should be slower in the L2+L1 group, comparative to the L2+L1prac group, due to more attentive processing of L1 forms. Such a finding would indicate that the L2+L1 instruction supported L2 development because it encouraged more careful consideration of the meanings expressed by viewpoint aspect forms in both languages and not just in L2. In this way, the current study seeks to clarify *how* and *why* explicit instruction about L1 can improve the accuracy and speed of L2 comprehension by analyzing learners' item-by-item comprehension of L1 sentences that was completed during the L2 instruction.

2. Crosslinguistic influence

The knowledge and experience built up from using a particular language (e.g., L1) not only biases the forms that get processed and how, but this knowledge and experience can lead to L2 learning difficulties when a speaker's languages express the same meanings in different ways (Ellis, 2006; Jarvis & Pavlenko, 2008; McManus, 2022). Usage-based accounts of learning explain findings like these as effects of blocking and learned attention (Ellis, 2006; Ellis & Sagarra, 2011). Because language learning involves the creation and strengthening of form-meanings mappings (e.g., word order reliably indexes subject-object information in English active sentences; MacWhinney, 2008), once a specific form-meaning mapping is created and strengthened/automatized through usage (DeKeyser, 1997), blocking can make it difficult to modify existing mappings to create new ones. For example, once word order has been learned to be a strong and reliable cue for subject-object information, it is more

difficult to learn that a different cue (e.g., case morphology) can also serve as a valid cue for this meaning (Ellis, 2006; MacWhinney, 2008).

Although L2 research shows that learners can overcome the effects of blocking to create new form-meaning mappings (e.g., via instruction; Cintrón-Valentín & Ellis, 2016; Zhao & MacWhinney, 2018), learned attention developed from prior language use can exacerbate new learning. This is because prior experience conserves processing costs by directing attention toward the most informationally useful cues in that language. For example, one way that L1 English speakers conserve processing costs is that they learn from experience to attend less to verbal inflections than speakers of languages like French because the same information included in English verbal inflections (e.g., time reference, person) is more reliably expressed elsewhere in sentences (e.g., adverbs, pronouns; Ellis & Sagarra, 2011; VanPatten, 2004). In sum, the cognitive processes of blocking and learned attention are important explanations not only for how and why experience optimizes L1 learning, but also for how and why prior experience can complicate L2 learning when L1-L2 differences exist (e.g., the same cue is informationally strong in L2, but weak in L1).

3. Addressing the negative effects of crosslinguistic influence with instruction

Building on this understanding, instructional research has investigated if explicit instruction can reduce the negative effects of crosslinguistic influence. For instance, Cintrón-Valentín and Ellis (2016) compared three types of explicit instruction that directed Chinese speakers' attention to verbal inflectional cues for time reference in L2 Latin: EI with comprehension practice, textual enhancement with comprehension practice, and comprehension practice alone. Results showed that EI about L2 verbal inflections for tense with comprehension practice was the most effective method for improving L2 learners' comprehension of Latin verbal inflectional cues. Indeed, using EI with practice to direct attention to L2 cues that can go unnoticed due to blocking and learned attention is one way to effectively support L2 learning (see also Ellis & Sagarra, 2011; Presson et al., 2014; Zhao & MacWhinney, 2018).

Other approaches have used EI to encourage learners to use, analyze, and compare their languages, based on the understanding that cross-language awareness can support L2 development. For example, Spada et al. (2005) used contrastive EI that described L1-L2 differences and similarities with example sentences in both languages to support young French speakers' learning of question formation in English. Specifically, yes-no questions in French tend to be asked using declarative word order with raising intonation (e.g., *Jean est chez*

lui?, John is at home?), but in English are asked using interrogative word orders (or subject-verb inversion, e.g., Is John at home?). Learners were taught that asking English questions using French word order and raising intonation does not apply in English. Instead, learners were provided with the following simple EI: "To form a yes/no question using *can*, *will*, *is* and *are*, invert the subject and the auxiliary verb" (p. 210), followed by meaning-based production practice in L2 that required use of the target feature. For example, participants played "Find someone who . . .," which required learners to ask yes-no questions like "Can you play hockey?" Results from grammaticality judgments and production tests showed that directing attention to these L1-L2 differences using contrastive EI improved the accuracy of learners' question formation in English (see also de la Fuente & Goldenberg, 2022; Lucas, 2020).

However, even though using EI to direct attention to crosslinguistic differences followed by practice can support L2 development, not well understood is *how* and *why* directing attention in this way benefits L2 development. One reason for this situation is that instructional studies including L1 instructional components have not (systematically) collected or analyzed data about L1 knowledge and/or use. Such evidence is needed to understand the specific ways that instruction about L1 supports L2 learning (e.g., by influencing L1 knowledge/use in some way).

4. McManus and Marsden (2017, 2019a)

One line of research that can address this gap is McManus and Marsden (2017, 2019a), who investigated to what extent providing EI about how French and English express habitual and ongoing aspectual meanings (Smith, 1997) followed by comprehension practice of French and English sentences improved L2 learners' production and comprehension of the French *Imparfait* (IMP), a functionally complex and late-acquired linguistic feature (Ayoun, 2013; Kihlstedt, 2015). McManus and Marsden's instruction lasted four weeks, included different types of EI and comprehension practice, and was input-based (Marsden, 2006; VanPatten, 2004). An 'L2-only group' received EI about French form-meaning mappings for viewpoint aspect plus comprehension practice of French sentences. An 'L2+L1 group' received the same French EI and practice plus additional EI about English form-meaning mappings for viewpoint aspect and comprehension practice of English sentences. An 'L2+L1prac group' received the same instruction as the L2+L1 group except that no English EI was provided (see Table 1 for summary of treatments and Method for description of the instruction).

Table 1 Summary of instructional components in McManus and Marsden (2017)

	L2+L1	L2+L1prac	L2-only
Practice in L2	X	X	X
EI about L2	X	X	X
Practice in L1	X	X	
EI about L1	X		

McManus and Marsden's instruction was designed in this way because L2 difficulties with IMP have been explained in terms of crosslinguistic differences in how English and French express the same viewpoint aspect meanings (Ayoun, 2013; Howard, 2005; McManus, 2015). For example, even though English and French can express the same viewpoint aspect meanings with verbal morphology, form and meaning are mapped differently (Smith, 1997; see Table 2). Briefly, French maps the imperfective meanings of past ongoingness and past habituality to IMP, while past perfectivity is mapped to the *Passé Composé*. In English, however, these same imperfective meanings are mapped to separate forms, *Past Progressive* and *Simple Past*, respectively. *Simple Past* expresses also expresses past habituality. In sum, ongoingness and habituality are mapped to separate forms in English, but to the same form in French. Therefore, McManus and Marsden (2017) investigated if directing attention to these crosslinguistic differences could address persistent learning difficulties with IMP (for a review of instructional research about L2 aspect, see Bardovi-Harlig & Comajoan-Colomé, 2022).

Table 2 Viewpoint aspect meanings in French with English glosses

Viewpoint aspect meaning	French sentence with English gloss
Past habituality	*Elle jouait au tennis (tous les jours)* 'she played / would play / used to play tennis (every day)'
Past ongoingness	*Elle jouait au tennis quand le téléphone a sonné* 'She was playing football when the telephone rang'
Past perfectivity	*Elle a joué au tennis (hier)* 'She played tennis (yesterday)'

Following previous research that has examined L2 performance *during* the instruction to understand connections between the instruction and L2 development rather than focusing on pretest-posttest comparisons only (e.g., DeKeyser, 1997; Fernández, 2008), McManus and Marsden (2019a) examined learners' item-by-item comprehension of the L2 sentences completed during the instruction to understand how the type of EI (L2 only vs. L2+L1) influenced the trajectories of L2 comprehension (for post-instruction performance in oral production, self-paced reading, and listening/reading comprehension, see McManus & Marsden, 2017, 2018, 2019b). Results showed that increasing amounts of practice led to

more accurate and faster L2 comprehension for learners in the L2+L1 group only. Coefficient of variation analyses (Segalowitz & Segalowitz, 1993) were used to interpret the faster RTs, which showed that RT variability reduced over time, suggesting evidence of knowledge restructuring as a function of the practice (Solovyeva & DeKeyser, 2018). As a result, not only did L2 comprehension become more accurate and faster with increasing amounts of practice, but it also became less variable. Lastly, these analyses of L2 comprehension were consistent with post-instruction findings reported in McManus and Marsden (2017, 2018): the L2+L1 treatment improved the speed (online self-paced reading test) and accuracy (offline sentence judgement task in reading and listening) of aspectual interpretation four days after instruction (Immediate Posttest) and six weeks later (Delayed Posttest).

In sum, McManus and Marsden's (2019a) exploratory study showed that providing additional EI about L1 played a critical role in benefitting the accuracy, speed, and automaticity of L2 comprehension. Not well understood, however, is *how* and *why* this additional instruction about L1 supported L2 learning in these ways.

