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Infusing metacognition into advanced linguistics courses

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TEACHING LINGUISTICS

Infusing metacognition into advanced linguistics courses

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This study explores the implementation of critical thinking via metacognition in linguistics courses. It employs surveys to examine strategies used by students in two courses, Morphosyntax and Field Methods, devoted to the development of analytical skills in linguistics. We hypothesized that the application of metacognition surveys would enhance students' awareness of techniques that promote critical thinking and active learning. Two surveys built in as core components in each course were deployed at different points during the semester. Students' responses indicate that metacognition surveys can help students and instructors gain greater awareness of learning concerns and capabilities and identify areas for intervention.*

Keywords: linguistics, metacognition, critical thinking, active learning, morphosyntax, fieldwork

1. INTRODUCTION. Metacognition is linked to improving thinking skills and promoting conceptual change in students. The overarching goal of metacognition research is to monitor academic and skill-based growth over the duration of a given course. However, the role of metacognition in active learning among college students and within particular disciplines needs further research. This study explores students' metacognitive awareness in advanced linguistics courses. More specifically, it examines patterns of responses among students when researching unfamiliar languages in order to identify areas of strength and for intervention at both the individual and the group level.

This study aims to explore the extent to which the implementation of metacognitive activities in advanced linguistics courses has an impact on the development of students' research skills. More specifically, it investigates what kinds of metacognitive processing questions can support the development of students' scientific reasoning about language and linguistic patterns. It focuses on effective strategies that promote critical thinking and active learning in linguistics. The courses selected for this study were Field Methods (Spring 2020, before COVID-19) and Morphosyntax (Fall 2020, during COVID-19), as both courses aim to develop analytical skills in linguistics. Twenty-three students participated in the study. Metacognition surveys were administered after the completion of two research assignments in each course. We adapted Tanner's (2012) self-questions to design the surveys, which elicited information about the main stages of metacognition: planning, monitoring, and evaluation. The overall findings of this study suggest that integrating metacognition surveys into linguistics courses helps both students and instructors to 'notice' learning concerns and capabilities and to identify areas of teaching intervention to enhance critical thinking.

2. THEORETICAL FRAMEWORK.

2.1. METACOGNITION IN LEARNING. Metacognition refers to thinking about one's thinking, that is, the knowledge we have about our own cognitive processes (Flavell 1979). Flavell (1979) proposes that metacognition consists of both metacognitive knowledge and metacognitive experiences that involve regulation. In the context of

* First and foremost, we thank all of the participants in the study. We are also grateful to the LSA 2019–2021 Faculty Learning Community on the Scholarship of Teaching and Learning in linguistics, and to the participants at the 2021 Symposium on 'Scholarly Teaching in the Age of COVID-19 and Beyond' for their feedback. Thank you to the editors and two anonymous referees for their detailed comments. All omissions and misinterpretations are fully our own.

learning, metacognition is a problem-solving skill in which students use strategies to monitor their learning and control their attention (Kurfiss 1988). It is a critical constituent of successful learning, as it involves the reflective self-regulation of strengths, weaknesses, and the types of strategies we create when learning. Metacognition also involves the processes used to plan, monitor, and assess one's understanding and performance. As metacognition involves being self-aware of thought processes, students engage in the learning process as active learners who have control in determining their learning outcomes. Effective approaches to metacognitive instruction involve providing students both with knowledge of cognitive processes and with strategies and opportunities to implement cognitive and metacognitive practices in their learning endeavors (Livingston 2003).

Since metacognition plays a critical role in successful learning, it is important to determine how students can be taught to apply their cognitive resources through metacognitive activity. Students often lack the metacognitive skills they need to succeed, but can develop these skills by addressing questions that help them monitor their thinking and learning strategies. In other words, with greater awareness of how they acquire knowledge, students learn to regulate their behavior to optimize learning (Livingston 2003, Pintrich 2002). Students then begin to see how their strengths and weaknesses influence how they perform. They also learn better when they have the time and the skills to understand the goals and objectives of an activity, along with the ability to reflect on and assess their learning as it is happening. In addition to focusing on the subject content, students need to reflect on how they come to understand given concepts through the use of introspective thinking, individual and collaborative skills, and learning strategies. As students identify their strengths and weaknesses in learning, they are better positioned to focus on skills and strategies that will be most helpful to them. This information-gathering process can be applied not only at the individual level, but at the group level as well. Several studies have shown that students who use metacognitive approaches in groups improve their scientific thinking (Hogan 1999, Kramarski et al. 2002, Steffe & Gale 1995). For instance, when students engage in collaborative group work, they become more conscious of their own thinking as they explain an idea to a partner, summarize a text, address assigned questions, and so forth (D'Avanzo 2003).

2.2. METACOGNITION IN LINGUISTICS. A brief survey of the syllabi of linguistics courses offered at different institutions reveals that some of the most salient learning outcomes are related to students' ability to think analytically about language, to present and justify analyses systematically, to support claims with sound arguments and empirical evidence, and to evaluate claims about language critically. In other words, the ability to reason scientifically about language is at the core of the linguistics curriculum (Anderson 2016). Anderson's (2016) study significantly contributed to existing literature in the scholarship of teaching and learning on the cognitive processes and concept-based representations of undergraduate students taking introductory linguistics courses. Seven undergraduate students participated in two think-aloud sessions that took place in the second half of the semester. Each participant wore a head-mounted microphone connected to a computer running audio-recording software. Participants were asked to describe and explain out loud their thinking while working on a specific task. Think-aloud protocols, like the one used in Anderson 2016, are employed to document thinking and problem solving (Newell & Simon 1972, van Someren et al. 1994). Results of the sessions revealed areas where scaffolded teaching practices were needed to help students continue to develop scientific reasoning in linguistics. Anderson concludes by

suggesting follow-up research on the nature of metacognitive processing questions for the development of scientific reasoning in language. The present study addresses Anderson's recommendations.

Although not related to teaching linguistics per se, Berardi-Coletta et al.'s (1995) methodology adds another dimension for consideration when using think-aloud as a tool for observing disciplinary thinking. This study compared participants' problem-solving performance in a think-aloud condition to their performance in a condition where they were asked metacognitive questions (Example: 'How are you deciding? How do you know this is a good move?'). Participants are engaged in metacognitive thinking about their reasoning 'only when ... asked to explain what they are doing and why' (Berardi-Coletta et al. 1995:220). The authors suggest scaffolding metacognitive processes within problem-solving exercises to support learners' development of metacognition. These findings have inspired the creation of some of the metacognitive questions employed in the present study.

In addition to Anderson's scholarship of teaching linguistics for novice students of phonology, observations about teaching linguistic topics like morphology, syntax, and field methods are provided in Kuiper 2011. Bauer's (2011) reflection on teaching introductory morphology notes that some of the challenges students face emerge when they are not familiar with the language(s) to be analyzed. He recommends instructors clarify what would be considered valid evidence and avoid judgments about 'correct' answers. In his view, 'if students are used to thinking about potential objections and presenting arguments based on evidence, this should stand them in good stead' (Bauer 2011:33). A similar challenge has been identified by Chung (2011) in teaching introductory syntax. She reports that an effective strategy is 'the sustained investigation of just one language which is known to all the students in the class' (p. 35).

A particularly effective activity to teach students how to reason about language is the use of problem sets. Students solve them outside of class, in collaboration with each other, write up their solutions in an essay, and later discuss them in class. During classroom discussion of the problem sets, the instructor guides students to assess the merits of each solution and identify one as the best analysis. Chung (2011:36) states that 'this mode of instruction is the most effective way I know to teach undergraduates how to reason about syntax'. However, in the case of teaching field methods, Collins (2011:203) asserts that 'exposing what we don't know is basically what happens in a field methods course'. Collins indicates that prior to taking field methods, students should have had previous coursework on phonetics, phonology, syntax, and sociolinguistics.

