

THEMATIC ARTICLE

Phonology from the Inside Out: Constructed Language as a Pedagogical Tool

Sara Sowers-Wills

University of Minnesota Duluth, Duluth, United States
Email: sowe0034@d.umn.edu

(Received 2 May 2022; revised 1 February 2024; accepted 4 February 2024)

Abstract

This paper reflects on a project-based curriculum employing constructed languages to teach linguistics, with a focus on phonology. In a special topics linguistics course, nine students were led through the construction of a language. While students in introductory linguistics courses sometimes struggle with phonology, active engagement with a semester-long language construction project endowed these students with the practical motivation to understand (1) what phonology is, (2) how phonological rules work, and (3) why rules surface in the first place. They readily captured generalizations based on natural classes of sounds, recognizing the systematicity of their constructed phonology. Student performance and engagement in this course support the use of constructed languages as a pedagogical tool in linguistics. Because an ongoing project builds in problem-solving opportunities and processual thinking, highlighting relationships among key concepts, students achieve a more comprehensive understanding of core areas in the broader linguistic picture.

Keywords: constructed language; phonology; project-based learning; active learning; pedagogy

Résumé

Cet article se penche sur un programme d'études basé sur des projets employant des langues construites pour enseigner la linguistique, en particulier la phonologie. Dans le cadre d'un cours spécial de linguistique, neuf étudiants ont été guidés dans la construction d'une langue. Alors que les étudiants des cours d'introduction à la linguistique éprouvent parfois des difficultés avec la phonologie, leur engagement actif dans un projet de construction linguistique tout au long d'un semestre a donné à ces étudiants une motivation pratique pour comprendre (1) ce qu'est la phonologie, (2) comment fonctionnent les règles phonologiques et (3) pourquoi les règles émergent-elles de toute façon. Ils ont facilement saisi des généralisations basées sur des classes naturelles de sons, reconnaissant le caractère systématique de leur phonologie construite. Le rendement et l'engagement des étudiants dans ce cours étaient la pertinence d'employer des langues construites comme outil pédagogique en linguistique. Comme les projets continus intègrent des possibilités de résolution de problèmes et une réflexion procédurale, mettant en évidence les relations entre les concepts clés, les étudiants parviennent à une compréhension plus complète des domaines essentiels de la linguistique plus généralement.

1. Introduction

Building on prior publications on the pedagogical use of constructed languages (Sanders 2016, Punske et al. 2020), this paper reflects on a project-based curriculum (Helle et al. 2006, Kokotsaki et al. 2016) using active learning techniques (Felder and Brent 2009, Brame 2016) in a Constructed Languages course. I relate the students' grasp of phonological concepts to that attained in a traditional introductory course. While students in introductory linguistics courses often struggle with phonology, engagement with a semester-long language construction project provided students with the practical motivation to understand (1) what a phonological system is, (2) how phonological rules work, and (3) why rules surface, in connection with a whole language system. During the semester, students developed sound and morpho-syntactic systems and a lexicon, with options for incorporating semantic and pragmatic elements into their invented language. With some exception, students demonstrated an ability to capture generalizations based on natural classes of sounds, recognizing the systematicity of their constructed phonology.

1.1. Overview of conlangs in linguistics pedagogy

A small but growing body of research on the use of constructed languages (conlangs) in linguistics pedagogy precedes this paper. Preparing to design a course on constructed languages, I consulted Sanders (2016) and Punske et al. (2020). This section highlights relevant conclusions from these publications.

Contextualizing his argument in the pejoration with which many linguists view conlangs, Sanders (2016) demonstrates the ability of conlangs to elucidate challenging linguistic concepts. To begin, constructed data sets provide the instructor with greater control over instructional material in order to facilitate conceptual learning. Natural data can be unwieldy, which is instructive, but can muddy the reception of key concepts. Sanders (2016) observes that constructed data are regularly used in mathematics instruction, pointing to word problems. While attaining skill in tackling real-world data is necessary, grasping key concepts must precede that, and using "clean" constructed data is a strong resource. Additionally, constructed languages are well-suited for class activities. Sanders (2016) describes a hands-on activity he assigns, which engages students in familial relationships between languages, and further discusses the effectiveness of conlangs for longer projects.