5. Rationale for the current study

Given McManus and Marsden's (2017, 2018, 2019a) evidence of L2 development in the L2+L1 group but not in the L2-only and L2+L1prac groups, the L2+L1 treatment was claimed to be important for two reasons. First, the L2+L1 EI directed attention to how aspectual meanings are expressed in L2 *and* L1, which addressed the nature of the crosslinguistic learning difficulty, hypothesized to be the application of L1 processing routines for interpreting IMP (e.g., restricted mapping of IMP to meanings expressed by *used to + verb* for past habituality) rather than attending to inflectional morphology cues in L2. Indeed, McManus's (2019) pretest data of verbal reports corroborated this hypothesis because the learners reported using L1-L2 translation as an initial strategy for interpreting IMP. Second, the L2 EI and practice supported the creation and strengthening of new and more appropriate strategies for processing L2 forms because it pushed learners toward strategies that interpreted IMP using verbal inflectional cues rather than with L1 routines. Critically, both components were claimed to be necessary to support the L2 learning of this crosslinguistically complex target feature.

However, as discussed by McManus and Marsden (2017, 2019a), these claims about the effectiveness of the L2+L1 treatment for supporting L2 development remain speculative because only L2 comprehension was analyzed. Analyzing L1 comprehension is needed to verify if directing attention to form-meaning mappings in L1 and L2 led to more careful processing of the meanings expressed by

L1 forms, which would suggest that the L2+L1 EI increased sensitivity to the meanings expressed by L1 forms. Evidence in support of this conclusion would be reflected in comparatively slower reaction times (RTs) in the L2+L1 group compared with the L2+L1prac group in the comprehension of the L1 practice items.

6. Current study

The current study examined to what extent the accuracy and speed of L2 learners' item-by-item performance during comprehension practice of L1 sentences in the context of L2 instruction was influenced by the type of pre-practice EI received. This aim was achieved by comparing the signatures of L1 comprehension in two groups of learners that completed the same comprehension practice of L1 sentences but received different types of pre-practice EI. One group received EI about L2 and L1 (L2+L1 group), while the other group received EI about L2 only (L2+L1prac). Comparing the trajectories of L1 comprehension in these groups has the potential to advance knowledge and understanding about the role of instruction about L1 in instructed L2 learning. The current study investigated the following research questions:

RQ1: To what extent does the accuracy and speed, performance during comprehension practice of L1 sentences change over time with increasing amounts of practice?

RQ2: To what extent is L1 performance influenced by different types of pre-practice EI (about L2 only vs. about L2+L1)?

7. Method

7.1. Participants

Thirty-six university learners of French (five males) enrolled in semester two of a four-year Bachelor of Arts Honours degree program in England participated in the study. All learners were L1 (British) English speakers, aged 18-21 ($M = 19.2$, $SD = 0.5$), and had completed A2-level French (school leaving qualification in England, equivalent to CEFR level B2). No learner had spent more than six weeks abroad in a French-speaking country ($M = 3$ weeks, $SD = 5.6$). The average number of years spent learning French was 10 ($SD = 2.7$).

7.2. Target features in L2 and L1

The L2 target feature was IMP verbal morphology, a past tense form that expresses past habitual and past ongoing meanings (e.g., *elle jouait au foot* - 'she was playing/used to play/played football'). IMP was selected because L2 research has repeatedly shown that use of IMP to express past habituality and ongoingness is late-acquired due to functional complexity and L1-L2 form-meaning mapping differences (Ayoun, 2013; Howard, 2005; Labeau, 2009). English verbal morphology that expresses these same meanings was selected as the corresponding feature in L1: *Past Progressive* for ongoingness (e.g., she was playing football) and *Simple Past*, *used to*, and *would* for habituality (e.g., she played football, she used to play football, she would play football). All exemplars were third-person singular forms to focus the learning task on aspectual meaning rather than subject-verb agreement, for example (see McManus & Marsden, 2017): 25 regular (e.g., *jouait* 'play') and 23 irregular (e.g., *finissait* 'finish') verb forms balanced across 48 lexical verb types: twelve states (e.g., be happy), twelve activities (e.g., run in the park), twelve accomplishments (e.g., walk to the shop) and twelve achievements (e.g., arrive home).

7.3. Study design

This study is part of a larger experimental intervention that included three instructional treatments and a control group that completed the pretest and post-tests only (for description, see McManus & Marsden, 2017, and IRIS for materials). The focus of the current analysis is comprehension performance of L1 sentences in L2+L1 and L2+L1prac groups, whereas McManus and Marsden (2019a) examined comprehension performance of L2 sentences only. The instructional treatments included the same comprehension practice of L2 and L1 sentences, but different types of pre-practice EI: The L2+L1 group received EI about L2 and L1 form-meaning mappings for viewpoint aspect, but the L2+L1prac group received EI about L2 form-meaning mappings for viewpoint only (i.e., no EI about L1). Therefore, the only difference between these treatments is that the L2+L1prac group received no EI about English. All other aspects of the treatments were the same.

Participants were assigned to a treatment using matched randomization based on pretest performance that assessed knowledge of IMP in different ways: comprehension tests in listening and reading, a self-paced reading task, and the X-Lex receptive lexical knowledge test (Meara & Milton, 2003; for full description and justification of these tests, see McManus & Marsden, 2017). A

battery of different tasks was triangulated to achieve a more global understanding of participants' L2 abilities. For example, the comprehension tests assessed participants offline comprehension accuracy of French viewpoint aspect forms in reading and listening whereas the online self-paced reading task assessed participants' moment-by-moment processing of French sentences expressing viewpoint aspect. Pretest scores showed no statistically meaningful between-group differences on these tests (negligible Cohen's *d* effect sizes with 95% confidence intervals for *d* that included zero, see McManus & Marsden, 2017), indicating between-group equivalence for online and offline knowledge of IMP prior to instruction. Because all participants were adult L1 speakers of English enrolled in university degree programs in an English-speaking university, L1 proficiency was not directly assessed. However, as previously noted, McManus's (2019) analysis of pretest verbal report data in which learners gave reasons for when (not) to use IMP, learners indicated some metalinguistic knowledge about L1, especially for when (not) to use English progressive forms.

All instruction was administered one-to-one with laptops using E-Prime 2.0, delivered in four 45-minute sessions over three weeks, totaling 3.5 hours. Sessions 1 and 2 were delivered in week two, session 3 in week three, and session 4 in week four. This schedule was selected to (i) be comparable to the intensity and frequency of the instruction these learners received as part of their postsecondary education in foreign languages and (ii) facilitate comparison with other instructional studies used in the field. At each session, the participant met individually with the investigator in a research lab. Participants used noise-cancelling headphones during data collection to reduce distractions.

Each session had a different pedagogical focus: Session 1, ongoingness in the past vs. present; Session 2, habituality in the past vs. present; Session 3, past ongoingness vs. past habituality. Session 4 focused on information about past ongoingness and habituality that had been experienced in the previous sessions. As a result, sessions 1 and 2 presented information that was new within the experiment and involved single clause stimuli only (e.g., she was eating a sandwich). Sessions 3 and 4 combined information about ongoingness and habituality that had already been received in sessions 1 and 2, but applied to two-clause sentences (e.g., he was eating in the canteen when his friend arrived), thus steadily increasing the complexity of the task (see Table 3 for examples of L2 and L1 stimuli). In addition, the decision to order the teaching of ongoingness before habituality was made in line with L2 research with English-speaking learners of L2 French which indicates that ongoingness is acquired earlier than habituality (Howard, 2005; Labeau, 2009). All materials are freely available from IRIS.

Table 3 Examples of English and French stimuli used in the instruction

Target condition	French examples	English examples
Past ongoing	Elle mangeait un sandwich	She was eating a sandwich
	Il mangeait un sandwich quand son ami est arrivé	He was eating in the canteen when his friend arrived
Present ongoing	Elle mange un sandwich	She is eating a sandwich
Past habitual	Elle regardait la télé	She used to watch TV
	Elle buvait du café quand elle s'est levée tôt	She drank coffee when she woke up early
Present habitual	Elle regarde la télé	She watches TV

7.4. Instructional treatments

All participants received EI about French form-meaning mappings for ongoingness and habituality plus comprehension practice interpreting English and French sentences expressing these meanings, using pedagogical techniques designed to improve how L2 learners process the input (Fernández, 2008; Marsden, 2006; VanPatten, 2004). The L2+L1 treatment additionally included EI about equivalent forms in English (e.g., *Past Progressive* for past ongoingness, *Present Progressive* for present ongoingness). Described here are the instructional components used in the current study (see also supplementary materials).