The present study builds on these observations regarding the need for students to improve their research and analytical skills. Our own observations from teaching morphosyntax and field methods courses indicate that even in advanced coursework students struggle with identifying patterns in unfamiliar languages, gathering the relevant evidence to build an argument, assessing competing analyses, and explaining their findings. In this context, instructional practices that include metacognitive activities could aid with the development of scientific reasoning about language.

2.3. METACOGNITION IN INSTRUCTION. Metacognition in learning contexts has been documented as part of an effort to improve thinking skills and promote conceptual change in younger students (Cross & Paris 1988, Georgiades 2000, Nickerson et al. 1985, White & Gunstone 1989, Zohar & Peled 2008). However, there is still much to be researched about the role that metacognition plays in learning by college students and within particular disciplines. Metacognition studies at the college level have tended to

focus on undergraduate science coursework, but have the potential to be applied to college teaching in general, and across disciplines (D'Avanzo 2003, Kurfiss 1988, Schraw et al. 2006, Tanner 2012).¹

There is as yet only limited research into the metacognitive strategies of graduate students and the effects of teaching such skills at the graduate level (Madix & Oxley 2009, Pejcinovic et al. 2019, Santelmann et al. 2018). Madix and Oxley (2009) examined how two students in a speech-language pathology graduate program matured in their first year as clinicians. The authors also included the students' clinical supervisors in the research. The pilot study took a qualitative approach, analyzing semi-structured interviews and videotaped therapy sessions. A main theme to emerge from the data was students' lack of both knowledge and metacognitive strategies, including awareness of failed techniques. In the instructional context, learning from failed techniques is considered an effective strategy because it helps the clinician realize that other techniques should be implemented. The authors concluded that awareness of the ineffectiveness of one method was an indicator of progress toward metacognitive awareness. More recently, Santelmann et al. (2018) conducted a qualitative case study about the teaching of writing at the master's level in a Teaching English to Speakers of Other Languages (TESOL) research writing course. They examined seventeen students' reactions to classroom activities designed to teach metacognitive awareness of writing strategies, self-regulation of writing practice, and strategies for the development of text. Five themes emerged from the data analysis: (i) increased metacognitive awareness of writing practices, (ii) focus on the social support of writing, (iii) opportunity for peer review of papers, (iv) discussion of the stress points around writing, and (v) instruction about the text structures underlying academic writing. The results indicate that students benefited from these five types of activity that were introduced in the course by the instructor.

2.4. SPECIFIC INSTRUCTIONAL STRATEGIES IN METACOGNITION. As a pedagogical approach, metacognition focuses on guiding students to reflect on their learning during a given class and/or course activity by applying strategies that facilitate a deeper understanding and application of concepts. Implementing metacognition as a guiding principle in course design and delivery helps teach students to self-identify, reflect on, and monitor how their learning is improved by using specific skills and strategies (Negretti 2012). In order for students to become more metacognitive learners, researchers such as Pintrich (2002) and Tanner (2012) recommend teaching the necessary concepts in an explicit manner. By following a KNOWLEDGE CONSTRUCTION APPROACH, students identify, assess, and make connections between new skills and old ones 'over an extended period of time' (Zohar & Ben David 2009:187). It is important that instructors plan to include some goals for teaching metacognitive knowledge in their regular unit planning and then assess the use of this type of knowledge as a means to improve both teaching and learning outcomes (Pintrich 2002).

Researchers have proposed several specific instructional approaches to teaching metacognition. Acknowledging the importance of providing explicit instruction of metacognition (Cross & Paris 1988, Schraw 1998, Schraw et al. 2006), they recommend that instructors value and focus on strategy training that explains how to use metacognitive practices, when to use them, and why they are beneficial for learning. For example, Schraw (1998) suggests that instructors should provide explicit prompts

¹ See Zohar & Barzilai 2013 for a summary of research on metacognition and science undergraduate education, and Lai 2011 for a review of research on typologies of metacognitive components that can be applied in teaching.

to help students improve the awareness and regulation of their own abilities. Instruments like checklists with entries for planning, monitoring, and evaluation, along with questions under each entry that need to be addressed during the course of instruction, have proven helpful. Kramarski and Mevarech (2003) also provided students with sets of metacognitive questions, including comprehension questions, strategic questions, and connection questions to be completed during a task. Comprehension questions were designed to encourage students to reflect on a problem before solving it. Strategic questions aimed to promote student reflection about what strategy might be appropriate for a given task and to provide a reason or rationale for one's choice of strategy. Connection questions were intended to help students identify and recognize the structural attributes and underlying concepts of particular tasks in order to implement appropriate strategies and make connections with relevant background knowledge. Responses were reported for individual students.

Other researchers have made recommendations for metacognition in the context of collaborative learning (Cross & Paris 1988, Kramarski & Mevarech 2003). Some metacognitive researchers encourage the use of group discussions to foster reading comprehension and analysis strategies among students. Group discussions may help generate higher-quality student discourse by encouraging students to provide clarification of their beliefs and the content-related information they share with their peers (Fox-Cardamone & Rue 2003, Howard & Weimer 2015). For collaborative activities, Schraw et al. (2006) recommend small group work where each peer is at a similar level, and they emphasize the importance of explicitly teaching collaboration strategies. This line of research also calls for instructors to model metacognitive skills by sharing their own thoughts with students while instructing them on a given task, thereby exemplifying these skills in practice. For example, to model metacognitive strategies, an instructor might pose out loud questions students would ask themselves (e.g. how do I start?, how do I decide what to do first? and what to do next?) and facilitate a discussion of the potential challenges of an assignment, along with resources and strategies for students to overcome those challenges (Tanner 2012).

Tanner (2012), building from Ertmer and Newby (1996), Schraw (1998), and Coutinho (2007), identifies three main stages in teaching metacognition in undergraduate biology courses. The activities include class sessions, homework assignments, and quizzes/exams. For each stage, the author provides examples of the kinds of questions to pose to promote metacognitive skills.

- **STAGE 1: PLANNING.** In this stage, students identify the learning goals and objectives of the lesson and/or specific activity as they understand them. For example, during a class session students can be asked: 'What are the goals of the class session going to be? What do I already know about this topic?'. When engaging in active-learning tasks and/or homework assignments, students are asked: 'What is the instructor's goal in having me do this task? What resources do I need to complete the task?'.
- **STAGE 2: MONITORING.** Students reflect on their own behavior and thought processes while performing a given task for an activity. This stage allows them to identify effective strategies and where there is room for improvement while still performing the task. During this stage, students might be asked questions such as: 'What strategies am I using that are working well or not working well to help me learn?' and 'What other resources could I be using to complete this task?'.
- **STAGE 3: EVALUATING.** At the end of the lesson/activity, students assess to what degree the strategies employed were useful and effective and whether they need to

apply or reshape those strategies differently in future lessons and/or activities. Some examples of metacognitive strategies in teaching and learning environments include promoting a self-reflexive awareness among students regarding their strengths, weaknesses, and learning styles. As part of the self-evaluation stage, students are asked questions such as: 'If I were the instructor, what would I identify as strengths of my work and flaws in my work? When I do an assignment or task like this again, what do I want to remember to do differently? What worked well for me that I should use next time?'.

Tanner (2012) recommends embedding these questions in particular assignments such as reflection journals, surveys, and in-class discussions or activities.²

2.5. THE PRESENT STUDY. This study addresses the gap in the literature with regard to metacognition in graduate linguistics coursework. It builds on previous research on the importance and impact of metacognition for instructional intervention and incorporates metacognition questions suggested in the literature. Previous research on teaching morphology and syntax has identified challenges for students when presented with data from unfamiliar languages.

