

Eliciting Production of L2 Target Structures through Priming Activities

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Abstract: This study focuses on the pedagogical applications of structural priming research in an English for academic purposes (EAP) context, investigating whether priming activities are an effective tool for eliciting production of target grammatical structures. University students across four EAP classes carried out a total of 6 information-exchange activities over a 13-week semester. Some students received information-exchange activities that provided models of the target structures (e.g., primes), while other students received activities without any models. Analysis of the students' novel utterances generated from sentence fragments (e.g., prompts) indicated that students who carried out the priming activities produced more target structures following prime sentences than they did in the absence of primes. In addition, students who did priming activities produced significantly more relative clauses and adverbial clauses overall than did students who carried out the activities without models, but there was no difference in their production of passives. Implications and suggestions for instructors interested in incorporating priming activities in L2 classrooms are discussed.

Keywords: adverbial clauses, passives, relative clauses, structural priming

Résumé: Cette étude s'intéresse aux applications pédagogiques d'une recherche sur l'amorçage structurel en contexte d'anglais pour les études (APÉ). Elle cherche à savoir si les activités d'amorçage constituent un outil efficace pour provoquer la production de structures grammaticales cibles. Les étudiants de quatre cours universitaires d'APÉ ont participé à six activités d'échange d'information au cours d'un trimestre de treize semaines. Certains ont participé à des activités où les modèles des structures cibles (les amorces) étaient fournis, et d'autres à des activités où ces modèles ne l'étaient pas. L'analyse des énoncés nouveaux produits par les étudiants et générés à partir de fragments de phrases (p. ex. des indices) indique que ceux qui ont réalisé les activités d'amorçage produisent davantage de structures cibles à la suite d'une amorce qu'en l'absence d'amorce. De plus, les étudiants qui ont réalisé les activités d'amorçage produisent significativement plus de propositions relatives et adverbiales, en général, que ceux qui ont réalisé les activités sans modèles; en revanche, il n'y avait pas de différence dans leur production de formes passives. Les conséquences de ces résultats ainsi que des suggestions pour les enseignants qui

souhaitent intégrer des activités d'amorçage dans leurs cours de L2 sont présentées.

Mots clés : propositions adverbiales, voix passive, propositions relatives, amorçage structurel

Eliciting production of L2 target structures through priming activities

Numerous theoretical approaches to second language (L2) acquisition claim that language production can serve important functions in L2 learning. Cognitive approaches to L2 acquisition, such as skill acquisition theory (DeKeyser, 2007), hold that language production provides the types of practice opportunities that L2 learners need to develop the procedures necessary for accessing and using their linguistic resources during spontaneous language use. Interactionist (Mackey, 2012) and sociocultural (Lantolf, 2011; Swain, 2006) approaches to L2 acquisition regard language production in socially situated, interactional contexts as a primary source of L2 learning. According to these views, language production is part of the social act of communication, and learning occurs through situated language use. Even theories that regard input as a primary mechanism for the learning of new language forms, such as universal grammar (White, 2007) and input processing (VanPatten, 2007), acknowledge that language production serves other aspects of L2 development, such as promoting fluency and automatization or the development of speaking and writing skills.

Reflecting the important functions attributed to language production across these theoretical perspectives, numerous approaches to L2 teaching have called for the use of oral and written production activities in L2 classrooms. Some approaches reflect a skill-acquisition perspective, such as present-practice-produce (PPP), in which linguistic information is provided by the teacher or in the textbook, after which production activities help students access this information for production. Communicative and task-based approaches call for collaborative activities that create learning opportunities through the negotiation of meaning, interactional feedback, and peer scaffolding that can occur when learners carry out tasks in pairs or small groups. To help learners use language forms that are useful for task accomplishment, instructors can implement a variety of pretask activities, such as providing explicit information about target structures (Lapkin, Swain, & Smith, 2002; Leaser, 2004; Swain, 1998; Swain & Lapkin, 2001), modelling how

learners should interact with each other (Kim & McDonough, 2008a, 2011; Swain, 1998; Swain & Lapkin, 1998, 2001), or training learners to recognize and repair errors (Bouffard & Sarkar, 2008; Sato & Lyster, 2012).