7.4.1. EI about L2

Pre-practice EI was provided for approximately five minutes at the start of each session and depicted conceptual-semantic information of viewpoint aspect meanings using short videos and images. Following Tyler (2012), the EI was designed using a cognitive-linguistic approach in which viewpoint aspect meanings were presented using visualizations and imagery rather than linguistic descriptions and dictionary definitions. In addition, the EI started by introducing a viewpoint aspect meaning (e.g., ongoingness) before discussing the forms that can express the meaning (e.g., IMP). For example, the pedagogical focus in Session 1 compared ongoingness in the present versus the past. The concept of ongoingness was depicted using a ten-second video of a person eating an apple, in which the apple was never fully eaten. After watching the video, learners were then asked to think about how they would describe in French what they had just seen (e.g., *il mange une pomme*, 'he is eating an apple'). Then the appropriate L2 aural and written forms were presented on screen. In this way, the instruction focused learners' attention on meaning before form.

Because not all French verbal inflections are aurally distinct (e.g., *joué* 'played[-past participle]' vs. *jouait* 'was playing/used to play/played[-IMP]'), French exemplars were presented aurally and visually. Cues to aid processing were also provided. For example, because there is not always an aural distinction between IMP and the past participle (e.g., *jouait* 'was playing/played[-IMP]' and *joué* 'played[-PP]'), learners were instructed to look/listen out for the presence of an auxiliary verb (e.g., *a* 'have') to help distinguish between *Passé Composé* (*il a joué* 'he played') and IMP (*il jouait* 'he was playing/used to play/played'). Both L2+L1 and L2+L1prac treatment groups received this EI.

7.4.2. EI about L1

Pre-practice EI about L1 followed the same design as the L2 EI: using the same videos and images to depict conceptual-semantic information (e.g., concept of ongoingness), asking learners to think how they would describe what was depicted in the videos/images, then presenting the grammatical forms used to describe the viewpoint meanings (e.g., *he is eating an apple* vs. *he was eating an apple* for ongoingness). Similarly, processing cues were also provided in the English EI. For example, to determine whether the sentence referred to an ongoing event in the past or the present, learners were instructed to listen out for whether the auxiliary was in the present tense (e.g., 'is') or the past tense (e.g., 'was') since English past participles (e.g., 'playing') do not express time reference (e.g., 'she is playing tennis' vs. 'she was playing tennis'). In this way, the L2 and L1 EI provided comparable information about form-meaning mappings and cues to aid processing. EI about L1 was received by the L2+L1 group only.

7.4.3. Comprehension practice in L2 and L1

The EI was immediately followed by L2 and L1 task-essential comprehension practice in listening and reading that forced learners to attend to form-meaning mappings expressed by IMP, *Passé Composé* or *Présent* (for French) or by *Past Simple, Past Progressive, Present Simple*, or *Present Progressive* (for English), designed following previous instructional research using task-essential activities (e.g., Fernández, 2008; Marsden, 2006; VanPatten, 2004). For each practice item, learners saw on screen a sentence and had to select the meaning of that sentence from fixed options. The sentences were single clause in Sessions 1 and 2 and two-clause in Sessions 3 and 4 (see Table 3 for examples). An image (e.g., sandwich) plus a bracketed infinitive (e.g., *manger,* eat) appeared alongside the two-clause sentences so

that learners knew which verb to interpret (see IRIS and McManus & Marsden, 2017). Learners selected the stimulus's meaning from two options in Sessions 1, 2, and 3, and from three options in Session 4. The response options used in Sessions 1 and 2 were "right now" for present stimuli and "in the past" for past stimuli. In Sessions 3 and 4 the response options were "regularly repeated" for past habitual stimuli and "ongoing/interrupted" for past ongoing stimuli. The wording used in response options matched that used in the EI (see supplementary materials).

The comprehension practice contained 712 stimuli in total (552 French and 160 English). 96 French and 32 English in each of Sessions 1 and 2, 144 French and 48 English in Session 3, and 216 French and 48 English in Session 4. Learners completed the same amounts of practice and received the same stimuli, but the stimuli within each practice session were randomized by E-Prime. The stimulus appeared first (e.g., *jouait au foot quand sa petite amie est arrivée* 'was playing football when his girlfriend arrived'), then after 2500ms (for two-clause stimuli) or 500ms (for single-clause stimuli) the response options appeared at the bottom of the screen and remained until a response was pressed. For aural stimuli, response options did not appear until the full stimulus had finished playing. Thus, for all practice items, responses were not time pressured. Responses could not be changed after initial selection.

Correct/incorrect feedback was shown immediately after each response (see supplementary materials). Additional EI (in L1 and L2) was provided during the practice following incorrect responses only, which was infrequent and occurred in similar amounts in both treatments. However, while L2 EI was provided in all practice sessions following incorrect responses, L1 EI following incorrect responses was only provided to the L2+L1 group in Sessions 1 and 2.

The lexical semantic properties of verb types were counterbalanced across listening/reading and ongoing/habitual items: 12 states (e.g., *be happy*), 12 activities (e.g., *swim in the sea*), 12 accomplishments (e.g., *walk to the shop*), and 12 achievements (e.g., *arrive home*). Verb type frequency was balanced across the four lexical semantic classes using Lonsdale and Le Bras's (2009) frequency dictionary of French. French aural stimuli were recorded by two L1 French speakers in a recording studio. The French sentences were verified for authenticity by 26 native French speakers: All were rated as 100% acceptable, with the meanings (ongoing/ habitual, present/past) as intended.

7.5. Data analysis

E-Prime was programed to automatically collect accuracy and RT data for every response in the comprehension practice. For accuracy, E-Prime automatically coded the raw data as correct (1) or incorrect (0). RTs were automatically collected

by E-Prime and were calculated in milliseconds from the onset of response options to response selection. For each item, RTs of more than 3 SDs above the group mean were considered extremely slow and RTs of more than 3 SDs below the mean were considered as extremely fast. RTs that fell into these categories were removed and treated as missing data (see Marmolejo-Ramos et al., 2015).

Accuracy and RT were analyzed in R (R Core Team, 2022), with separate analyses for each session because each had a different pedagogical focus and not all sessions included the same number of practice items. Accuracy was analyzed with logit mixed-effects analyses (Jaeger, 2008) using the *lme4* package (Bates et al., 2015). Mixed-effects linear regression analyses (Baayen et al., 2008) using *nlme* (Pinheiro et al., 2021) were used to analyze RTs. Explanatory variables were as follows: Group (L2+L1, L2+L1prac) and Item (i.e., ranked item number in each practice session), which were entered into the models as fixed effects. Subject and items were added as cross-random factors.

For each session, multiple models were constructed, and the most plausible model was determined through comparison. Starting with the simplest model, new parameters were added one at time (Field et al., 2012). Models were compared as they were built using maximum-likelihood estimation. First, a base-line model was fitted in which only the intercept was included, then a model was fitted that allowed the intercept to vary over Subjects. Finally, to verify whether allowing the intercepts to vary improved the model fit significantly, the models were compared using AIC (Akaike Information Criterion) and the *anova* function in R. Subsequent models were then built by adding Group and then Item as fixed-effect factors, followed by a random slope added for the effect of Item, and then a Group x Item fixed-effect interaction. After adding each new parameter to the model, AIC and *anova* were used to verify whether its addition improved the fit of the model.

For all analyses, the alpha was set at .05. To interpret effect estimates and magnitudes of change, 95% confidence intervals (CIs) and R^2 effect sizes are presented. CIs with short intervals that do not include zero are interpreted as statistically reliable indicators of change (Field et al., 2012). Following Nakagawa and Schielzeth (2013), R^2 was used as a summary index for statistical models, which range from 0-1 and estimate how much of the variance in performance can be accounted by the entire model (conditional R^2) and by the fixed effects only (marginal R^2), computed using the *MuMIn* package (Bartoń, 2023) in R (see supplementary materials).

8. Results

This section presents results for learners' comprehension of L1 sentences at each practice session, starting with accuracy and then RTs.

8.1. Accuracy

Table 4 shows the effects of the fixed factors (Item, Group) in all sessions for accuracy (see Figure 1 for corresponding plots).

The accuracy of L1 comprehension over the course of each session was not significantly influenced by either Item or Group (CIs for all fixed effects included zero, $p > 0.05$). Indeed, Figure 1 also shows negligible change over time for both groups. These results indicate that the accuracy of L2 learners' comprehension of L1 sentences was not significantly influenced by increasing amounts of practice.