In particular, the present study uses metacognition-driven surveys that model questions and stages identified in Tanner's (2012) research to examine the strategies used by graduate students in two linguistics courses. In each course, we selected two collaborative assignments in which students researched unfamiliar languages. We did not teach metacognition other than with the surveys, which were designed to both measure students' existing metacognition strategies and lead students to greater metacognition. The research questions for the study are the following:

- How can critical thinking via metacognition be implemented in advanced linguistics courses?
- Do metacognition activities have an impact on the development of students' research skills?

We hypothesized that the application of metacognition surveys would enhance students' awareness of techniques that promote critical thinking and active learning in linguistics. We also hypothesized that the implementation of metacognition surveys would help instructors identify areas of strength and points for intervention throughout a given course.

3. METHODS. The discussion of methods is organized as follows: courses selected for the study (§3.1), profiles of the participants (§3.2), and the instruments and procedures employed (§3.3).

3.1. COURSES. The two linguistics courses selected for this study were Field Methods and Morphosyntax, each offered during a sixteen-week semester at the University of New Mexico (UNM). UNM is a Hispanic-serving, Research 1 university and the flagship institution of the State of New Mexico, one of the most multilingual and multicultural states in the US. There were several reasons to select these two courses.

First, at UNM, both Field Methods and Morphosyntax build on our mission and commitment to the application of linguistics to social concerns, including minority language maintenance and empowerment of minority communities. Both courses focus on the development of analytical skills in the context of investigating understudied languages. The languages that are examined in these courses have very few linguistic resources and minimal digital presence. Given that students in the courses are unfamiliar

² See, for example, Angelo and Cross's (1993) 'muddiest point' five-minute writing activities.

with these languages, we begin both classes with several activities that situate these languages in the context of their communities and sociocultural histories.

Second, both courses include several collaborative research projects by design. In order to promote teamwork, students are organized into preassigned groups for some research activities that occur throughout an entire semester. Collaborative research projects are designed to stimulate dialogue and constant negotiation among group members, as well as among all of the participants in the courses, throughout the semester.

Third, both classes consisted of undergraduate and graduate students. As shown in Table 1 below, 80% of the participants in Field Methods were graduate students, while the ratio of undergraduate to graduate students was balanced in Morphosyntax. This variable was considered in preassigning participants to specific groups, so that each group comprised both graduate and undergraduate students.

A final point is that both courses were taught by the same instructor in consecutive semesters. This helped to keep the goals and logic of the project, as well as the instruments used, consistent across both semesters, with just minor adaptations (explained in §3.3). Both classes having the same instructor also made it possible to embed this research project into the courses from the very beginning. However, each course was also unique in some respects. We describe each course in detail below.

FIELD METHODS was offered in the Spring of 2020 and had eleven students enrolled. At UNM, this course introduces students to the study of a language through direct interaction with native speakers. Students gain first-hand experience with gathering, organizing, and analyzing the primary data on which they will base their descriptive and theoretical claims throughout the semester. The language studied in Spring 2020 was iKalanga, a Bantu language spoken in Botswana and Zimbabwe. Some instruction in various software options (i.e. FLE_x, Praat³) was provided during the course. A language consultant was available for in-class elicitation and discussion, as well as for out-of-class elicitation four to five hours per week. Later in the semester, an iKalanga specialist from the University of Botswana joined some class meetings, observed the research presentations, and provided feedback. Students in this class were organized into four groups (three groups of three students, and one group of two students) for the entire semester, and they conducted weekly out-of-class elicitation and completed four research projects together.

MORPHOSYNTAX was offered in the Fall of 2020 and had fourteen students enrolled. This course trains students in morphosyntactic analysis and grammatical description from a typological perspective. The main goals of the class are to highlight the functions of grammatical constructions in a broad range of languages and to provide experience in using reference grammars. Seven grammars of languages spoken around the world were selected in Fall 2020. The languages and their respective linguistic families were as follows: Fwe (Bantu), Yakkha (Sino-Tibetan), Xong (Hmong-Mien), Belep (Austronesian), Yeri (Indo-Pacific), Yuki (Penutian), and Hup (Nadahup). All of these languages were unfamiliar to the students. Students were organized into pairs and assigned a language.

3.2. PARTICIPANTS. A total of twenty-three students enrolled in the two linguistics courses at UNM participated in the present study. The participants were distributed as follows: eleven students from Field Methods (100% of students enrolled in that class), and twelve from Morphosyntax (86%). Table 1 provides a snapshot of the self-reported

³ <https://software.sil.org/fieldworks/>; <https://www.fon.hum.uva.nl/praat/>

demographic information of the participants, which reflects the diversity of the student body at UNM. It is important to note that UNM is a Hispanic-serving institution, hence ‘Hispanic’ as a demographic category.

LEVEL	Undergraduate	35%
	Graduate	65%
GENDER	Female	49%
	Male	43%
	Nonbinary, unspecified	9%
RACE/ETHNICITY	White	59%
	Hispanic	27%
	Native American, African American, Asian	13%

TABLE 1. Participant demographics.

All participants in Field Methods had previous experience with linguistics coursework, ranging from four to twenty courses taken prior to our study (average: thirteen). All but one also reported having taken at least one course on the grammar of a language different from their own. Of the participants, 87% had taken an online course prior to our study, a relevant point given that we had to switch to remote teaching during the 2020 academic year because of the COVID-19 pandemic. In Morphosyntax, all participants had experience with linguistics coursework, ranging from four to eleven courses (average: eight), and had completed at least one grammar-focused course prior to our study, and 60% of participants had taken an online course previously.

3.3. INSTRUMENTS AND PROCEDURES. The present study received IRB approval. The second author, who was not the instructor of the class, handled the recruiting sessions so that participants’ identities were unknown to the first author in her dual roles of researcher and course instructor. All participants gave informed consent to participate and, as compensation, earned participation credit toward the course.

We used two instruments in our research: (i) a brief demographic questionnaire and (ii) a metacognition survey. The demographic questionnaire contained five open-ended questions eliciting information about gender, ethnicity, and linguistics coursework. It was administered at the end of each course after participants had consented to take part in the research study. Only those who agreed to participate responded to the questionnaire.

In designing the metacognition survey, we adapted Tanner’s (2012) self-questions that elicit information about the three main stages of metacognition when completing a given assignment: **PLANNING** (three questions), **MONITORING** (nine questions), and **EVALUATION** (ten questions). We used Microsoft Forms to design the survey, which included five open-ended questions (section 1), fourteen multiple choice questions (section 2), and three ten-point scalar questions (section 3); see the appendix for the full survey.

Two metacognition surveys were embedded in the calendar of each course and included as core components in the respective syllabi; they were administered immediately after the completion of specific research assignments. In Field Methods, student groups collaborated on four research projects during the semester. The first metacognition survey was given during the fifth week, right after the completion of the second research project, and the second around the eighth week, right after the completion of the third research project. Morphosyntax had six research projects built around the languages adopted for the semester. The first metacognition survey was given during week seven with the second research project, and the second during week twelve with the fifth research project.

Students were asked to submit their responses within four days after each survey was released. They received credit for completing the survey as a component of their course participation. This information was clearly stated in the syllabi and was also explained during class. Reminders to complete the research projects and surveys were sent simultaneously in order to highlight the tight connection between the two. Responses were analyzed after each semester was officially over.

Given that surveys were completed after students had submitted their projects, it is possible that the timing might have affected the way students responded to them, especially for the planning phase. However, this study follows a retrospective protocol, what Berardi-Coletta et al. (1995:207) call ‘metacognitive processing’, in which ‘problem solvers asked to explain their solution moves must take themselves out of one mode of processing—the problem level—to another—the processing level—and observe themselves as a problem solver’. In sum, the surveys were designed to elicit retrospective thought-listing methods about the three stages of metacognition.