In this *Focus on the Classroom* article, we investigate the potential effectiveness of another technique, termed *structural priming*, for helping learners produce language forms during meaning-focused communication. We describe a classroom-based study that investigated the effectiveness of meaning-oriented activities that were designed to provide English for academic purposes (EAP) students with opportunities to produce specific grammatical structures (passives, relative clauses, and adverbial clauses) while also activating their prior content knowledge, promoting the exchange of opinions, developing new content knowledge, and scaffolding other written assignments. To encourage production of these grammatical structures while maintaining a primary focus on meaning, we applied insights from structural priming research to the design of communicative tasks.

Theoretical framework

Our theoretical rationale for the design of the communicative activities comes from structural priming research. Structural priming is the tendency for speakers to produce a structure that was present in the recent discourse, rather than an alternative structure that can express a similar meaning (Bock, 1986). For example, if a speaker produces a prepositional dative (e.g., *We should send a birthday card to Grandma this week*), she will be more likely to produce another prepositional dative later on (e.g., *I gave most of my cash to Sally*), rather than a double-object dative (e.g., *I gave Sally most of my cash*), which is an example of within-speaker priming. Between-speaker priming also occurs, such as during conversation, when one speaker uses a grammatical structure that an interlocutor recently produced. Put differently, if a speaker hears an interlocutor produce a relative clause, she may subsequently produce a novel utterance with a relative clause rather than an alternative structure, such as a prepositional phrase or prenominal modifier.

The occurrence of structural priming has been investigated primarily in psycholinguistic laboratory-based experiments that present models of the alternating structures (e.g., primes) and elicit novel utterances through the use of words, phrases, or incomplete sentences (e.g., prompts) that the participants use to generate a new utterance. For example, to elicit structural priming of dative constructions in the written sentence completion task (Pickering & Branigan, 1998), a participant

would receive a prime that has been manipulated to elicit a double-object dative (e.g., *the mother gives her son. . .*) or a prepositional dative (e.g., *the mother gives the toy. . .*). The next item would be a prompt that could be completed using either structure (e.g., *the nurse shows. . .*). Structural priming would be demonstrated if the participant had more double-object dative prompt completions following double-object dative primes, and had more prepositional dative prompt completions after prepositional dative primes. As summarized by [Pickering and Ferreira \(2008\)](#), structural priming research targeting first language (L1) speakers has investigated a wide variety of issues in psycholinguistics, ranging from the nature of syntactic representations to the occurrence of structural alignment in conversation.

Similar to the L1 structural priming research, L2 structural priming studies have investigated a broad range of topics, including its potential role in implicit learning (e.g., see [Shin & Christianson, 2012](#)). One such topic, which is directly relevant to L2 acquisition and pedagogy, concerns the question of whether priming activities encourage increased production of specific grammatical structures. To address this question, researchers typically have selected one of the alternating structures as the target that they want the participants to produce, and then provide primes of that structure only ([Kim & McDonough, 2008b](#); [McDonough & De Vleeschauwer, 2012](#); [McDonough & Kim, 2009](#)). For example, Thai EFL learners in [McDonough and Chaikitmongkol's \(2010\)](#) study often alternated between two *wh*-question structures when they carried out general communicative activities: a grammatically correct *wh*-question with an obligatory auxiliary verb (*how do people damage their health?*) and an interlanguage *wh*-question in which the obligatory auxiliary verb is omitted (*how people damage their health?*), which is ungrammatical in English. Because the researchers' goal was to increase the learners' production of *wh*-questions with auxiliary verbs, their priming activities only included primes of *wh*-questions with auxiliaries. In this type of research, therefore, the goal is to determine whether "flooding" the learners with primes of a specific structure leads them to produce that structure rather than a less complex or ungrammatical structure.

Priming activities that provide primes of only one structure may be more useful in L2 classroom contexts if an instructor's goal is to help students produce a difficult or infrequent structure. For example, even at advanced levels, L2 speakers may struggle with spontaneous use of the passive construction. In this context, an instructor might create priming activities that present only passive primes because the goal is to elicit the structure that students have difficulty with (passives) rather than to practice a structure they have already acquired and use

frequently (actives). In fact, L1 developmental research has shown that less-frequent and weakly-represented structures are more susceptible to priming (see [Rowland, Chang, Ambridge, Pine, & Lieven, 2012](#), for an overview of structural priming from an L1 developmental perspective). In L2 classroom contexts, therefore, it may be particularly useful for instructors to provide primes of structures that are infrequent or that students have difficulty producing. In other words, embedding primes into communicative tasks may represent an additional technique for encouraging learners to use target structures while preserving a task's primary focus on meaning.