A major boon of centring an entire course around constructing a language is that an instructor can tailor the course to specific interests (Sanders 2016). For example, Pearson (2020) describes a class whose core provides instruction in typology and universals; students must learn about typologically diverse languages in order to construct a typologically feasible language. Material and expectations can be adapted to introduce beginning linguistics students to the field (Berry 2020), or to challenge more advanced students (Carpenter 2020). Across the board, linguists bringing conlangs into their pedagogy report that students thrive, attaining valuable skills, when given the opportunity to learn linguistics by actively creating language

(Sanders 2016, Anderson et al. 2020, Carpenter 2020, Gillon et al. 2020, Sanders and Schreyer 2020).

The current paper contributes to the body of work described in this section by offering a reflection on and analysis of student learning in the multi-step construction of a phonological system. Goodall (2020) offers a guide to designing a language, pointing to phonemic inventory and resolving issues of phonotactics, and Berry (2020) describes a course on language construction as an introductory course. Examining student performance in a conlang setting can reveal aspects of instruction that support learning and may draw more students to the field.

1.2. Overview of pedagogical approaches

In this section, I discuss the pedagogical approaches used in a Constructed Languages course I taught in Spring 2021.

1.2.1 Project-based learning

Motivated by the need to more deeply sustain student interest, project-based learning promotes learning by doing, facilitating active student engagement in course material (Krajcik and Blumenfeld 2005, Helle et al. 2006). Project-based inquiry is student-centred, with the instructor as a guide, allowing students to apply what they learn to their project in a way that they have thought through on their own (Helle et al. 2006).

The design of project-based work enhances student motivation and leads to a deeper understanding of course material (Blumenfeld et al. 1991, Krajcik and Blumenfeld 2005). Krajcik and Blumenfeld (2005: 318) list five key features of a project-based learning environment, abbreviated here: a) students begin with a driving question; b) students explore the question in a process of problem-solving, applying important concepts from the discipline; c) students and the instructor collaboratively work to find solutions to the problem; d) “students are scaffolded with learning technologies that help them participate in activities normally beyond their ability”; and e) students produce tangible solutions to the driving question they began with.

I directly quote the feature in (d) for its description of the usefulness of constructed languages in linguistics pedagogy, which can be broken down as follows: Defining a problem around which students can orient their approach provides a focal point that drives them to seek out information they need to solve the problem, while also acquiring expertise in the subject area (Helle et al. 2006). To make this work, an instructor needs to develop guidelines for an extended project that keep the constraints on the project loose enough for students to assess problems and think creatively to define solutions (Blumenfeld et al. 1991). This way, students are working toward a well-defined goal, but find their own solutions using the knowledge given to them.

If project-based learning intends for students to provide solutions to real-world problems in an extended project, then a course designed around the construction of a language achieves that. Aspiring linguists will need to analyze language data functioning as a system, which draw from rules internal to the language and those typical of what we know about language overall. A successful conlang project demonstrates critical thought, attention to disciplinary detail, and creative problem-solving.

1.2.2 Active learning

Students benefit from being able to actively work with material as they learn it (Felder and Brent 2009, Arthurs and Kraeger 2017). Despite its traditional role in transmitting course material in a college classroom, lecturing has limited appeal for many students. Felder and Brent (2009: 2) carefully define active learning as excluding a call-and-response formula, where lectures alternate with question-and-answer sessions; rather, students are presented with short activities that give them the opportunity to apply new, instructor-led information. Emphasis is placed on activities that ask students to use information presented in lecture to solve a problem. This is because learning entails more than scooping up information and recalling it. A meaningful learning experience entails deep engagement with the subject and is enhanced by the social construction of knowledge (Lombardi et al. 2021).

Woven into a project-based learning environment, active-learning activities can instill students with focused disciplinary skills, first applied on a smaller scale, then to larger projects. Working through these smaller-scale activities in class allows for the multiple perspectives of students to contribute to a richer network of problem-solving techniques and for individual understanding to become more complete. In this way, students learn in cooperation with one another toward a common goal (Johnson and Johnson 2018). In the course under discussion, I employed an active-learning approach at each new step in the construction process (see section 2).