It is important to note that while the research projects were completed in groups, the surveys were done individually. Our decision to organize these tasks in this way was motivated by the fact that we wanted to promote both individual and group reflection. Thus, the research projects were spaces to encourage engagement in the process of learning from one another within groups (i.e. data analysis, writing organization, time management, etc.), and the surveys were designed to capture both individual reflection and the dynamics within each group from the perspective of each student.

Another important consideration is that the two surveys in the Field Methods course in Spring 2020 were administered before the COVID-19 pandemic affected the semester, whereas the surveys in the Morphosyntax course in Fall 2020 were administered well into the pandemic. Because the pandemic hit us in the middle of the Field Methods course, we considered it necessary to prepare an additional survey with questions exclusively focused on the pandemic. This survey was administered toward the end of Spring 2020, and we discuss the results in §4.4.

4. RESULTS. In this section we provide the main results organized by the three stages of metacognition: planning (§4.1), monitoring (§4.2), and evaluating (§4.3). Each figure provides snapshots of the results, comparing responses from the two surveys in Field Methods (Spring 2020) and the two in Morphosyntax (Fall 2020). (See the appendix for the full survey.)

4.1. PLANNING STAGE. Three questions in the survey elicited information about the planning stage. These questions invited students to think about the key elements that need to be pondered when starting a research project:

Q6: What did I think was the instructor’s goal in having me do this project?

Q7: How did I select the specific topic or data for the project?

Q8: What resources did I need to start this project?

Most participants reported that the goal of each project was clear. For example, the goal of one of the projects in the Morphosyntax course was the following:

Identify and describe the coordination construction(s) in your language. Classify each construction on the following parameters: conjunction type (asyndetic, syndetic or bisyndetic), verbal inflection (balanced or deranked), and switch-reference of arguments.

This assignment directly informs the following course learning outcomes listed in the syllabus.

- Learn about the diversity of grammatical constructions expressing semantic/pragmatic functions across a broad range of languages
- Develop analytical skills via critical reading and the identification of grammatical constructions in specific languages
- Acquire experience in using reference grammars as sources of data.

Students confirmed an understanding of the goals of the projects. Their responses show that all of the research projects had clear guidelines and were explained in detail. The participants also confirmed that the objectives of each assignment matched the student learning outcomes listed in the syllabus. As for the selection of the topic, in Field Methods 73% of the participants said that their peer(s) played a key role, and 45% that their background and interests did. In Morphosyntax, students did not select the topic but only the data to analyze. All of them said the availability of the data that matched the assignment guidelines was the primary criterion for selection, and around 60% of them mentioned their background and interests.

The results for Q8 are given in Figure 1. The response patterns are comparable across surveys and across courses. Note, however, that the response categories are slightly different, a fact that is directly linked to the nature of the courses themselves. In Field Methods, students had to organize the data being collected throughout the course, but also gather new data if necessary. In Morphosyntax, students had to identify data in the reference grammars, but also find supplementary information if needed. All of the participants identified literature review and access to data as the primary resources for the completion of the projects. While gathering additional data was key for the projects in Field Methods, finding supplementary information seems to have been a marginal task in Morphosyntax. In sum, responses from participants indicate that they were ready and on the right track to begin their research projects.

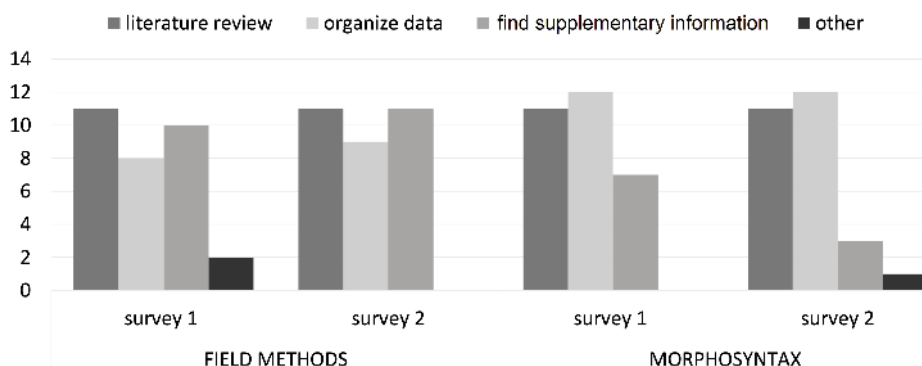


FIGURE 1. Student responses to Q8: 'What resources did I need to start this project?'
(Vertical axis shows number of students.)

4.2. MONITORING STAGE. A total of nine questions in the survey were related to the monitoring stage. As part of the metacognition process, students were encouraged to think about and decide what resources they would use during this stage. Additionally, students were asked to evaluate the different sources of information that were available to them. Three questions in the survey elicited information from students regarding the metacognitive process of monitoring:

Q10: How did I weigh the different pieces of evidence I have collected?

Q9: What resources did I use to complete this task?

Q16: Did I document my references to confirm 'who was saying what' (consultant, references, peers, instructor)?

The responses to these questions varied according to course and survey. For example, in the first survey in Field Methods, in answering Q10, 91% of the participants reported that they first identified a claim in the sources and then tried to find empirical evidence in the data. In the second survey, however, 91% reported the opposite strategy: this time, their hypotheses emerged from the data. In Morphosyntax, 62% of participants in the first survey had made preliminary observations from the reference grammar. In the second survey, while 62% of participants said that they had again made preliminary observations from the reference grammar, 69% also indicated that they identified a claim in the textbook (note that some students selected both answers, reflecting the use of multiple strategies).

In terms of resources used (Q9), in Field Methods, all participants used the available equipment and software to record and analyze the sounds of the language. In the first survey, the majority stated that they met with their peers to work on different aspects of the project and also met with the language consultant to gather data and additional information. In the second survey, all participants indicated that they met with their peers and the consultant. Additionally, 28% of participants in the second survey also asked the instructor for guidance (through email contact, office hours, or talking in person before/after class). In Morphosyntax, all participants in both surveys reported that they used the data from the reference grammar, and 85% used information from the textbook. One difference between the surveys is related to the use of supplementary information on a given topic, with 46% of participants using additional resources in the first survey and only 23% using them in the second survey. With regard to documentation of references (Q16), participants across surveys and courses overwhelmingly confirmed that they documented references diligently.

The survey also included questions aimed at identifying areas for intervention and support. These questions (Q11 and Q12) and the responses are provided Figures 2 and 3.

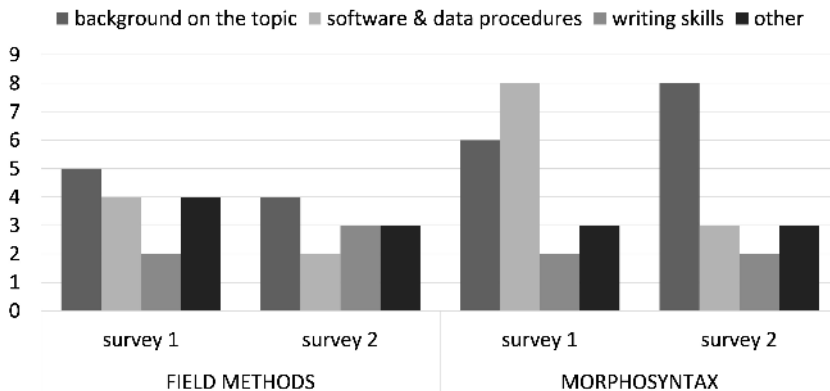


FIGURE 2. Student responses to Q11: 'What limitations or questions did I face to complete this task?' (Vertical axis shows number of students.)