Current study

Situated within the framework of structural priming research, the current study investigated whether the tendency to produce a structure that was present in recent discourse can be exploited for L2 pedagogical purposes. In the EAP instructional context reported here, students experience difficulty using complex grammatical structures in their spontaneous production, even though they have studied English grammar for many years and may be able to use these structures when completing form-oriented grammar practice tasks or editing activities. Therefore, we created priming activities to elicit written and oral production of the structures that the students have difficulty producing. The target structures were passives (as opposed to actives), relative clauses (instead of prepositional phrases), and adverbial clauses (rather than noun or prepositional phrases).

Because relatively little priming research has been situated in L2 classrooms, our first research question was whether structural priming occurs when students carry out priming activities in an EAP classroom. Because structural priming has been shown to occur with word stress patterns in an EAP classroom ([Trofimovich, McDonough, & Foote, 2014](#)) and with nominal clauses during synchronous computer-mediated interaction in a Spanish foreign-language classroom ([Collentine & Collentine, 2013](#)), we predicted that the priming activities would elicit primed production. In other words, we expected that the students would produce more target structures when the preceding discourse context contained a prime sentence. In addition to exploring the occurrence of structural priming, our second goal was to determine whether priming activities elicit greater production of the target structures than do communicative activities without models of the target structures. Even if priming activities are unsuccessful at eliciting priming, they may still provide increased opportunities for learners to produce the targeted structure, which is valuable information

for instructors. Therefore, the second research question asked whether priming activities, which have prime sentences with the target structures, elicit greater production of those structures than the same activities without prime sentences (i.e., no models). Due to the presence of the primes, we expected that students who carried out the priming activities would produce more target structures than students who received activities without any models of the target structures, in both their written and oral production. To summarize, our two goals were to investigate whether priming occurs and whether priming activities elicit a greater proportion of targeted structures in learner production, compared to activities without models.

Method

Participants and instructional context

The participants were 69 English L2 speakers (44 men, 25 women) enrolled in undergraduate (66) and graduate (3) degree programs at a Montreal university. They ranged in age from 18 to 34, with a mean age of 21.1 years ($SD = 2.8$), and their length of residence in Canada varied considerably from two weeks to six years, with a mean of 15.9 months ($SD = 16.9$). Their amount of prior English instruction ranged from 1 to 18 years, with a mean of 7.5 years ($SD = 3.8$). They were studying academic disciplines in the business (34), engineering (14), and arts and sciences (10) faculties (11 students did not report their degree programs). Participants were speakers from diverse language backgrounds, with the largest L1 groups being Chinese (34), Arabic (11), Spanish (7), French (6), Portuguese (3), and Vietnamese (3). Additional L1s included Armenian, Farsi, Pashto, Romanian, and Urdu.¹

Based on their performance on a university placement exam, the participants were required to take an intensive credit academic English writing course (two 165-minute classes per week for 13 weeks). They were enrolled in four classes of the same EAP course that were taught by two instructors in two semesters (Winter 2012, Winter 2013). The EAP course focused on the development of general academic language skills, including reading strategies, review of vocabulary and grammatical structures useful for understanding and composing academic texts, and paragraph-level writing tasks. The course was organized into 11 thematic chapters, with each chapter containing a variety of reading texts related to the chapter theme, vocabulary and grammar explanation and practice, and a paragraph-level writing activity. Each chapter provided metalinguistic information about a target grammatical structure, along with sentence-level grammar practice activities. The course did not include any oral communication objectives or activities, but

Table 1. Information-Exchange Activities

Unit	Theme	Student A topic	Student B topic	Target structure
4	Socialization	Domestic violence	Marriage & divorce	Relative clauses
5	Collective living	Immigration	Workplace discrimination	Passives
6	Education	School violence	Peer pressure	Adverbial clauses
8	Elite children	Child athletes	Gifted children	Adverbial clauses
9	Intelligence	Human IQ	Animal cognition	Relative clauses
10	Public health	Obesity	Depression	Passives

students had opportunities to speak English with their peers during pair or small-group activities such as pre-writing brainstorming sessions, comparing answers to practice activities, and discussing or analyzing texts. There were no changes in the curriculum, course textbook, or assessment between the two semesters of data collection.

Materials

The materials were six information-exchange tasks in which students tested each other's knowledge about topics related to a unit theme, followed by open-ended discussion questions that linked the topics to the activities in the course textbook. Because the grammar practice activities in the course textbook were form-oriented and unrelated to the chapter themes, students did not have opportunities to produce the target structures in more meaning-oriented contexts. Therefore, the information-exchange activities were designed to elicit production of those grammatical structures through activities in which the primary focus was on the communication of meaning. Three grammatical structures targeted in the course textbook were selected (passives, relative clauses, and adverbial clauses) and two activities were created for each target structure, for a total of six activities (see [Table 1](#)).