1.3 Institutional and course details

The data in this paper were produced in a Constructed Languages course I offered during the Spring 2021 semester at the University of Minnesota Duluth (UMD). UMD is a public university in the United States with approximately 9,000 undergraduate students, and the Linguistics program is housed within the Department of English, Linguistics, and Writing Studies, currently with 20 linguistics majors for its Bachelor of Science degree. The Constructed Languages course was offered with no prerequisites, both to provide an additional course for majors and in an effort to draw additional students to the program. With only two tenure-track faculty, and two term faculty who split duties in another program of the department, the number of courses that can be offered is limited.

Initially, 10 students enrolled in the course, one of whom withdrew early on. Among the nine students who completed the course, two were linguistics majors; eight of the nine students had previously completed an Introduction to Linguistics course, and the other student was concurrently enrolled in Introduction to Linguistics.

We began the course with a discussion of culture in relation to language, and students contributed to a discussion forum, situating the speakers of their conlang in a definable place, in order to lay a foundation for the lexicon. Students also described, impressionistically, what they each wanted their conlang to sound like. Subsequently, students created a phonemic inventory informed by world-language inventories and implicational universals and established a set of phonotactic constraints. Once they defined their phonological shapes, the students spent several weeks building their lexicon and morphosyntactic system, along with semantic and pragmatic elements. As a final step, a return to phonology asked students to create phonological rules

and demonstrate their system-wide effect, mindful of phonetic motivation and the effects of affixation. Returning to phonology as a final step allowed students to establish the lexicon and morphology of their language in the meantime, enabling them to think about how morphological processes might affect phonetic forms.

Section 2 describes relevant assignments and activities, followed by a presentation of the data and analysis in section 3. Section 4 (Results) highlights key findings, and section 5 (Discussion) examines implications from the analysis for consideration in linguistics pedagogy going forward.

2. Course content

Instructional materials in this course included assigned texts, lecture slides, in-class activities, discussion forums, longer homework assignments, and exams. Units of instruction included linguistic relativity, linguistic universals/typology, phonetics/phonology, the lexicon (e.g., Swadesh list, methods of word and root generation), morphosyntax (e.g., morphology type, sentence/phrase word order, verbal and nominal inflection, gender, and tense/aspect/modality), pragmatics (e.g., greetings/closing, apologies), semantics (e.g., expletives, taboo, idioms, temporal expression), and phonological rules. Examples were given, variously, from the following languages: Turkish, Hungarian, Latin, French, Greek, and Ojibwe, among others. Only units directly related to the creation of the sound system are discussed here.

Beginning students benefit from having guides. The unit on linguistic universals introduced students to typical distribution of sounds in natural language, and which sounds tend to imply the presence of others. For example, if a language has only five vowels, those tend to be [i, e, a, o, u], or if a language has voiced stops, it is likely to have voiceless stops. While students were not required to abide by universals, they were asked to justify deviation from them. We also worked with the World Atlas of Language Structures (WALS; Dryer and Haspelmath 2013), a large database of the structural properties of many of the world's languages.

Texts included Peterson (2015), Rosenfelder (2010), and a chapter from Okrent (2010), along with textbook chapters relevant to each unit. I introduced the word generating programs Awkwords (Mejzlík 2018) and Gen (Rosenfelder 2012); each site generates word forms in response to supplied phonological detail, the latter of which runs phonological rules. Additionally, I introduced *Index Diachronica* (2016), a 438-page document that lists diachronic sound changes present in natural languages. The use of these tools was not required, but some students experimented with them in the creation of their sound system. In view of a future presentation of the course, requiring the use of word generators may guide students to a richer engagement with the details of their sound systems. They would need to carefully consider how the phonological processes they devised apply to a set of input forms with greater phonetic range.

2.1 Training in phonological concepts

In-class activities, discussion forums, short assignments, and the final project all contribute to the analysis forming this paper. The following two subsections describe a)

classwork that served as training in phonological concepts and b) assignments that asked students to demonstrate their skills.

2.1.1 Collaborative mock language

With each new area of language construction, we co-constructed a mock language as a class, beginning with a sound system. The process of co-constructing this mock language was ongoing from unit to unit. This sound system was unrelated to the individual projects, and was not intended to be fully developed, but rather to provide a space to put new knowledge into practice. To prepare for this process, students completed an activity, sorting sounds by features and placing them into natural classes. This task was worth credit, but not graded, and we all discussed their responses as a class.