Table 4 Summary of fixed effects for accuracy

Session #	Parameter	Estimate	95% CIs for estimate	SE	df	t	p
1	(intercept)	.99	.98, 1.00	.01	1114	144.83	<.001
	Item	.00	-.00, .00	.00	1114	.87	.39
	Group	.01	-.01, .03	.01	34	.91	.37
	Item x Group	-.00	-.00, .00	.00	1114	-1.17	.24
2	(intercept)	.99	.97, 1.01	.01	1052	117.98	<.001
	Item	.00	-.00, .00	.00	1052	.07	.94
	Group	-.00	-.03, .02	.01	32	-.18	.86
	Item x Group	.00	-.00, .00	.00	1052	.21	.84
3	(intercept)	.97	.95, .99	.01	1596	92.52	<.001
	Item	.00	-.00, .00	.00	1596	.66	.51
	Group	.00	-.03, .03	.01	32	.06	.95
	Item x Group	.00	-.00, .00	.00	1596	.31	.76
4	(intercept)	.97	.95, .99	.01	1596	100.56	<.001
	Item	.00	-.00, .00	.00	1596	1.21	.23
	Group	.02	-.01, .05	.01	32	1.42	.17
	Item x Group	-.00	-.00, .00	.00	1596	-1.39	.16
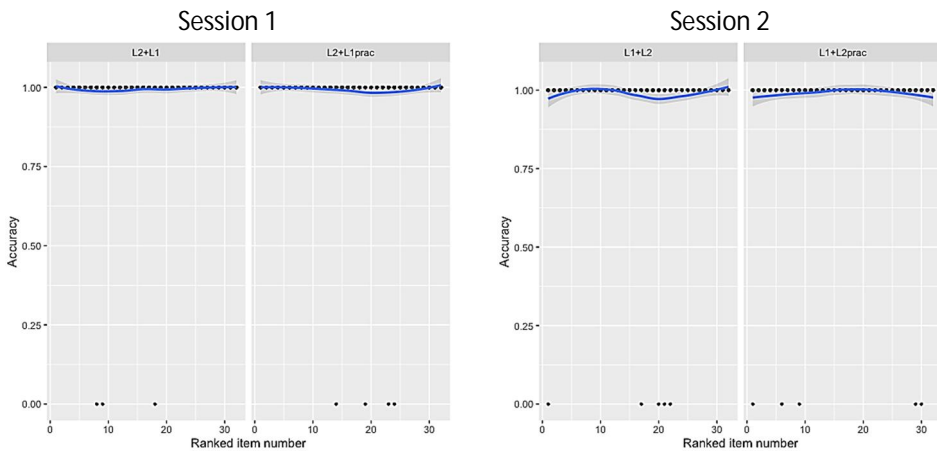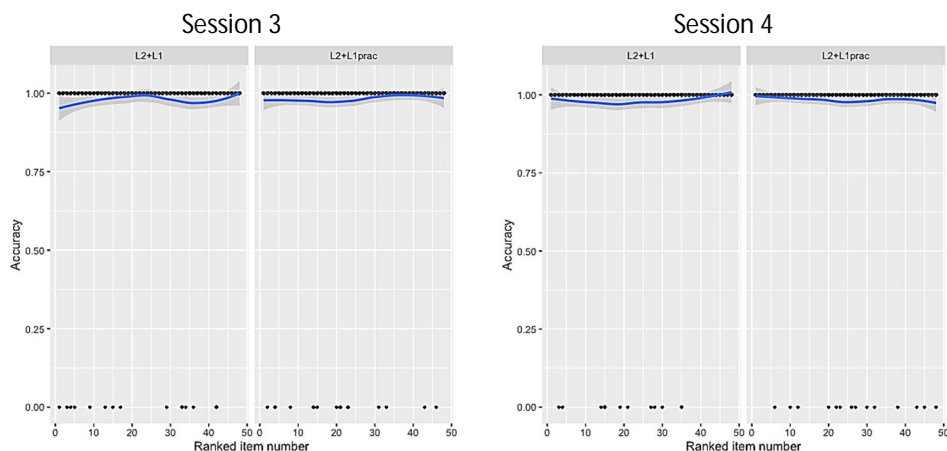
Figure 1 Plots for L1 accuracy performance over the course of each practice session in L2+L1 and L2+L1prac treatments

8.2. RTs

Table 5 shows the effects of the fixed factors (Item, Group) in all sessions for RTs of L1 comprehension (see Figure 2 for plots).

In contrast to L1 accuracy, RTs for L1 comprehension were significantly influenced by ranked item number in practice Sessions 2, 3 and 4, and by Group and the Item x Group interaction in sessions 3 and 4 (CIs did not include zero in these sessions, $p < 0.05$). Comprehension in Session 1 was not significantly influenced by Item or Group. However, it is not the case that RTs over the course of sessions 3 and 4 changed for both groups. As shown in Figure 2, RTs in the L2+L1prac group remain largely constant over the course of each session, but RTs in the L2+L1 group are more variable. In Session 3, the L2+L1 group's RTs get gradually slower until the middle of that session and then begin to quicken with increasing amounts of comprehension practice. In Session 4, the L2+L1 group's RTs are slower at the beginning of the session and quicken over time with increasing amounts of practice. No corresponding changes in RTs are visible for the L2+L1prac group.

Posthoc tests were carried out to understand the Item x Group interactions found in sessions 3 and 4 (see Table 6), which show that RTs in sessions 3 and 4 changed significantly over time for the L2+L1 group only (CIs did not include zero, $p < .001$). In the L2+L1prac group, RTs did not change significantly over the course of either practice session.

In sum, results for the accuracy and speed of L2 learners' comprehension practice of L1 sentences show that while the speed of comprehension in the L2+L1 group changed significantly over time, no statistically meaningful changes for RT were found

in the L2+L1prac group. In addition, no changes to L1 comprehension accuracy were found in either group. These findings indicate that the L2+L1 instruction but not the L2+L1prac instruction influenced the speed but not the accuracy of L1 comprehension.

Table 5 Summary of fixed effects for RT

Session #	Parameter	Estimate	95% CIs for estimate	SE	df	t	p
1	(intercept)	1009.99	962.36, 1057.62	24.32	1114	41.53	<.001
	Item	-.94	-3.21, 1.33	1.16	1114	-0.81	.42
	Group	-39.41	-107.32, 28.50	33.48	34	-1.18	.25
	Item x Group	-.40	-3.52, 2.73	1.59	1114	-0.25	.80
2	(intercept)	954.11	905.41, 1002.80	24.86	1052	38.38	<.001
	Item	3.99	.76, 7.22	1.65	1052	2.42	.02
	Group	36.47	-35.02, 107.96	35.16	32	1.04	.31
	Item x Group	-2.83	-7.39, 1.74	2.33	1052	-1.21	.23
3	(intercept)	2825.45	2705.96, 2944.95	60.99	1582	46.32	<.001
	Item	-6.18	-10.54, -1.83	2.17	1582	-2.85	.006
	Group	-586.93	-734.89, -438.97	75.93	46	-7.77	<0.001
	Item x Group	5.85	.59, 11.11	2.68	1582	2.18	.029
4	(intercept)	2446.98	2358.79, 2535.16	45.01	1596	54.36	<.001
	Item	-9.90	-13.03, -6.78	1.59	1596	-6.21	<.001
	Group	-388.39	-510.89, -265.89	60.21	32	-6.45	<.001
	Item x Group	10.45	6.27, 14.63	2.13	1596	4.89	<.001

Table 6 Posthoc results for within-group RT performance over time in practice sessions 3 and 4

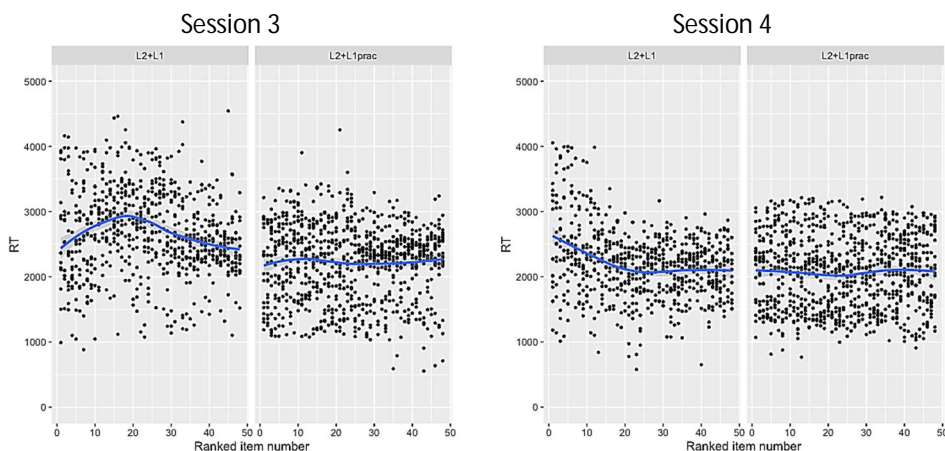|		b	CIs	df	t	p	R^2
Session 3	L2+L1	-5.90	-9.44, -5.89	704	-3.27	<.001	.02
	L2+L1prac	-.38	-3.67, 2.91	892	-.23	.82	.00
Session 4	L2+L1	-9.90	-13.08, -6.73	704	-6.11	<.001	.07
	L2+L1prac	.54	-2.22, 3.31	892	.38	.70	.00
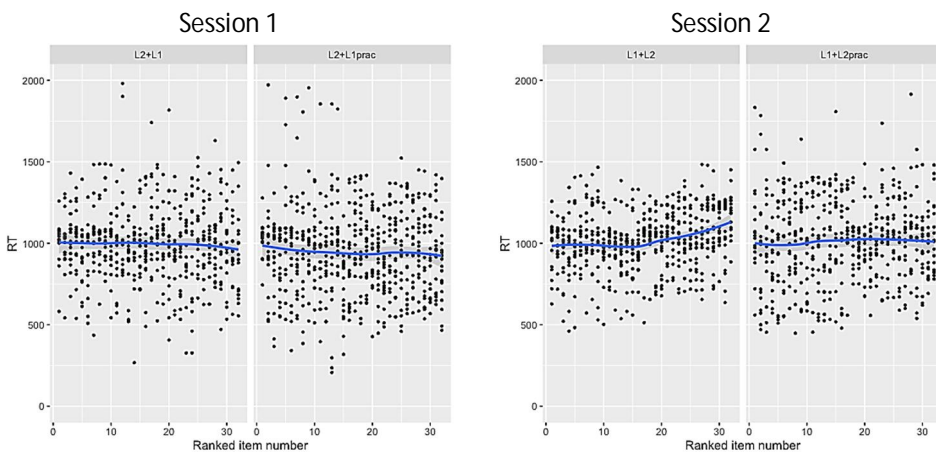
Session 1