For each activity, every student received information about the topic in the form of a table that contained two columns of information. The first column provided 10 beliefs about the topic, while the second column provided supplementary information in the form of statistics or reasons that could be used to argue whether each belief was factually true or false. Whereas the odd-numbered beliefs were written in complete sentences, the even-numbered beliefs were prompts (sentence fragments) that the students had to complete using the supplementary information. To help students locate the relevant information, each prompt was followed by a hint. The order of the complete sentences and prompts alternated to determine whether the complete sentences influenced how the students completed the prompts.

To create two versions of the information-exchange activities, the complete sentences were manipulated so that the priming activities

Table 2. Example of a Complete Sentence Plus Prompt Sequence

Beliefs	Supplementary information
Parents should begin to worry about peer pressure regarding alcohol and drugs when their children are aged 8 to 12. [priming activity]	The pressure from peers to try alcohol and other drugs can begin in fourth grade.
Parents should begin to worry about peer pressure regarding alcohol and drugs for children between the ages of 8 and 12 years. [comparison activity]	
More than 75% of teenagers report that they drink _____.	Less than half of teenagers said they drink out of boredom. The most frequent reason is that it makes them feel good.
Hint: <i>Why?</i>	

contained complete sentences with the target structures, but the comparison activities contained complete sentences without any target structures. Priming and comparison activities were created to test whether students who received the primes generated more target structures from the prompts than students who did not receive any models of the target structures. An item from each version of the Peer Pressure quiz (Unit 6) is provided in Table 2 as an example. Whereas the priming activities present the belief in the form of a complex sentence with an adverbial clause (*when their children are aged 8–12*), the comparison activities state the same information using a prepositional phrase (*for children between the ages of 8 and 12 years*). It was expected that students who received the adverbial clause prime sentence would complete their prompt using an adverbial clause (*because it makes them feel good*). In contrast, it was expected that students who received sentences without an adverbial clause would complete the prompt using other grammatical structures (e.g., *to feel good, for fun, because of boredom*). As well as eliciting target structures, the activities served other pedagogical functions in the EAP classes, such as facilitating post-reading discussions and stimulating pre-writing brainstorming. The primary, meaning-based goal of the activities was to provide students with additional content related to the unit themes along with opportunities to discuss that content.

Design and procedure

The current study adopted a quasi-experimental, mixed design to (a) determine the occurrence of structure priming (within-groups analysis) and (b) compare the effectiveness of meaning-oriented instructional activities with and without primes for eliciting production of target grammatical structures (between-groups analysis). The dependent variable was the students' production of the target structures,

which was operationalized in terms of overall frequency of the target structure (the number of prompt-generated sentences with the target structure / all prompt-generated sentences) produced by each student. To determine the occurrence of structural priming, a within-groups comparison was carried out with the data from priming activities group only. Their production of the target structures in two discourse contexts (with and without primes) were compared. For the between-groups comparison, the independent variable was activity type, which had two levels: priming activities, which provided models of the target grammatical structures, and comparison activities, which did not provide any models of the target structures. The EAP classes were randomly assigned to receive either the priming or comparison activities, which students then carried out as part of the normal instructional routine. Students in two EAP classes completed all passive activities (priming $n = 18$; comparison $n = 12$) and/or all relative clause activities (priming $n = 15$; comparison $n = 12$), while students in two EAP classes completed all adverbial clause activities (priming $n = 17$; comparison $n = 12$).

The activities were implemented following the same procedure in all EAP classes by the instructors, one of whom was the third researcher. To integrate the research materials within existing units, both instructors chose to distribute the materials at the end of a class period and asked the students to complete the prompts as homework, which created opportunities for within-speaker priming to occur in the written modality and minimized the time required in class to carry out these tasks. As part of each target activity, the students collaborated with a partner who had a different topic so that they could interview each other (Student A stated the belief; Student B guessed "true" or "false"; Student A provided the correct answer; students switch roles). This created opportunities for both within-speaker and between-speaker priming to occur in the oral modality. After completing the quiz, the students discussed the open-ended questions that linked the topics to the chapter theme. This discussion then led into the reading or discussion of a text from the course book or a group brainstorming activity on a writing topic. The interaction between the students while carrying out all six information-exchange activities was audio-recorded using individual digital audio-recorders (one recorder per pair), and their written materials were photocopied.