Figure 2 reveals that the main limitations identified by students pertained to prior knowledge about a specific topic. This limitation was salient in both classes, but emphasized significantly more in Morphosyntax. Figure 3 provides the results for Q12 about monitoring. 'Data procedures & analysis' was the most challenging aspect of the research process in both Field Methods and Morphosyntax. For example, in Field Methods, narrowing down a topic for elicitation purposes and coming up with a cohesive explanation to account for the collected data was identified as difficult by several participants. This is an essential student learning outcome in the Field Methods course. In Morphosyntax, analysis of certain linguistic patterns in unfamiliar languages was identified as very chal-

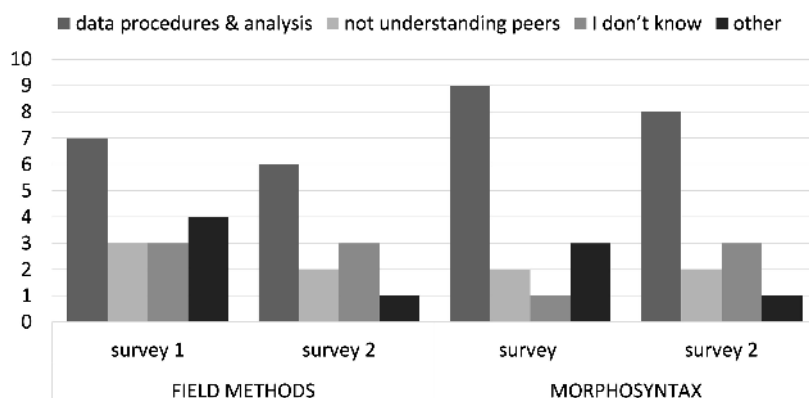


FIGURE 3. Student responses to Q12: 'What was most challenging for me about this task?'
(Vertical axis shows number of students.)

lenging. Completing the morphological parsing and interpreting morpheme boundary notations and the interlinear morpheme translation of examples was particularly difficult for undergraduate students. For example, analyzing causative and applicative constructions was difficult not only because these were unfamiliar categories, but also because the descriptions, formal representations, and abbreviations employed in reference grammars were often idiosyncratic. Placing linguistic patterns in the context of crosslinguistic variation proved challenging for both undergraduate and graduate students alike. In light of this, it is important to unpack the step-by-step processes involved in data analysis. For example, a typological approach to uncovering the grammar of causatives and applicatives in a given language includes questions such as: 'What are causative and applicative categories conceptually? How are these categories encoded in morphosyntactic form in the languages of the world? Which of the documented grammatical strategies is used in a specific language?'. These overarching questions were key in intervention teaching practices that helped students produce a coherent analysis in the Morphosyntax course.

Questions 13 and 14 were designed to make students identify the learning strategies that were effective in the completion of the research projects.

Q13: Who did I ask about my questions to overcome my limitations?

Q14: What strategies did I use that worked well to help me learn?

A vast majority of participants found support among their peers; this was true in both courses (averages = 96% in Field Methods, 91% in Morphosyntax). In terms of strategies that participants used that worked well to help them learn (Q14), participants in both surveys and courses stated that they focused on identifying ways to handle data collection and the finding of relevant examples. For instance, in both courses, division of labor was commonly addressed as an effective plan of action, as in the following response:

The division of labor between myself and my partner ended up working really well. My partners were in charge of doing most of the acoustic analysis in PRAAT (which they are much more versed than I am), while I took care of the theoretical synthesis, development of research questions and discussion of results. This allowed us both to contribute to the project using our respective strengths. (survey 1, Field Methods)

Another recurring theme in participants' responses was an emphasis on workflow when completing a task. In Field Methods, one participant stated that 'continual communication with the other group members and expressing clearly how we wanted to divide the work according to our strengths' was an effective strategy (survey 2). Students

in this course also indicated that they reached out to others and asked for help ‘regardless of how intimidating it was’. A similar trend was observed in responses from the Morphosyntax course, where participants indicated that working together on a shared document and communicating well with other group members was helpful: ‘X and I were texting and FaceTiming during the whole process, and that was incredibly helpful to know who could do what part when we were struggling with a section’ (survey 1).

Participants were also asked about things that could be done differently mid-assignment or when completing another research project:

- Q4: What could have I done differently mid-assignment to address some challenges and confusions?
 Q5: When I do the next language report, what do I want to remember to do differently?

Responses from participants overwhelmingly identified time management in both surveys and courses: ‘we want to remember to collect data further in advance so we’re not rushing to collect and analyze the data right before the paper is due’ (Field Methods, survey 1); ‘I want to give myself a bit more time to work on the project so I can review the readings multiple times to make sure I am clear on the content’ (Morphosyntax, survey 2). Participants also confirmed that paying attention to a combination of time management and teamwork would be helpful: ‘we were not always 100% on the same page as to the direction we were going. Some of the analyses that were done turned out not to be necessary, and I was sometimes confused about certain aspects of the data and needed some clarification’ (Field Methods, survey 1). Finally, participants also stated that they should have reached out to the instructor, the language consultant, and other campus resources: ‘I could have scheduled a meeting with [Center for Academic Support] or my instructor to clarify some items that confused me and start the assignment earlier to be able to get more feedback from the professor’ (Morphosyntax, survey 1).

To summarize this section, participants indicated that they were aware of multiple possible sources of evidence, and they documented their references throughout the research projects. Participants also indicated that they knew about the resources available to them to complete each task, and that they asked their peers questions when needed. In both courses, participants stated that they struggled with data analysis and procedures and were not always confident of their background knowledge of a given topic. Regular, open communication with peers and instructors was also a common pattern that was highlighted by participants as both an effective strategy and an aspect to improve upon.

4.3. EVALUATING STAGE. Ten questions in the survey were dedicated to evaluation. Figures 4 and 5 provide a snapshot of some of the responses for questions 1 and 2 (open-ended questions).

When evaluating performance and process, students self-reported on their individual strengths that contributed to the completion of the research projects. As Fig. 4 indicates, participants in both courses identified prior theoretical knowledge as their main strength: ‘My biggest strength was probably my prior familiarity with the subject matter cross linguistically. I think this enabled us to elicit a good variety of useful data’ (Field Methods, survey 2). Participants also identified knowledge about ‘data procedures’ as another strength: ‘I would consider the collection part of this project as my strength. I very thoroughly went through a large part of the grammar collecting the best possible examples to use for our project and comparing agents, themes, patients, and recipients’ (Morphosyntax, survey 1). Some of the participants identified feeling confi-

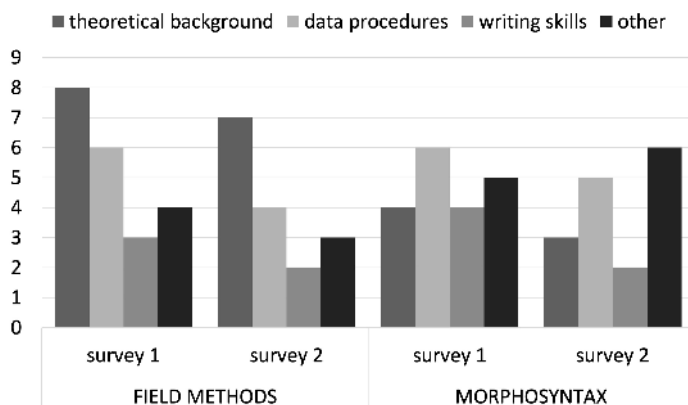


FIGURE 4. Student responses to Q1: 'What would I identify as my own strengths in the completion of this project?' (Vertical axis shows number of students.)

dent about their writing skills when crafting a strong introduction and conclusion to a paper as well as in the process of synthesizing ideas from one section to the next.