Session 2

Figure 2 Plots for L1 RT performance over the course of each practice session in L2+L1 and L2+L1prac treatments

9. Discussion

The current study revisited and extended McManus and Marsden (2019a) to clarify *how* and *why* providing additional instruction about L1 (EI with comprehension practice), alongside an instructional core of EI about L2 and comprehension practice of L2 sentences benefitted the L2 learning of IMP, a functionally complex and late-acquired target feature exhibiting L1-L2 form-meaning differences for aspect. This question was addressed by examining (i) the accuracy and speed of learners' item-by-item comprehension of L1 sentences completed over the course of the L2 instruction and (ii) the extent which L1 comprehension varied as function of the pre-practice EI provided (with or without EI about L1). Given that all learners received the same EI about French and completed the same comprehension practice of L2 and L1 sentences, the only instructional difference between the groups was that additional EI about L1 was provided to the L2+L1 group but not the L2+L1prac group. Overall, the current study's results showed that increasing amounts of L1 comprehension practice did not impact L1 accuracy in either group. In addition, the RTs of L1 comprehension were stable in the L2+L1prac group but not in the L2+L1 group: RT trajectories were bell-shaped in session 3 and gradually quickened over time in session 4. These findings demonstrate that providing additional EI about L1 form-meaning mappings impacted the speed but not the accuracy of L1 comprehension.

Taken together, these patterns of results are consistent with those reported by McManus and Marsden (2019a) for L2 comprehension because changes

to L2 comprehension (accuracy improved, RTs quickened over time) were found in the L2+L1 group only. McManus and Marsden's (2019a) L2 development evidence therefore corresponds with this study's findings for L1 comprehension.

These results and those reported by McManus and Marsden (2019a) are important for clarifying *how* and *why* additional L1 EI and L1 practice can benefit the L2 learning of target features exhibiting crosslinguistic differences. In terms of *how* the L2+L1 instruction influenced L1 comprehension, the current study's findings show that providing learners with additional EI about L1 form-meaning mappings temporarily slowed their processing of L1 sentences, as evidenced by changes to the speed of L1 comprehension in Sessions 3 and 4, which were the most complex practice sessions in the instruction. In contrast, L1 comprehension was stable across all instructional sessions for learners who received no additional EI about L1 (i.e., L2+L1prac learners). In addition, neither the presence nor the absence of additional EI about L1 impacted the accuracy of L1 comprehension. Consistent with McManus and Marsden's hypothesis, this finding suggests that intentionally directing attention to L1 form-meaning mappings led to more careful processing of the meanings expressed by L1 forms. Because L1 accuracy was stable and not different between the groups, it is likely that the L1 EI did not trigger the development of new L1 knowledge, but instead encouraged learners to pay more attention to the meanings expressed by L1 forms. It appears that encouraging this more careful processing of L1 forms played an important role in McManus and Marsden's (2019a) findings.

In terms of *why* the L2+L1 instruction supported L2 learning in the ways that it did, there is broad agreement that EI can increase the effectiveness of task-essential practice (Fernández, 2008; Marsden & Chen, 2011), especially for functionally complex L2 features with L1-L2 differences that can go unnoticed due to blocking and learned attention (Cintrón-Valentín & Ellis, 2016; Zhao & MacWhinney, 2018). Using the EI to clarify the meanings expressed by L2 and L1 forms likely induced noticing of IMP inflectional morphology more quickly, which thus better supported the creation and strengthening of new and more appropriate strategies for processing L2 forms. Given the L2 learning difficulty identified for IMP (i.e., inappropriate use of L1 strategies for interpreting L2 forms), the L2+L1 instruction pushed learners toward more appropriate routines that interpreted IMP using verbal inflectional morphology. Indeed, no detectable improvement for L2 accuracy in the L2+L1prac and L2-only groups (see McManus & Marsden, 2019a) indicates that these treatments did not adequately support the creation and/or development of new processing strategies. This is likely because the L2+L1prac and the L2-only instruction did not adequately address the nature of the L2 learning problem: application of L1 routines for interpreting IMP's meanings.

Taken together, the L2+L1 treatment more effectively supported L2 development for this crosslinguistically complex target feature because (i) it clarified the meanings expressed by L2 and L1 forms, as evidenced by initially slower processing of L2 and L1 sentences compared to performance in the other instructional groups, (ii) it reduced the negative effects of blocking and learned attention by directing attention to L2 verbal inflectional cues, and (iii) it provided repeated opportunities for practice in L2 and L1 that required learners to interpret the meanings expressed by L2 and L1 forms. These findings also indicate that McManus and Marsden's L2-only and L2+L1prac treatments were less effective for supporting L2 development because they did not explicitly clarify the meanings expressed by L1 forms and were therefore less successful at addressing the negative effects of blocking and learned attention. Importantly, however, these insights were only possible through an analysis of the L1 comprehension data which provided evidence that L1 comprehension performance temporarily slowed following the provision of additional EI about L1, even though both the L2+L1 and L2+L1prac groups completed the same comprehension practice of L1 sentences. Future research is required to corroborate these conclusions.

10. Implications for language pedagogy

In line with growing consensus in the field (de la Fuente & Goldenberg, 2022; Lucas, 2020; Spada et al., 2005), a key pedagogical implication from this line of research is that directing attention to how L2 and L1 express the same meanings can be helpful for learning L2 features with crosslinguistic differences. The current study's finding that L1 accuracy did not change for either group suggests that the instruction did not lead to the creation of new (declarative) knowledge of the target feature (likely because these participants were highly educated and very experienced users of English), but rather it prompted closer attention to viewpoint aspect forms and the aspectual meanings that these forms can express, as evidenced by temporary changes to the speed but not the accuracy of L1 comprehension. For instructed adult L2 learners, this finding suggests that providing EI about L1 may not (always) serve to create new (declarative) knowledge of L1, especially among highly educated, university-level L2 learners. Rather, it appears that EI about L1 helps increase noticing and/or sensitivity to the meanings expressed by specific forms, in both L2 and L1. This explanation seems most likely given the current study's findings for L2 learning difficulties caused by inappropriate use of L1 processing strategies for interpreting L2 forms (see also VanPatten, 2004).

Indeed, these findings and their explanations are consistent with growing trends in the field of instructed L2 learning that have documented the usefulness of instruction that increases learners' awareness to the meaning implications of

words and sentences (Lantolf et al., 2021; Tyler et al., 2018). It is also important to note that this line of L2 research challenges growing interest in 'comprehensible input' based approaches to instruction that prioritize the *amount* of input classrooms without developing learners' awareness and understanding of language (ACTFL, 2023). The American Council on the Teaching of Foreign Languages (ACTFL), for example, has for a long time now recommended that teachers use the target language 90% of the time or more in foreign language classrooms to effectively support L2 learning, as represented in their *Guiding Principles for Language Learning*. Broad-level pedagogical recommendations like this should be empirically tested and revisited because even though L2 theory acknowledges that input is important for L2 learning, learning outcomes cannot be explained by input alone (Nassaji & Fotos, 2011; VanPatten, 2004). At the same time, there is evidence of change, given that national language teaching associations are increasingly embracing instructional approaches that develop learners' awareness and understanding of language (including of L1-L2 differences) as being necessary for language development (ACTFL, 2015). One challenge for future instructional research will be to develop evidence-based strategies for integrating cross-language awareness-raising techniques into language teaching.

11. Limitations and future research

Current understanding about the role of instruction to support L2 learning is predominantly based on investigations of L2 performance using pretests and posttests, with very little investigation of how performance changes *during* the instruction itself. However, in line with a small body of research (e.g., DeKeyser, 1997; Fernández, 2008; McManus, 2021a; McManus & Marsden, 2019a), research that focuses on L2 performance during the instruction can provide important information about instructional effectiveness and the specific ways in which instructional components shape the trajectories of L2 learning. As such, more longitudinal research in instructed contexts is needed that systematically investigates the trajectories of L2 learners' performance during the instruction to document and theorize how L2 knowledge and use changes over time as function of specific instructional conditions (e.g., presence of different types of EI, practice schedules). These performance signatures are needed to make better informed inferences about the processes involved in L2 learning and thus design instructional techniques to support development.