Analysis

The audio recordings were transcribed and verified by research assistants. The students' prompt-generated sentences in the written task handouts and in the transcripts were coded in terms of their grammatical

Table 3. Examples of Prompt-Generated Sentences

Prompt	Sentences produced by students	Coding decision
Antidepressants and other appropriate drugs. . .	Antidepressant and other appropriate drug <u>are given to teenager to help them recover from a depression</u>	Passive
Job-specific technologies. . .	Job specific technologies <u>are used by older worker</u>	Passive
People. . . are creative and smart	People <u>who listen to classical music</u> are creative and smart	Relative clause
Dogs . . . show some emotional response	Dogs <u>who bark as a way to express joy and jealousy</u> show some emotional responses	Relative clause
59% of kids in public and private schools could get a handgun. . .	59% of kids in public and private schools could get a handgun <u>whenever they need to</u>	Adverbial clause
Fitness levels for children are declining. . .	Fitness levels for children are declining <u>even though a majority is participating in sports</u>	Adverbial clause

structure. For the passive activities, any prompt-generated utterance with a patient in subject position, followed by a verb phrase consisting of auxiliary *be* plus lexical verb, and an optional by-phrase to express that the agent was coded as a passive.² For the relative clause activities, prompt-generated utterances with an overt relative pronoun (e.g., *that, who, which*) and a tensed verb in a clause that modified a head noun were coded as having a relative clause. For the adverbial clause activities, prompt-generated utterances with an overt subordinate conjunction (e.g., *even though, because, if*) and a tensed verb in a clause that expressed time, place, manner, reasons, conditions, and contrasts were coded as having an adverbial clause. The morphological features of individual lexical items (number, tense, aspect) or grammatical errors were not considered because structural priming is based on the presence or absence of constituents or their order in an utterance rather than on morphological features. Examples of utterances that were coded as having the target structures are illustrated in Table 3.

The first researcher coded all of the transcripts ($N = 100$) and trained a research assistant to code a subset of the transcripts (28%) for inter-rater reliability. Cohen's kappa was .95, and all disagreements were resolved through consensus and included in the analysis. After all the utterances were coded, a proportion score was obtained for each student by dividing the number of prompt-generated utterances that included the target structures by the total number of prompt-generated utterances for that student. To determine the occurrence of priming,

Table 4. Proportion Scores by Discourse Context for Participants in the Priming Group

Target structure	Prime		No prime		Statistics		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>Z</i>	<i>p</i>	<i>d</i>
Passives	.36	.21	.07	.08	3.52	.001	1.83
Relative clauses	.29	.16	.09	.12	2.61	.009	1.41
Adverbial clauses	.42	.21	.16	.15	2.53	.011	1.42

the proportion scores in two discourse contexts were compared, when the preceding discourse context contained a prime sentence, or lacked a prime sentence. In this classroom-based study, we were not concerned with comparing different kinds of priming (i.e., within-speaker priming and between-speaker priming), so prime sentences produced by either the same speaker or an interlocutor were included. For the written task materials, one researcher or research assistant coded all of the handouts, and their coding was then checked by another researcher. There were no disagreements in the classification of prompt-generated utterances in the written task handouts. A proportion score was computed for each student in the written task, with the scores thus reflecting only within-speaker priming because the written task was completed individually. Due to the small sample size and large variability in scores, non-parametric statistics were used. Alpha was set at .05 for all statistical tests, and one-tailed tests of significance were used.³

Results

The first research question asked whether structural priming occurs when students carry out priming activities in an EAP classroom. To determine the occurrence of structural priming, we examined only the production of students who carried out the priming activities. We compared their production of the target structures in two discourse contexts (with and without a prime sentence), with the expectation that the presence of a prime sentence in the preceding discourse context would result in greater production of the target structure. To simplify the presentation of results, the data from the two activities that targeted the same structure were combined.⁴ As shown in Table 4, the expected relationship between discourse context and proportion scores was found for all three target structures. Individual Wilcoxon signed-ranks tests indicated that the students produced a significantly greater proportion of target structures when there was a prime sentence in the preceding discourse context. The effect sizes, which reflect the degree of difference between the groups, ranged from 1.41 to 1.83. These values fall within the range of values for Cohen's *d* which are typically considered "large."