With a blank IPA chart in view, students made suggestions for sounds to include in our mock language, discussing the integrity of the system and looking to natural languages. Students were asked to connect their choices to universals. Their quick attention to natural classes was noted. As students selected consonants, one requested “all the nasals”. Figures 1 and 2 show the consonant and vowel inventories they built.

At this early stage, students were careful to select a balanced set of sounds (i.e., voiced/voiceless consonants where relevant, rounded/unrounded vowels). The feature [\pm round] is contrastive only for the high vowels. Where students became more adventurous with their own sound system, they were asked to justify their choices.

In addition to selecting sounds, the students settled on phonotactic constraints, shown in (1) and (2):

- (1) Allowable syllable shapes: (C)V(C)(C)(C)
- (2) Sound sequences: (C)V*stop-liquid, (C)V*[l]

The mock language allowed for syllables shaped by only a vowel, with one consonant optionally preceding the vowel and up to three consonants optionally following the vowel (1). Constraints on sound sequences prevented a syllable from ending in a

| | labial | labio-dental | alveolar | retroflex | palatal | velar | uvular |
|-------------|--------|--------------|----------|-----------|---------|-------|--------|
| stop | p b | | t d | | | k g | q ɢ |
| nasal | m | ɱ | n | ɳ | ɲ | ŋ | ɴ |
| flap | | | ɾ | | | | |
| trill | | | r | | | | |
| lateral | | | l | | | | |
| approximant | | | | | | | |

Figure 1. Mock conlang consonants

| | front | central | back |
|------|----------|---------|----------|
| high | i y | | u u |
| mid | e | | o |
| low | | a | |

Figure 2. Mock conlang vowels

stop-liquid sequence or in a lateral approximant [l] (2). With no fricatives in the language, and the possibility for three sequential coda consonants, challenging pronunciations arose (e.g., [mnk], [rld]). We did not return to the mock language during the unit on phonological rules near the end of the semester. Instead, we worked with a mock language, Snurp (constructed by the instructor), where students decided how to resolve disallowable sound sequences. In a future class, returning to the original mock language would likely be valuable to students.

While the major project itself was not collaborative, the training and learning process was. When we held a workshop during two class periods toward the end of the semester, the students agreed that active feedback like this from each other would have been helpful earlier on, although they preferred to create their languages independently. A combination, then, of independent creation and collaboration (see Johnson and Johnson 2018, Lombardi et al. 2021) seems optimal.

2.1.2 Petlang

In addition to collaborating on a mock language, each student chose a “pet language” (petlang), which could be either a natural language or a pre-existing conlang. With each new unit (e.g., phonology, morphology, syntax), students reported on that aspect of their petlang. For the phonology unit, students presented consonant and vowel IPA charts for their petlang. They also discussed the organization of phonemic sounds in connection with implicational universals and examined phonotactic constraints apparent in their petlang.

To further familiarize students with the systematicity a sound system exhibits – emphasizing that it is not simply a random collection of sounds – students compared the sound system of their petlang with a selection of consonant and vowel inventories in languages we had discussed in class, pointing to similarities and differences in distribution and classes of sounds.

The petlang assignments were conducted as online discussion forums so that everyone could see the languages that others had chosen, exposing themselves to a broader range of phonological possibilities. All but one student chose a natural language (Table 1). Together, the class collected structurally distinct languages from a variety of families.

Contributions to these discussion forums were detailed. Students demonstrated a burgeoning ability to identify systemic differences grounded in articulatory features. Additionally, students observed differences in phonotactic constraints, noting details

Table 1. Petlangs

| Natural languages | Constructed languages |
|-------------------|-----------------------|
| Russian | Klingon |
| Polish | |
| German | |
| Modern Greek | |
| Japanese | |
| Korean | |
| Hawaiian | |

like consonant clusters and consonants that can be syllabic. An improvement on this method would include more active incorporation of these forums into class discussion, by building routinized time for either individual presentations to the class or group presentations into the schedule. Instead of being treated as a side project, the discussion forum assignments could productively be the focus of instructional topics on designated days.