As previously noted, the claims made here about changes to L1 comprehension are based on learning data from adult English-speaker L2 learners with extensive classroom experience. The target feature selected is also well-documented to

be functionally complex and late-acquired in L2 research. Nonetheless, future studies with both young and beginning learners are needed to more fully understand how directing attention to L1 form-meaning differences can facilitate L2 learning, involving different language combinations with less commonly taught languages (e.g., Korean, Russian). There is also a strong need for L2 researchers to systematically collect and analyze data about learners' knowledge of other languages (i.e., not L2 only), including L1 knowledge/use. This is because L2 learning does not happen in a vacuum, but new learning impacts the entire language system. In addition, incorporating and analyzing L1 data into future instructional research designs will inform understanding about the ways in which instruction about L1 plays a role in shaping L2 learning. Lastly, the current study's findings require replication in actual classrooms given that all instructional treatments and assessments were delivered with laptops in lab settings.

12. Conclusion

The current study revisited and extended McManus and Marsden (2019a) to clarify *how* and *why* providing additional instruction about L1 (EI with comprehension practice), alongside an instructional core about L2, benefitted the L2 learning of a crosslinguistically complex target feature. Results showed that increasing amounts of L1 comprehension practice did not impact L1 accuracy in either group. In terms of the speed of L1 comprehension, results showed that RTs of L1 comprehension were stable in the L2+L1prac group, but RT trajectories in the L2+L1 group changed with increasing amounts of practice: RTs were bell-shaped in session 3 and gradually quickened over time in session 4. Taken together, these findings suggest that the L2+L1 instruction supported L2 development because (i) it clarified the meanings expressed by L2 and L1 forms, (ii) it reduced the negative effects of blocking and learned attention by directing attention to L2 verbal inflectional cues, and (iii) it provided repeated opportunities for practice in L2 and L1 that required learners to interpret the meanings expressed by L2 and L1 forms. While these findings have important implications for the design and implementation of language teaching curricula, consistent with a growing body of research examining roles for L1 use in instructed L2 learning, replication studies with intentional modifications to learning contexts, L1-L2 pairings, and other L2 features exhibiting well-documented crosslinguistic effects are needed to verify these conclusions (McManus, 2021b; Porte & McManus, 2019).

References

ACTFL. (2015). *World-readiness standards for learning languages.* ACTFL.

ACTFL. (2023, May 31). *Guiding Principles for language learning.* ACTFL. https://www.actfl.org/resources/guiding-principles-language-learning

Ayoun, D. (2013). *The second language acquisition of French tense, aspect, mood and modality*. John Benjamins.

Baayen, R. H., Davidson, D. J., & Bates, D. M. (2008). Mixed-effects modeling with crossed random effects for subjects and items. *Journal of Memory and Language*, *59*(4), 390-412. https://doi.org/10.1016/j.jml.2007.12.005

Bardovi-Harlig, K., & Comajoan-Colomé, L. (2020). The aspect hypothesis and the acquisition of L2 past morphology in the last 20 years: A state-of-the-scholarship review. *Studies in Second Language Acquisition*, *42*(5), 1137-1167. https://doi.org/10.1017/S0272263120000194

Bardovi-Harlig, K., & Comajoan-Colomé, L. (2022). The relation of second language acquisition, instructed second language acquisition, and language teaching from the lens of second language tense-aspect. *Language Teaching*, *55*(3), 289-345. https://doi.org/10.1017/S026144482200009X

Bartoń, K. (2023). *MuMIn: Multi-model inference* (1.47.5). https://CRAN.R-project.org/package=MuMIn

Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using *lme4*. *Journal of Statistical Software*, *67*(1). https://doi.org/10.18637/jss.v067.i01

Cintrón-Valentín, M. C., & Ellis, N. C. (2016). Salience in second language acquisition: Physical form, learner attention, and instructional focus. *Frontiers in Psychology*, *7*. https://doi.org/10.3389/fpsyg.2016.01284

de la Fuente, M. J., & Goldenberg, C. (2022). Understanding the role of the first language (L1) in instructed second language acquisition (ISLA): Effects of using a principled approach to L1 in the beginner foreign language classroom. *Language Teaching Research*, *26*(5), 943-962. https://doi.org/10.1177/1362168820921882

DeKeyser, R. (1997). Beyond explicit rule learning: Automatizing second language morphosyntax. *Studies in Second Language Acquisition*, *19*(2), 195-221. https://doi.org/10.1017/S0272263197002040

Ellis, N. C. (2006). Selective attention and transfer phenomena in L2 acquisition: Contingency, cue competition, salience, interference, overshadowing, blocking, and perceptual learning. *Applied Linguistics*, *27*(2), 164-194. https://doi.org/10.1093/applin/aml015

Ellis, N. C., & Sagarra, N. (2011). Learned attention in adult language acquisition: A replication and generalization study and meta-analysis. *Studies in Second*

Language Acquisition, *33*(4), 589-624. https://doi.org/10.1017/S0272263 111000325

Fernández, C. (2008). Reexamining the role of explicit information in processing instruction. *Studies in Second Language Acquisition*, *30*(3), 277-305. https:// doi.org/10.1017/S0272263108080467

Field, A. P., Miles, J., & Field, Z. (2012). *Discovering statistics using R*. Sage.

Howard, M. (2005). Les contextes prototypiques et marqués de l'emploi de l'imparfait par l'apprenant du français langue étrangère. In *Nouveaux développements de l'imparfait* (pp. 175-197). Rodopi.

Jaeger, T. F. (2008). Categorical data analysis: Away from ANOVAs (transformation or not) and towards logit mixed models. *Journal of Memory and Language*, *59*(4), 434-446. https://doi.org/10.1016/j.jml.2007.11.007

Jarvis, S., & Pavlenko, A. (2008). *Crosslinguistic influence in language and cognition*. Routledge.

Kihlstedt, M. (2015). Acquisition of the *imparfait* in L2 French in adults and children: The same or different?: A comparative case study of Swedish adults and children in an immersion setting. *Language, Interaction and Acquisition*, *6*(1), 74-106. https://doi.org/10.1075/lia.6.1.03kih

Labeau, E. (2009). An imperfect mastery: The acquisition of the functions of imparfait by Anglophone learners. In E. Labeau & F. Myles (Eds.), *The advanced learner variety: The case of French* (pp. 63-90). Peter Lang.

Lantolf, J. P., Xi, J., & Minakova, V. (2021). Sociocultural theory and concept-based language instruction. *Language Teaching*, *54*(3), 327-342. https://doi.org/ 10.1017/S0261444820000348

Lonsdale, D., & Le Bras, Y. (2009). *A frequency dictionary of French: Core vocabulary for learners*. Routledge.

Lucas, M. (2020). Cross-linguistic influence and plural marking: Enhancing error recognition and written accuracy among Japanese EFL learners through web-based awareness-raising. *Language Awareness*, *29*(2), 155-177. https:// doi.org/10.1080/09658416.2020.1737096

MacWhinney, B. (2008). A unified model. In P. Robinson & N. C. Ellis (Eds.), *Handbook of cognitive linguistics and second language acquisition* (pp. 241-371). Routledge.

Marmolejo-Ramos, F., Cousineau, D., Benites, L., & Maehara, R. (2015). On the efficacy of procedures to normalize Ex-Gaussian distributions. *Frontiers in Psychology*, *5*. https://doi.org/10.3389/fpsyg.2014.01548

Marsden, E. (2006). Exploring input processing in the classroom: An experimental comparison of processing instruction and enriched input. *Language Learning*, *56*(3), 507-566. https://doi.org/10.1111/j.1467-9922.2006.00375.x

Marsden, E., & Chen, H.-Y. (2011). The roles of structured input activities in processing instruction and the kinds of knowledge they promote: Roles of structured input activities in processing instruction. *Language Learning*, *61*(4), 1058-1098. https://doi.org/10.1111/j.1467-9922.2011.00661.x

McManus, K. (2015). L1-L2 Differences in the acquisition of form-meaning pairings in a second language. *Canadian Modern Language Review*, *71*(2), 155-181. https://doi.org/10.3138/cmlr.2070.51

McManus, K. (2019). Awareness of L1 form-meaning mappings can reduce crosslinguistic effects in L2 grammatical learning. *Language Awareness*, *28*(2), 114-138. https://doi.org/10.1080/09658416.2019.1620756

McManus, K. (2021a). Examining the effectiveness of language-switching practice for reducing cross-language competition in L2 grammatical processing. *Bilingualism: Language and Cognition*, *24*(1), 167-184. https://doi.org/10.1017/S1366728920000218

McManus, K. (2021b). Replication research in instructed SLA. In L. Gurzynski-Weiss & Y. Kim (Eds.), *Instructed second language acquisition research methods* (pp. 103-122). John Benjamins.