Table 5. Proportion Scores for Participants in the Priming and Comparison Groups

Target structure	Written handouts				Oral interaction			
	Priming		Comparison		Priming		Comparison	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Passives	.45	.24	.47	.15	.43	.23	.44	.23
Relative clauses	.29	.16	.29	.28	.38	.13	.22	.16
Adverbial clauses	.47	.25	.39	.22	.58	.13	.42	.18

The second research question asked whether priming activities were more effective at eliciting target structures than comparison activities that did not provide models of the target structures. To address this question, we compared the proportion scores for students in the priming and comparison activity groups for each target structure separately, for both the written task handouts and oral interaction data. Thus, unlike the data in Table 4, which included proportions of primed and unprimed structures for the priming group only, the data set used in this analysis included both the priming group and the comparison group. It was expected that the priming activities would encourage students to produce more target structures (regardless of discourse context) than the activities without any models of the target structures. As shown in Table 5, there was little difference in the effectiveness of the priming and comparison activities at eliciting students' production of passives in either the written handouts or the oral interaction. Mann-Whitney tests confirmed that there was no statistically significant difference between their proportion scores in writing, $Z = .23, p = .819, d = .10$, or orally, $Z = .23, p = .819, d = .04$.

The priming activities and comparison activities were equally effective at eliciting relative clauses in the written handouts [$Z = .42, p = .683, d = 0$], but the priming activities elicited significantly more relative clauses during the oral interaction than the comparison activities [$Z = 2.40, p = .016, d = 1.10$]. The same pattern was found for adverbial clauses, with no statistically significant difference in the written handouts [$Z = .89, p = .394, d = .24$], but the priming activities were more effective at eliciting adverbial clauses in the oral interaction [$Z = 2.36, p = .018, d = 1.02$].

Discussion

The goals of this study were to determine whether structural priming occurred in an EAP classroom setting, and to investigate whether priming activities were more effective at eliciting production of L2 grammatical structures than activities without models. The results

indicated that structural priming did occur in the students' oral interaction for passives, relative clauses, and adverbial clauses, which extends the findings of previous classroom-based studies that found priming with word stress patterns in English (Trofimovich et al., 2014) and subjunctives in Spanish (Collentine & Collentine, 2013). The findings also indicated that the priming activities were more effective than the comparison activities at eliciting production of relative clauses and adverbial clauses, but not passives. However, the effectiveness of priming activities at eliciting relative and adverbial clauses was only evident in the students' oral interaction, as there were no significant differences in their written task handouts. Thus, the findings suggest that including primes in individual written tasks may not facilitate increased student production of target structures. However, embedding primes into meaning-oriented oral communicative tasks may be another pedagogical technique, along with pretask modelling, training, and explicit metalinguistic information, that instructors can use to provide students with opportunities to orally produce target grammatical structures in classroom settings.

An interesting question, then, is why the priming activities were not effective at eliciting greater production of passives than the activities without models. One possibility, of course, is to assume that certain structures, such as passives, may be more challenging for students due to potential L1 influence. However, the current participant pool included students from such diverse L1s that including L1 background as an additional variable in the analysis was not possible. Another potential explanation is that some tasks can elicit specific grammatical structures naturally, which makes the provision of primes unnecessary. This was the pattern we observed for the passives, which appear to be elicited more easily than relative and adverbial clauses even when materials do not provide models of the target structures. Indeed, passives are ostensibly the only alternative to active sentences, so it is not surprising those occurred relatively frequently in the types of academic and scientific language targeted in the activities. In contrast to passives, however, adverbial and relative clause prompts elicited a much broader range of response options. For example, the Peer Pressure quiz contained the prompt *talking to teens is an important strategy. . .*, which elicited sentences with four different structures (Examples 1–4):

- (1) Adverbial clause: Talking to teens about drugs is an important strategy because they will be less likely to use drugs.
- (2) Infinitive: Talking to teens about drug use is an important strategy to make them less likely to use drugs.

- (3) Main clause: Talking to teens about drug use is an important strategy. Research results show less teens likely to use drugs.
- (4) Because of + NP: Talking to teens about drug use is an important strategy because of less use.

Similarly, the relative clause materials also elicited a wide range of prompt-generated sentences. In the Family quiz, for example, the students generated sentences with four different structures (Examples 5–8) from the prompt *unhappiness in marriage is convincing evidence. . .*:

- (5) Relative clause: Unhappiness in marriage is convincing evidence that they will divorce.
- (6) Prepositional phrase: Unhappiness in marriage is convincing evidence of divorce.
- (7) Infinitive: Unhappiness in marriage is convincing evidence to divorce.
- (8) Adverb phrase: Unhappiness in marriage is convincing evidence eventually.