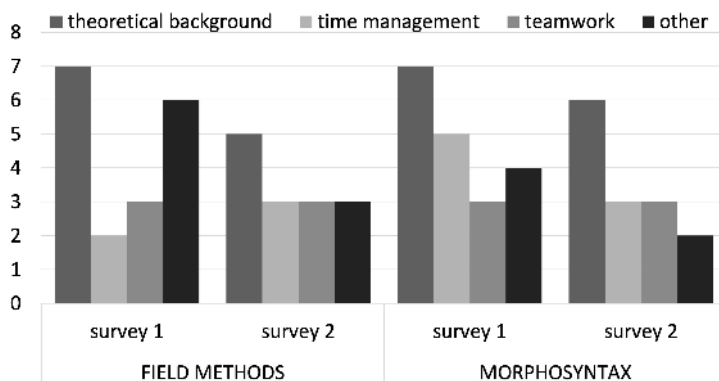


FIGURE 5. Student responses to Q2: 'What would I identify as my own areas of improvement in the completion of this project?' (Vertical axis shows number of students.)

As for areas of improvement, responses to Q2 (presented in Fig. 5) reveal that theoretical background was also identified as a weakness by some participants in both courses. Additionally, data procurement was reported as an area that needed attention in future research projects. For instance, one participant in Field Methods stated that '[I] needed more practice with data collection and data analysis' (survey 1). A participant also stated that they would like to learn more 'about how the programs that we are using for this class work' (survey 2). Other themes that emerged in the responses were related to time management and teamwork, as in this example:

Better collaborating with the other group members of the project, to plan and prepare the work, and trusting my other group members to do their share of the work ... I could have started the project earlier and read through the entire chapters that addressed the subject rather than picking and choosing which sections would benefit from a glance. (Morphosyntax, survey 2)

Responses from Q17 on the survey relate directly to individual strengths, as participants played specific roles in the group based on those areas of strength:

Q17: What roles have I played in the group when producing the report?

In survey 1, 64% of the participants in Field Methods reported that they wrote specific sections of the paper and 73% helped with the data analysis. In survey 2, all participants in the course indicated that they contributed to both data analysis and writing. Participants also reported that they answered peers' questions. A similar distribution of labor was observed in both courses, the only difference being that some participants from the Morphosyntax course emphasized their roles in helping their peers at the beginning of the research project.

Figure 6 plots responses to three questions about evaluation of performance and process across both surveys, and for each course. The questions (scalar; see appendix) are the following:

Q20: How much time did I need to complete this project?

Q21: What was my contribution to the group in this research project?

Q22: How confident do I feel about the outcome of this group project?

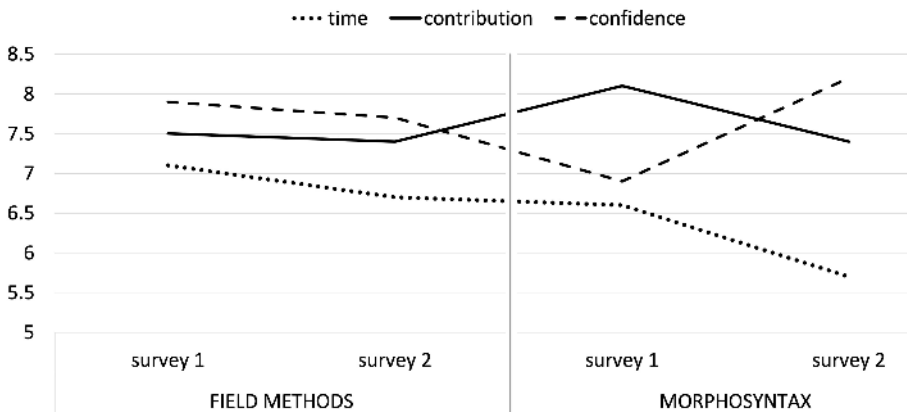


FIGURE 6. Students' scaled self-assessments of time spent, contribution, and confidence on outcome across surveys (Q20, Q21, Q22).

Figure 6 shows that participants spent more time on the first project than the second project in both courses. Their contributions to both projects remained about the same in Field Methods, but slightly decreased in Morphosyntax. Confidence in the outcome of their research projects remained about the same in Field Methods across surveys. However, there was a noticeable increase of confidence from survey 1 to survey 2 in the Morphosyntax course.

We focused more closely on 'confidence' in two additional questions (Q18, Q19):

Q18: Is there any particular area of the assignment that I did not feel confident about?

Q19: Does my peer know what area(s) I did not feel confident about?

Participants in both courses identified specific areas that they did not feel confident about. These were (i) skills with the software and technology (i.e. Praat, FLEx, Kaltura, etc.) and (ii) difficulty with the readings. In Morphosyntax, some participants also had difficulty in identifying grammatical patterns that peers and/or the instructor often commented on. More than half of the participants in both courses reported that their peers knew about the areas where they did not feel confident.

In conclusion, participants reported their self-perceptions regarding their own areas of strength and places for improvement. In both courses, a binary distribution of strengths

was observed: theoretical background and data procurement. Some participants felt that their theoretical foundation in linguistics was a key aspect that helped them to complete each task, while others felt quite comfortable with their knowledge about data procurement. The self-identification of areas of strength helped participants assume specific roles according to their own areas of comfort. Background knowledge and data analysis emerged as areas of strength for some, while others marked these areas as needing improvement. These results highlight the need for both students and instructors to identify areas of comfort among class participants when forming teams. In courses focused on developing analytical skills, for example, having balanced groups in terms of background knowledge and data analysis seems desirable. Time management and teamwork were also reported as areas for improvement in future research projects. Finally, the amount of time spent on the project, the level of contribution from participants, and individual confidence do not necessarily correlate with each other.

4.4. THE IMPACT OF COVID-19. In March 2020 the semester was disrupted by COVID-19. Because we were trying to understand the impact of the pandemic on our everyday lives as well as its implications for ongoing courses, we considered it necessary to prepare a special additional survey with questions focused on this issue. This survey was envisioned as a tool to promote personal reflection during a time of crisis and provided students with an opportunity to express their feelings and concerns. This survey was deployed toward the end of the Field Methods course, one month into the pandemic. Ten students (91%) responded to this survey. The questions are given below, with a summary of students' responses.

- *What changes have I experienced as a result of COVID-19 and the transition to remote learning?* (multiple choice question)

Responses to this question included: 'changes in my interactions with others' (nine students), 'changes in my financial situation' (five students), 'changes in my living conditions' (four students), and 'changes in my access to technology' (three students).

- *Did I perceive a change in terms of time commitment and effort in the course because of COVID-19?* (multiple choice question)

Most of the students felt overwhelmed at the beginning of the pandemic but adjusted somewhat to the circumstances over the first month (six students). However, five students indicated that they continued to have difficulties with their everyday lives.

- *When the world gets back to 'normal', what aspects of the remote learning format that we had to accommodate would I like to continue?* (open-ended question)
- *When the world gets back to 'normal', what aspects of the remote learning format that we had to accommodate will I NOT miss?* (open-ended question)

These two questions were designed to promote reflection about the remote learning strategies that were implemented to respond to the unfolding public health emergency. Students noted the importance of learning strategies that allowed flexibility regarding time and space, the use of technology to promote collaboration among peers, and opportunities, enabled through Zoom, to engage with specialists. One student explained it in this way: 'It was a great experience being able to zoom in an outside expert on the topic (Dr. X) to participate in the discussion, which may not have been as easy in an in-person class setting'. Another student indicated that 'the format of this class I feel has suffered greatly from a lack of face to face contact. While some of the interactions have helped me to see the benefit of developing remote communication skills, I do not feel

that this class has benefited from the covid crisis in any way' (Field Methods, survey on COVID-19).