McManus, K. (2022). *Crosslinguistic influence and second language learning*. Routledge.

McManus, K., & Marsden, E. (2017). L1 explicit instruction can improve L2 online and offline performance. *Studies in Second Language Acquisition*, *39*(3), 459-492. https://doi.org/10.1017/S027226311600022X

McManus, K., & Marsden, E. (2018). Online and offline effects of L1 practice in L2 grammar learning: A partial replication. *Studies in Second Language Acquisition*, *40*(2), 459-475. https://doi.org/10.1017/S0272263117000171

McManus, K., & Marsden, E. (2019a). Signatures of automaticity during practice: Explicit instruction about L1 processing routines can improve L2 grammatical processing. *Applied Psycholinguistics*, *40*(1), 205-234. https://doi.org/10.1017/S0142716418000553

McManus, K., & Marsden, E. (2019b). Using explicit instruction about l1 to reduce crosslinguistic effects in L2 grammar learning: Evidence from oral production in L2 French. *Modern Language Journal*, *103*(2), 459-480. https://doi.org/10.1111/modl.12567

Meara, P., & Milton, J. (2003). *X-lex: The Swansea levels test*. Express Publishing.

Nakagawa, S., & Schielzeth, H. (2013). A general and simple method for obtaining R^2 from generalized linear mixed-effects models. *Methods in Ecology and Evolution*, *4*(2), 133-142. https://doi.org/10.1111/j.2041-210x.2012.00261.x

Nassaji, H., & Fotos, S. (2011). *Teaching grammar in second language classrooms: Integrating form-focused instruction in communicative context*. Routledge.

Norris, J. M., & Ortega, L. (2000). Effectiveness of L2 Instruction: A Research synthesis and quantitative meta-analysis. *Language Learning*, *50*(3), 417-528.

Pinheiro, J., Bates, D., DebRoy, S., Sarkar, D., & R Core Team. (2021). *nlme: Linear and nonlinear mixed effects models* (version 3.1-153). https://CRAN.R-project.org/package=nlme

Porte, G. K., & McManus, K. (2019). *Doing replication research in applied linguistics*. Routledge.

Presson, N., MacWhinney, B., & Tokowicz, N. (2014). Learning grammatical gender: The use of rules by novice learners. *Applied Psycholinguistics*, *35*(4), 709-737. https://doi.org/10.1017/S0142716412000550

R Core Team. (2022). *R: A language and environment for statistical computing* (4.2.1). R Foundation for Statistical Computing. https://www.R-project.org/

Segalowitz, N., & Segalowitz, S. J. (1993). Skilled performance, practice, and the differentiation of speed-up from automatization effects: Evidence from second language word recognition. *Applied Psycholinguistics*, *14*(3), 369-385. https://doi.org/10.1017/S0142716400010845

Smith, C. S. (1997). *The parameter of aspect*. Springer Netherlands. https://doi.org/10.1007/978-94-011-5606-6

Solovyeva, K., & DeKeyser, R. (2018). Response time variability signatures of novel word learning. *Studies in Second Language Acquisition*, *40*(1), 225-239. https://doi.org/10.1017/S0272263117000043

Spada, N., Lightbown, P., & White, J. (2005). The importance of form/meaning mappings in explicit form-focused instruction. In A. Housen (Ed.), *Investigations in instructed second language acquisition* (pp. 199-234). DeGruyter.

Tyler, A. (2012). *Cognitive linguistics and second language learning: Theoretical basics and experimental evidence*. Routledge.

Tyler, A., Ortega, L., & Uno, M. (Eds.). (2018). *Usage-inspired L2 instruction: Researched pedagogy*. John Benjamins Publishing Company.

VanPatten, B. (2004). *Processing instruction: Theory, research, and commentary*. L. Erlbaum Associates.

Zhao, H., & MacWhinney, B. (2018). The instructed learning of form-function mappings in the English article system. *Modern Language Journal*, *102*(1), 99-119. https://doi.org/10.1111/modl.12449

SUPPLEMENTARY MATERIALS

Table 1 Summary of mixed-effects linear model comparisons for accuracy

Session #	Model	Fixed effects	Random effects	AIC	Δ AIC	BIC	2LL Statistic	p
1	Model 1	None	By-Subject random-intercepts	-2610.84		-2595.69		
	Model 2	Model 1 + Item	Same as Model 1	-2608.84	2	-2588.64	0.00	0.98
	Model 3	Model 2 + Group	Same as Model 1	-2606.89	1.95	-2581.65	0.05	0.82
	Model 4	Same as Model 3	Model 1 + by-Item random slope	-2602.89	4	-2567.55	0.00	1.00
Final model	Model 5	Same as Model 4 + Item X Group interaction	Same as Model 1	-2602.27	0.62	-2561.88	1.38	0.24
2	Model 1	None	By-Subject random-intercepts	-2018.62		-2003.65		
	Model 2	Model 1 + Item	Same as Model 1	-2016.72	1.9	-1996.75	0.10	0.76
	Model 3	Model 2 + Group	Same as Model 1	-2014.72	2	-1989.76	0.00	1.00
	Model 4	Same as Model 3 + Item X Group interaction	Same as Model 1	-2012.76	1.96	-1982.81	0.04	0.84
3	Model 1	None	By-Subject random-intercepts	-1811.64		-1795.45		
	Model 2	Model 1 + Item	Same as Model 1	-1811.44	0.2	-1789.85	1.80	0.18
	Model 3	Model 2 + Group	Same as Model 1	-1809.89	1.55	-1782.91	0.46	0.49
	Model 4	Same as Model 3	Model 1 + by-Item random slope	-1805.89	4	-1768.12	0.00	1.00
Final model	Model 5	Same as Model 4 + Item X Group interaction	Same as Model 4	-1803.99	1.9	-1760.81	0.10	0.76
4	Model 1	None	By-Subject random-intercepts	-2083.83		-2067.63		
	Model 2	Model 1 + Item	Same as Model 1	-2081.89	1.94	-2060.30	0.07	0.79
	Model 3	Model 2 + Group	Same as Model 1	-2080.07	1.82	-2053.09	0.18	0.67
	Model 4	Same as Model 3	Model 1 + by-Item random slope	-2076.07	4	-2038.29	0.00	1.00
Final model	Model 5	Same as Model 4 + Item X Group interaction	Same as Model 4	-2076.01	0.06	-2032.83	1.94	0.16

Table 2 Summary of mixed-effects linear model comparisons for RT

Session #	Model	Fixed effects	Random effects	AIC	Δ AIC	BIC	2LL Statistic	p
1	Model 1	None	By-Subject random-intercepts	16021.95		16037.10	14.56	<0.001
	Model 2	Model 1 + Item	Same as Model 1	16021.87	-0.08	16042.07	2.08	0.15
	Model 3	Model 2 + Group	Same as Model 1	16019.21	-2.66	16044.45	4.66	0.03
Final model	Model 4	Same as Model 3 + Item X Group interaction	Same as Model 1	16021.15	1.94	16051.44	0.06	0.80
2	Model 1	None	By-Subject random-intercepts	14833.75		14848.73	4.88	0.03
	Model 2	Model 1 + Item	Same as Model 1	14822.81	-10.94	14842.77	12.95	0.0003
	Model 3	Model 2 + Group	Same as Model 1	14824.45	1.64	14849.41	0.36	0.55
	Model 4	Same as Model 3	Model 1 + by-Item random slope	14794.90	-29.55	14829.85	33.54	<0.0001
Final model	Model 5	Same as Model 4 + Item X Group interaction	Same as Model 4	14795.45	0.55	14835.39	1.45	0.23
3	Model 1	None	By-Subject random-intercepts	25568.21		25584.41	154.01	<0.0001
	Model 2	Model 1 + Item	Same as Model 1	25563.22	-4.99	25584.81	6.99	0.008
	Model 3	Model 2 + Group	Same as Model 1	25510.30	-52.92	25537.28	54.93	<0.0001
	Model 4	Same as Model 3	Model 1 + by-Item random slope	25504.64	-5.66	25542.43	9.65	0.008
Final model	Model 5	Same as Model 4 + Item X Group interaction	Same as Model 4	25501.96	-2.68	25545.13	4.69	0.03
4	Model 1	None	By-Subject random-intercepts	25234.10		25250.29	9.93	0.0016
	Model 2	Model 1 + Item	Same as Model 1	25218.65	-15.45	25240.24	17.45	<0.0001
	Model 3	Model 2 + Group	Same as Model 1	25206.03	-12.62	25233.02	14.62	0.0001
	Model 4	Same as Model 3	Model 1 + by-Item random slope	25198.69	-7.34	25236.48	11.33	0.0035
Final model	Model 5	Same as Model 4 + Item X Group interaction	Same as Model 4	25182.53	-16.16	25225.71	18.17	<0.0001