When information can be expressed through a wide range of grammatical structures, which is the case for the meanings expressed by relative clauses and adverbial clauses, priming activities may be particularly useful for eliciting one of those structures, especially if the alternatives are used more frequently. As an example, the *talking to teens* prompt elicited an adverbial clause from 70% of the students in the priming group, but only 37% of the students who did not receive models (comparison groups). The *unhappiness in marriage* prompt failed to elicit any relative clauses from the comparison group, while one third of the students in the priming group produced a relative clause. Previous developmental priming research has shown that alternative structures that are less preferred or less frequent may show greater priming effects (Rowland et al., 2012), and this tendency may help instructors decide which structures might be appropriate for priming activities, as opposed to structures that can be elicited through general communicative tasks or by providing pretask activities.

Pedagogical considerations

As discussed in the introduction, instructors may have difficulty designing activities that provide students with opportunities for oral practice of grammatical structures during activities in which the primary focus remains on meaning. The priming activities described here have promise as a tool that can serve a variety of pedagogical functions simultaneously. As well as their grammar focus, the activities were designed to complement the content of textbook readings and writing

assignments, and the transcripts revealed numerous instances in which the students made these connections (e.g., *yeah like we've seen in the readings, remember that one kid in the reading who went to gymnastic academy when she was three?*). The discussion questions following the information-exchange quizzes also created opportunities for students to share information about how the various issues were viewed in their own countries, such as differences in the educational systems, prevalence of drug and alcohol abuse, attitudes toward elite athletes, and access to firearms. These discussions also served as links to current events, such as the Newtown shooting in the United States, which several students mentioned while talking about school violence.

However, it is important to highlight that students need to recognize the purpose of these types of communicative activities, which could be accomplished through feedback about language, content, or both. Our goal was to investigate whether structural priming occurred when the students carried out the priming activities in pairs, so we did not make the grammatical component of those activities explicit in the instructions or through pretask activities. As shown in (9), S1 questioned the purpose of the activities, and although his partner knew that it was a research activity, he could not elaborate any other functions.

(9) S1: This activity to just record our voice, it's nothing

S2: She's studying something, I don't know

S1: There's nothing behind it

S2: Or what is this [*rustles paper*]?

S1: Like, what's the purpose of this paper? You see?

S2: I don't know, I really don't know

S1: For example when you write and give it to her and she correct it and she gives back to you, it means that you know where is your problem and how you can improve. But this kind of activity, like nothing behind it. For what?

Instructors may choose to implement priming activities with a primary focus on meaning, thereby keeping the grammar component more implicit. In such cases, it may be useful to provide feedback or self-monitoring opportunities so that students can recognize the pedagogical purpose of the activities and self-assess their language use.

Alternatively, instructors may find it useful to make the grammatical focus of the activity more explicit so that students understand that one purpose of the activity is to provide communicative activities that help them access and proceduralize their grammatical knowledge. In addition, instructors may also consider further highlighting the content focus of the priming activities, such as by contextualizing the activity within its thematic unit (e.g., this activity highlights a different perspective than the one illustrated in the textbook reading) or giving it an overt focus (e.g., this activity has more examples that you can refer to in the writing assignment). In essence, instructors may need to communicate the content and grammar aims of these types of collaborative activities more explicitly.

The students also expressed confusion about whether their performance on the activities was assessed, as shown in (10).

(10) S3: What is this thing? Like is it graded?

S4: I dunno

S3: this interviewing or this talk

S4: yeah it's like interviewing

S3: it's just for practice or is it graded?

S4: I dunno

In the EAP context reported here, the formal assessment procedures did not include an oral component, as the course grades were determined through writing assignments, traditional grammar practice activities, vocabulary and reading comprehension quizzes, and integrated-writing mid-term and final exams. Instructors may choose to incorporate these types of communicative activities into the formal assessment of their courses, which could either positively or negatively impact students' level of engagement. Students who are motivated by course grades may be more inclined to take an active role in the activity if they are being assessed, but this would require that instructors establish and communicate grading criteria that reflect the purpose of the activities, such as engaging students in the content of the tasks, eliciting specific grammatical structures, or promoting effective collaboration skills (negotiation, turn-taking, eliciting information). However, students who are more intrinsically motivated to use English for communication and therefore carry out the tasks as a way to obtain information about the topics or learn about their classmates'

countries may be negatively impacted by the inclusion of a formal assessment component.