The aspects of learning during the pandemic that students indicated were challenging were summarized by one student as follows:

not being able to compartmentalize my learning into several physical spaces (e.g. classroom, library); the lack of in-person interaction with peers (this was hard, as the sense of camaraderie with other grad students is one of my biggest supporters and learning boosters in grad school); the reliance on often-spotty internet connections; the business-meeting-like feel of ZOOM classes, which favors lecture but hinders discussion; and the list goes on. (Field Methods, survey on COVID-19)

- *Has COVID-19 had an impact in my expectations and learning in this course?* (open-ended question)

The responses to this question were mixed. Three students said their expectations and accomplishments did not change, one stating that 'things transitioned smoothly and expectations were the same. The only thing that may have affected learning was the internet stability'. Three students noted that the changes in the class were not significant. However, four students indicated that they did not get as much out of the course as expected because the course was originally intended to incorporate hands-on learning experiences. This sentiment was expressed by one student:

I had to spend quite a bit of time and energy focusing on my physical and mental health in the face of both the general stress associated with the pandemic and the personal stress of an altered living situation. I was not able to put all of the necessary time and energy into this course or any of my other courses, and I think my learning was seriously impacted in the end. In terms of my expectations, soon after class resumed online they were lowered from 'I want to get as much as I can out of this class to use in my future career' to 'I just want to get through this semester in one piece.' (Field Methods, survey on COVID-19)

- *How confident do I feel about my accomplishments in this course?* (scalar question)

On a 1–10 scale, with higher numbers indicating more positive responses, three students marked 8, five students 7, and two students 6. It is important to highlight that none of the students rated their confidence about their accomplishments toward the opposite ends of the scale. Additionally, most of the responses leaned toward the positive side of the scale. Considering the circumstances, we could have expected lower ratings in terms of confidence.

In summary, the overall results of this survey indicate that the COVID-19 pandemic significantly impacted students' lives, which seems to have affected their motivation to engage in the course. However, despite being in the middle of a global public health emergency, participants' self-efficacy in the course was apparently not compromised.

5. DISCUSSION. The primary purpose of the present study was to examine the implementation of metacognition as both a learning theory and a learning strategy in two advanced courses in linguistics. We assessed students' existing metacognition strategies when reasoning about language. The ultimate goal of the study was to identify strategies in instruction to enhance students' research skills in linguistics. The courses selected for this study were Field Methods and Morphosyntax, both of which focused on developing analytical skills in linguistics. They were taught by the same instructor and had a shared focus on unfamiliar languages.

Our study adhered to Tanner's (2012) recommendations to cultivate a classroom culture driven by metacognition by (a) giving students license to identify areas of confusion and asking them to acknowledge any difficulties, (b) integrating student self-reflection

into credited course work by asking students to provide feedback on what they found challenging or what questions arose during a specific project, and (c) the modeling of metacognitive strategies for students through thinking out loud retrospectively about language and related research skills—‘how you start, how you decide what to do first and then next, how you check your work, how you know when you are done’ (Tanner 2012:118). The metacognitive questions used in the present study followed Tanner’s three stages of metacognition practice in instruction (planning, monitoring, and evaluating). However, in our study (i) we did not provide explicit instruction about metacognition beyond the surveys themselves, and (ii) the same set of questions was administered at two different points of the semester to help students identify, assess, and adapt strategies from one activity to another within the same course.

5.1. MAJOR FINDINGS. Like previous research on the value of metacognition-based activities for instructional intervention, the results of our study suggest that the inclusion of metacognition surveys in linguistics courses can help both students and instructors gain greater awareness of learning concerns and capabilities. Students were invited to reflect on the process of conducting linguistic research projects, and some general trends emerged. Our results suggest that, in terms of planning, the goals of each assignment were clear, as were the strategies for beginning the research projects. As for monitoring, ‘data analysis’ was the most challenging aspect of the research process, followed by ‘knowledge about the topic’. Regarding evaluation, we observed small differences between semesters. Students felt more confident in and accountable for their work as the Spring 2020 semester progressed. Conversely, students expressed that they contributed more to their projects in Fall 2020, but their confidence regarding the outcome was slightly lower than in the Spring semester.

Participants struggled with data procedures across both courses and did not feel confident in their background knowledge on specific topics. When working in teams, they identified the strengths of each member in order to balance insecurities when, for example, finding the relevant examples in the reference grammars, collecting the appropriate data from a language consultant, building an argument with different pieces of evidence, or using different kinds of software for linguistic analysis. Participants in our study recognized multiple metacognition strategies that focus on general research activities. Several stated that the division of labor among team members, frequent communication with peers, and consultation with the course instructor were effective strategies. At the same time, some participants also acknowledged the need to improve their communication skills and, especially, time management.

Our study contributes to the existing line of research on metacognition in student learning through its implementation of metacognition-driven questions in teaching environments, as suggested in the literature. The results reported here also align with recent studies regarding the significance of infusing metacognition into advanced college courses. We followed previous recommendations from introductory linguistics coursework (Anderson 2016) and applied them to advanced courses in linguistics. The size of our study in terms of population and the specificity of the selected linguistics courses limits the potential for generalization of our results. Nevertheless, we provide a snapshot of what the implementation of metacognitive activities would look like as part of a linguistics course. The results reveal the kinds of challenges and strategies graduate students experience when conducting research in linguistics.

5.2. RECOMMENDATIONS. Most of the participants in our study had already taken several linguistics classes prior to enrolling in the courses discussed here. Nevertheless, a

majority of participants cited limited relevant background knowledge and analytical skills as an issue. Thus, the results of our study indicate that it is important to avoid making assumptions about the readiness of students in advanced courses and to create opportunities for them to identify what strategies might be implemented for specific class assignments. The integration of metacognition questions into course activities contributes to the development of what Tanner (2012:116–18) refers to as a ‘classroom culture grounded on metacognition’. In such a classroom, instructors incorporate metacognition concepts and their associated discourse explicitly to help students recognize, assess, and connect new skills with old ones ‘over an extended period of time’ (Zohar & Ben David 2009:187).

Although graduate students are generally less likely than undergraduate students to procrastinate (Cao 2012), self-regulation strategies relating to motivation and time management are still beneficial to them (Dunn & Rakes 2015). By identifying both strategies that work well and those that are not effective, students become more aware of different learning tools that help them to develop self-efficacy (Oxford & Cohen 1992). As they learn about the strategies that students use in research assignments, course instructors (like the one in our study) become better informed and equipped to create more inclusive and effective classroom spaces in the future (Negretti 2012, Pintrich 2002).

The design of teaching interventions following metacognitive exercises is a subject for further research, but our study does have implications for course design. The metacognition questions included in the surveys can allow instructors to monitor the flow of a course and create spaces in the calendar to address concepts that are key to student projects and further clarify concepts not being understood by the students. As those opportunities are created, students are better able to communicate their needs and challenges in relation to completing a task. At the same time, instructors can better pinpoint those ‘customized’ moments in the course that call for flexibility and immediate feedback at the level of both the individual student and the class as a group. In this regard, the results of our study inform future class design by highlighting the need for instructors to be open to making adjustments throughout the semester based on the answers provided by students in metacognition surveys.

It is important to highlight that the implementation of metacognition surveys in the present study took place during the early phases of the COVID-19 emergency, which resulted in significant teaching shifts in Spring 2020 (Field Methods) and the following semester, Fall 2020 (Morphosyntax). In a time of crisis like the COVID-19 pandemic, the infusion of metacognition questions into a course can have far-reaching implications for course planning, while also creating opportunities for students and instructors to identify coping strategies. Metacognition in times of crisis must be ‘even more intentionally brought from the implicit hidden curriculum of college to the explicit’ (McCabe 2020). Under circumstances that call for remote learning, self-regulation becomes an essential component of instructional design, since in-person interactions are no longer a possibility. Dunn and Rakes (2015) found that graduate students are not always prepared to be effective learners but can improve their self-regulation skills in an online course. The authors suggest that graduate students in an online course use effective metacognitive strategies like planning, self-monitoring, and self-evaluation as part of the course. When students are trained to think about and manage self-regulated learning strategies via metacognition, they become equipped with effective learning strategies that can be applied across multiple courses and different learning scenarios. It is also important to remember that we cannot assume that instructors have already developed

these self-regulation techniques; we may need to create opportunities for them to learn these as well.