Table 3 R^2 values per practice session for the fixed effects only (marginal R^2) and the entire model (conditional R^2)

		Marginal R^2	Conditional R^2
Session 1	Accuracy	0.001	0.001
	RT	0.010	0.039
Session 2	Accuracy	0.000	0.000
	RT	0.016	0.089
Session 3	Accuracy	0.001	0.001
	RT	0.127	0.154
Session 4	Accuracy	0.001	0.001
	RT	0.042	0.053

English (L1) stimuli used in the comprehension practice. See IRIS and McManus & Marsden 2017 for L2 stimuli

Session 1	is believing the news is liking the quiet is drinking wine is smoking cigarettes is driving to the bank is watching the film is leaving the house is knocking on the window was enjoying his dinner was hating the film was eating alone was walking around the garden was running to the shop was writing a letter was finding his wallet was noticing the time is enjoying the weather is liking all the performances is listening to the music is speaking to people is walking to the stage is drinking a glass of water is finishing his drink is leaving town was wearing a special hat was hating all the noise was laughing was playing cards was running towards the President was eating a sandwich was beginning to get bored was ringing his friend
Session 2	knows many things adores his boat reads in the park watches TV in the morning writes a diary entry at night drinks a glass of wine loses his way hits the wall used to live in Paris

	liked the weather did the washing up used to swim ran to the park used to eat a sandwich for lunch used to leave on time found time to go shopping knows many people doubts himself runs in the park drinks coffee in the morning watches a film at night writes a letter loses his wallet rings his brother used to wear a tie lived in London drove the car played squash walked to the church used to swim 3 metres used to arrive on time left with his friends
Session 3	was wearing a hat when it rained was listening to music when his phone rang was writing a letter when the ink spilled was leaving the house when the postman arrived was loving the painting when the man asked was smoking when the car passed was drinking a cup of tea when the cup broke was finding his keys when it started to rain was hating the chicken when the waiter arrived was reading when the baby started to cry was playing a game of football when he fell was knocking at the door when his phone rang used to enjoy the weekends when he didn't work spoke French when he had a French girlfriend read the newspaper when he had the time used to arrive on time when he lived closer to work hated catching the train when he used to commute used to listen to music when he lived alone ate an apple when he was feeling healthy won the lottery when he used to buy a lottery ticket knew his friends well when they socialized drank coffee when he woke up early used to drive to the supermarket when lived with his parents rang the doorbell when he lost his keys was enjoying the movie when he finished his popcorn was eating in the canteen when his friend arrived was writing a letter when there was a knock at the door was leaving the house late when his mum called was wanting some more ice cream when the shop closed was playing tennis when he received a text message was baking a cake when the news started was finding his keys when the bus arrived was living in London when the car exploded was driving the car when he spotted his friend

	was swimming a metre when he saw his boss
	was hitting the wall when the girl asked him a question
	used to enjoy the weekends when he didn't work
	spoke French when he had a French girlfriend
	read the newspaper when he had the time
	used to arrive on time when he lived closer to work
	hated catching the train when he used to commute
	used to listen to music when he lived alone
	ate an apple when he was feeling healthy
	won the lottery when he used to buy a lottery ticket
	knew his friends well when they socialized
	drank coffee when he woke up early
	used to drive to the supermarket when lived with his parents
	rang the doorbell when he lost his keys
Session 4	would like museums when he used to go on holiday with his mum
	would sing songs when he used to be in the choir
	would walk to the shop when he used to be an avid hiker
	would leave the house early when he used to have a girlfriend
	hated catching the train when he used to commute
	used to listen to music when he lived alone
	ate an apple when he was feeling healthy
	won the lottery when he used to buy a lottery ticket
	preferred red wine just when he was given the choice of white
	walked around the shops when he saw his sister
	sang a song when his phone rang
	left the house when he saw his son
	played football when he saw his boss
	played a game of tennis when his child arrived
	sang a song when he cycled to work
	found his keys where someone knocked at the door
	was hating the chicken when the waiter arrived
	was reading when the baby started to cry
	was playing a game of football when he fell
	was knocking at the door when his phone rang
	was living in London when the car exploded
	was driving the car when he spotted his friend
	was swimming a metre when he saw his boss
	was hitting the wall when the girl asked him a question
	would want more time in bed when he woke up late
	would play tennis when he lived in London
	would phone his mum when he lived alone
	would arrive late when he commuted to work
	preferred chips when he used to go to school
	wrote novels when he used to be a writer
	played a game of ping pong when he used to play for the school
	achieved his weekly goals when he used to stay up late
	wanted to sleep when his alarm sounded
	did the washing up when the plate smashed
	read the newspaper when the kids arrived
	arrived when his boss walked through the door
	knew the answer just when the teacher asked for the answer
	drove to work when it started to rain
	wrote a few sentences just when the pen broke
	finished the race when his wife saw him
	was wearing a hat when it rained
	was listening to music when his phone rang
	was writing a letter when the ink spilled

was leaving the house when the postman arrived
was loving the painting when the man asked
was smoking when the car passed
was drinking a cup of tea when the cup broke
was finding his keys when it started to rain

Description of the L1 components of treatments received by the L2+L1 and L2+L1prac groups. For description of the L2 components and the L2-only treatment, see IRIS and McManus and Marsden (2017)

Sessions 1 and 2: Ongoinmessg and habituality in present vs. past

	Session 1: Ongoingness (present vs past)	Session 2: Habituality (present vs past)
Pre-practice EI about L1 Received by L2+L1 group only	[A six-second video clip of man eating an apple. The apple was never fully eaten.] "To describe this you could say: *He is eating an apple* Or *He was eating an apple* The difference between these two is: 'he is eating' = ongoing action RIGHT NOW 'he was eating' = ongoing action IN PAST"	[Four identical images of girl cycling at the gym with text *every Thursday* and circular arrows between each image, indicating repeated event.] To describe this you could say: "To describe this you could say: *She cycles* Or *She used to cycle* The difference between these two is: 'she cycles' = regular action NOWADAYS 'she used to cycle' = regular action IN PAST There are other ways to talk about regular activities IN PAST: She used to cycle / would cycle / cycled BUT NOTE She used to cycle to the gym has 1 meaning: regular activity whereas... 'She cycled' has 2 different meanings: regular action *or* complete, one-off action"
	"To identify ongoing meaning in the present *versus* the past, you need to focus on the auxiliary. Look/listen out for 'is' or 'was' to indicate whether it is an ongoing action taking place RIGHT NOW (present) or it is one IN THE PAST."	To identify regular activities in the present *versus* the past, you need to focus on the tense. She goes = STILL CONTINUES She used to go = IN THE PAST She went = IN THE PAST She used to cycle on Mondays & She cycled on Mondays => *Elle faisait du vélo le lundi*
Practice Randomly interspersed with the French items	16 listening and 16 reading items. Learners must identify whether an ongoing event is "RIGHT NOW" or "IN THE PAST," e.g. He... is eating a sandwich was running to the shop	16 listening and 16 reading items. Learners must identify whether a habitual event is "NOWADAYS" or "IN THE PAST," e.g. He... (1) plays football (2) cycled to work

Received by both treatment groups		
EI given as feedback after incorrect responses during practice Received by L2+L1 treatment only	After incorrectly responding 'RIGHT NOW': "The present tense in English ('is +ing') and in French expresses the same thing: *ongoing action taking place RIGHT NOW*" After incorrectly responding 'IN THE PAST': "*The past tense in English ('was +ing') is the same as the IMP in French (-ait). They both express an ongoing action IN THE PAST*"	After incorrectly responding 'NOWADAYS': "The English Simple Past (-ed) and 'used to' are just like the IMP. After incorrectly responding 'IN THE PAST': "The present tense in English and in French expresses the same thing. Both express something done regularly NOWADAYS."

Sessions 3 and 4: Ongoingness and habituality in the past

	Session 3: Habitual vs Ongoing (in past)	Session 4: Habitual vs. Ongoing vs. Complete (in past)
Pre-practice EI Received by L2+L1 group only	[Same video/ images from Sessions 1 & 2 to illustrate ongoingness and habituality.] "In the past, English uses different tenses for each meaning, but French does not: He was cycling = il faisait du vélo He cycled/used to cycle = il faisait du vélo"	Summary of session 1-3: expressing ongoing and habitual action in (a) English, (b) French, and (c) differences between English and French Elle arrivait = 'was arriving' & 'arrived/used to arrive' Elle lisait = 'was reading' & 'read/used to read'
Practice Randomly interspersed with French items No EI given as feedback to any group	24 listening and 24 reading items. Learners must identify whether an event was ongoing/interrupted or habitual e.g., She… (1) was leaving the house when the postman arrived (2) drank a cup of coffee when he woke up early	24 listening and 24 reading items. Learners must identify whether an event was ongoing/interrupted or habitual or complete/one-off. She… (1) was driving to work when his phone rang (2) ate an apple when he used to go to school (3) sang a song when her phone rang