Finally, we would be remiss in failing to mention that using these activities did involve a certain number of classroom management challenges. For example, sometimes a student's pre-assigned partner was absent, which necessitated on-the-spot rearrangement of pairs or the formation of small groups of three students, which required that two students with the same topic share one set of primes and prompts. With flexibility on the part of students and instructors, all such situations were dealt with, but it meant that these activities did not always proceed as planned. Strategies for dealing with these eventualities, such as always having extra handouts ready, reassigning unprepared students, and having alternative task options if certain students were absent, helped maximize the amount of classroom time spent on the activities as opposed to classroom management.

Conclusion

Our aim was to bridge the gap between psycholinguistics and L2 classrooms by applying insights from structural priming research to the design of pedagogical activities that elicit grammatical structures during communicative interaction with a primary focus on the meaning. Although priming activities were more effective than communicative activities without models for eliciting adverbial and relative clauses in oral interaction in the context of EAP classes, they were not more effective for passives. Interpreted from the perspective of developmental priming research, the findings suggest that models of target structures may be particularly useful in encouraging speakers to use these structures in contexts where they have multiple options for expressing similar information. In light of the limited number of structural priming studies that have been carried out in L2 classrooms, we hope our findings encourage instructors to try out priming activities in their own classrooms (with different languages, target structures, proficiency levels, or instructional settings), thereby broadening the empirical basis of L2 structural priming research, and pave the way for future research that identifies the learning outcomes associated with priming activities.

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Acknowledgements

Funding for this project was provided from Quebec Ministry of Education (Fonds Québécois de la recherche sur la société et la culture), Social Sciences and Humanities Research Council of Canada, and the Canada Research Chairs program. We would like to thank the ESL instructors who helped with this project, Pat Donnelly, Doina Lecca, and Jerry Krauel, and the research assistants who helped with data collection, transcription, and coding: Jennifer Foote, Paula Kielstra, Rebecca Dorner, Xuan Qin, Jessica Bate, June Ruivivar, and Jihoon Kim.

Notes

1. An anonymous reviewer asked about power. We did not carry out an a priori power analysis to determine sample size because we were using intact EAP classes, and enrollment determined sample size. For interested readers, we carried out post-hoc power analyses in *R* using the formulas for independent-samples and paired-samples *t*-tests. Because we used non-parametric tests, these calculations should be interpreted as an approximation of true power. For the between-groups comparison, power was determined to be .78 based on the smallest group size (12), the smallest effect size obtained for a significant comparison (1.02), the significance level (.05), and one-tailed tests. For the within-groups comparison, power was determined to be .99 based on the smallest group size (15), the smallest effect size obtained (1.41), the significance level (.05), and one-tailed tests.
2. An anonymous reviewer asked whether including interlanguage passives in the coding would have affected the results. We examined the data for the occurrence of any interlanguage passives, which we defined as an attempted passive with the patient in subject position, but an omitted auxiliary verb (e.g., **a great percentage of Canadian jobs taken by immigrants*). There were a total of five interlanguage passives in the entire dataset, two of which occurred after a passive prime with the other three occurring in the absence of a passive sentence in the preceding discourse. Although interlanguage passives rarely occurred in this dataset, they may be more frequent in the speech production of lower-proficiency students.
3. An anonymous reviewer suggested that we clarify why Bonferroni adjustments were not used. First, the study-wide error rate applies to the universal null hypothesis, which is the hypothesis that the two groups are the same for passives, adverbial clauses, and relative clauses. Testing the universal null hypothesis requires that we divide alpha by the numbers of statistical tests and, if one of those *p* values was below that value, we would reject the universal null hypothesis. However, previous L2 priming research has shown that the occurrence of structural priming is affected by

the target structure, so our goal was to test the hypothesis for each structure separately. Second, the reduction of alpha to prevent a Type 1 error (concluding that a difference exists when in reality there is none) corresponds to increased Type 2 error (concluding that a difference does not exist when in reality there is one). As evidenced by the large effect sizes obtained, we believe that there is a difference between the groups for the adverbial clause and relative clause data, which led us to maintain the original alpha level to avoid committing a Type 2 error.

4. An anonymous reviewer suggested that the data for each activity be presented separately. We checked to confirm that the findings for each activity were consistent with those of the combined data. Because the pattern was the same, we have reported only the combined data to reduce the number of statistical comparisons being run on the dataset.

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