Responses to the surveys examined here indicate that participants identified specific areas of their courses that they did not feel confident about. These included skills with the software and technology used to process and organize linguistic data, difficulty with the readings, difficulty when identifying grammatical patterns that peers and/or the instructor often commented on, and difficulty building an argument in writing. Interestingly, more than half of the participants in both courses reported that their peers knew about the areas where they did not feel confident. In order to address those deficiencies, several intervention teaching practices could be implemented. For example, students could be explicitly taught how to collaborate, with instruction addressing areas such as time management skills, setting up a work plan, being accountable to their peers, and so on. But contrary to Schraw et al.'s (2006) recommendation of forming groups of students at a similar development level, our findings suggest that it is important to identify the strengths of different participants so that each student can be an expert in a given task. In our view, each group should be formed by individuals with a diverse set of skills and talents. For example, taking the responses of the first survey as the baseline, teams could identify a member who feels comfortable with writing, another with data collection, another in the use of a given software, and so forth. For the linguistics classes researched here, this would be a more effective arrangement of teams than creating homogenous groups.

We conclude this section by providing three specific recommendations for future studies on metacognition and general curriculum design. First, instructors should identify class sessions in the course calendar that will be fully devoted to engaging in a discussion with the entire class about the results of the surveys. We recommend that a week after students submit their responses, the class collectively discusses both the strengths of a project and areas that need adjustment for better results on forthcoming research projects. Once the instructor has read the individual reflections on a given survey, the class discussion provides another space for sharing one's voice when thinking about how to approach research (e.g. taking into account the different stages of a research project). Instructors would design a lesson plan for the post-survey discussion session that incorporates overall trends that emerged in the surveys and addresses questions and challenges posed by students. Instructors may opt to engage with students during in-class discussions or may manage an open class discussion through online forums. Our second recommendation is to adapt Tanner's (2012) metacognitive modeling techniques. This could be done either as part of a class discussion or as a video recording for students to watch as an activity for the course. Our third recommendation is to incorporate questions pertaining to metacognition during end-of-course student evaluations. Instructors should include customized questions related to the use of metacognition activities in the course and request student feedback to be considered in future reiterations of the course.

6. FINAL REMARKS. The innovative character and main contributions of this study are in three areas. First, this is the first study that examines the impact of metacognition in the field of Linguistics through the inclusion of a survey as an integral component of research activities. Second, it is one of very few studies that have focused on advanced courses that include graduate students. Third, it is novel in the implementation of metacognition activities at multiple points during the running of a given course. Furthermore, the research presented here carries insights drawn from having been conducted during an ongoing public health crisis.

The University of New Mexico has an unusually diverse student body with many first-generation college students. Metacognition activities such as the ones shared in the present study have the potential to contribute to our mission to train researchers by raising awareness of learning strategies that enhance the development of critical thinking skills. By engaging students in discussion about metacognition at different points throughout a course, instructors can create spaces for growth and build up student confidence. Class discussions that incorporate responses to metacognitive surveys help instructors identify diverse talents in a class as well as areas that need intervention and further dialogue. This is especially relevant in times of crisis. Instructors can also use the responses from the metacognitive surveys to polish and enrich their course design for future iterations of a class. Finally, the implementation of metacognitive surveys in a course could also inform teaching practices, since instructors would be able to reflect on information collected from their students to help identify potential improvements in their approach to a given course or group. The use of self-regulatory questions and activities such as those employed in this study aids both students and instructors and enables both to feel more in control of their learning and teaching environments.

APPENDIX: SURVEY

Section 1: Five open-ended questions

Please answer the following questions based on the project you have just submitted for the class. Think of yourself as a learner. Read each question carefully and answer it to the best of your ability. Provide examples.

1. What would I identify as my own strengths in the completion of this project?
2. What would I identify as my own area(s) of improvement in the completion of this project?
3. What strategies worked well for me that I should use for another research project?
4. What could I have done differently mid-assignment to address some challenges and confusions?
5. When I write another research project, what do I want to remember to do differently?

Section 2: Fourteen ‘check all that apply’ questions

Select all the answers that apply.

6. What do you think was the instructor’s goal in having me do this task?
 - That I learn about some grammatical constructions
 - That I learn to extract data from a reference grammar
 - That I learn to produce a written description of a language
 - I’m not sure
 - I don’t know
 - Other: _____
7. What made me select the specific examples for the report?
 - The data available in the grammar
 - My background and knowledge about the topic
 - I didn’t participate in the decision making process
 - I’m not sure
 - I don’t know
 - Other: _____
8. What resources did I need to START this task?
 - Textbook/literature review
 - Data from reference grammar
 - Supplementary information about the topic
 - I’m not sure
 - I don’t know
 - Other: _____
9. What OTHER resources did I use to complete this task?
 - I ‘met’ with my peer to work on different aspects of the project
 - I ‘met’ with someone else from the program
 - I asked the instructor for guidance
 - I didn’t use the resources mentioned above
 - Other: _____

10. How did I weigh the different pieces of evidence I have collected?
 - I identified a claim in the textbook and tried to find empirical evidence in my grammar
 - I made preliminary observations from my grammar and tried to find references
 - I reported a claim from the grammar without examples to support the claim
 - I'm not sure
 - I don't know
 - Other: _____
11. What limitations or questions did I face to complete this task?
 - I did not have the background for the topic
 - I did not know where or how to start writing the report
 - I had difficulty finding the relevant data
 - I don't know (I have too many questions)
 - Other: _____
12. What was most challenging for me about this task?
 - I felt at times that I was not understanding what my peer was doing/saying
 - I did not know if what I was doing with the data was right
 - I did not know how to interpret the patterns
 - I don't know (I cannot think of any specific challenge)
 - Other: _____
13. Who did I ask about my questions to overcome my limitations?
 - I asked the instructor
 - I asked my peer(s)
 - I asked someone else in the program
 - I don't know if I overcame my limitations
 - Other: _____
14. What strategies did I use that worked well to help me learn?
 - I asked different people about the questions I had
 - I worked on my own in advance so that I could interact with my peers and the instructor
 - If I felt blocked with specific concepts or procedures, I looked for information on the web (e.g. wikis, tutorials, forums ...)
 - I don't know
 - Other: _____
15. What strategies did I use that did NOT work well to help me learn?
 - I did not allocate enough time to complete the task
 - I did not ask questions when in doubt
 - I did not check references to start the project
 - I don't know (I cannot identify strategies that did not work well)
 - Other: _____
16. Did I document my references to confirm 'who was saying what' (grammar, textbook, instructor, peers)?
 - Yes, all the time
 - Yes, most of the time
 - Sometimes but did not include peers and/or instructor as sources of reference
 - I don't know/I forgot
 - Other: _____
17. What roles have I played in the group when producing the second language report?
 - I wrote a portion of the paper
 - I helped identifying the data
 - I answered questions from my peer
 - I don't know/I am not sure
 - Other: _____
18. Is there any particular area of the assignment that I did not feel confident about?
 - I was not good at identifying patterns that my peer or instructor commented on
 - My skills with the reference grammar
 - I had difficulties with the readings
 - I don't know (I cannot think of anything specific)
 - Other: _____

19. Does my peer know what area(s) I did not feel confident about?
- Yes
 - No
 - Maybe
 - Other: _____

Section 3: Three '1–10 scale' questions

On a scale of 1–10, please rate the following questions:

20. How much time did I need to complete this project?

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

Less than expected

More than expected

21. What was my contribution to the group in this project?

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

Minimal

Substantial

22. How confident do I feel about the outcome of this group project?

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

Not at all confident

Extremely confident

Survey questions organized by categories

	QUESTIONS
Planning	6, 7, 8
Monitoring	4, 5, 9, 10, 11, 12, 13, 14, 16
Evaluating	1, 2, 3, 15, 17, 18, 19, 20, 21, 22

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