2.1.3 Other activities and discussion forums

Students were asked to create three phonological rules for their conlang. Conducted as a discussion forum, students could see what others had designed, which was useful to students with less experience. In an online discussion forum, students had a low-stakes place to experiment, with soft pressure to do well in a “public” space.

Another activity asked students to explore any two chapters in WALS that interested them. Some students chose sound-related chapters like “Uvular Consonants” and “Tones”, while others turned to morphosyntax. These activities gave students choice, while encouraging close examination of disciplinary concepts (see Krajcik and Blumenfeld 2005) – some of which exceeded their current level of experience or knowledge (e.g., unfamiliar sounds, ergative case, sentence word order) – that might inform their conlangs. Evident in these activities are the benefits of project-based techniques, which drove deep engagement in the material, motivating the acquisition of knowledge students needed to develop their individual projects (see Helle et al. 2006).

2.2 Demonstration

The following subsections discuss the assignments that allowed students to demonstrate their understanding of the course material.

2.2.1 Homework and exams

Students completed five graded homework assignments, which asked them to produce a part of their conlang relevant to current units of instruction. For the first homework assignment involving their sound system, students provided consonant and vowel IPA charts, with a written description and justification of their choices,

along with phonotactic constraints. Their sound system did not need to be set at this point, but a solid foundation was expected. The fifth homework assignment, following units on morphosyntax, pragmatics, and semantics, asked students to provide three possible phonological rules and demonstrate how they apply throughout their conlang.

Two exams asked students to present their language as they had developed it up to that point. While the second exam dealt with morphosyntax, semantics, and pragmatics, the first exam asked for more polished details of the sound system compared with what was provided in the homework assignments, along with a table reflecting their orthography. Although the course omitted a unit on writing systems, some assignments asked for phrases or sentences in the conlang, so correspondence between sound and letter was needed. This exam also asked for 75 words forming the developing lexicon.

While the in-class activities and discussion forums created a space in which students could experiment with new skills, the homework and exams together called upon students to demonstrate these skills with more authority.

2.2.2 Final project

The final project served as the culmination of the semester's work, in which students presented their conlang and demonstrated it in action, in the following parts:

1. General description of the language and its speakers
2. Sound system (vowel and consonant charts, phonotactic constraints, orthographic choices, and phonological rules)
3. Lexicon (200 words, organized by lexical category)
4. Morphosyntax (morphological type, sentence word order, etc.)
5. Semantics and Pragmatics (choice of elements to include, e.g., greetings/closings, idioms, expletives, temporal reference)
6. Dialogue/prose writing
7. Reflection on the process
8. Presentation

The final project did not call for a fully fleshed-out language, but was expected to reflect thoughtful and justifiable choices, with clear systematicity. This required that students return to the details of their sound system to ensure that lexical items they had since generated abided by their phonotactics, and to demonstrate the effect of their phonological rules when words became morphologically complex.

3. Data and analysis

My observations about the student work generated during the semester prompted the present project. I obtained permission from all students whose data appear. By email, students consented to the inclusion of their constructed languages and indicated whether they wanted their names to appear.¹ Six students, contacted after the

¹Each of the following students agreed to contribute their conlang as data in this paper: Chrystina Yang (CY; Mawari), Jonah Nelson (JN; Flupys), Kai Andersson (KA; Krujuonya), Mitchell Mollett (MM; Jêmori), Tanner Meihak (TM; 'Oitánsü), Quinn Luetzow (QL; Pruzkiya).

completion of the semester, granted permission; two students had graduated, and one had not completed many assignments.

Below, I examine each student's skill in creating a sound inventory and phonological rules that generalize to natural classes, where relevant, and demonstrate systematicity. Both consonant and vowel IPA charts are included for each student's conlang.

3.1 *Mawari (CY)*

With multiple linguistics courses in her experience, CY began by imagining a language for a community of islanders. In her final project, she included a remarkably thorough description of influences on her sound system, of which we include the majority in (3):

- (3) *I want my language to sound like a combination of Polynesian languages such as Hawaii[an] and Maori and Asian languages specifically Japanese with a bit of Hmong influences [...] Hmong was the first language I learned, and later on in life, I learned more about how Korean, Mandarin, Cantonese, Thai, Laos, and Japanese sounded like. Mandarin especially was a bit similar to Hmong and I grew fond of these languages because their culture was so similar to mine and their sounds were so unique from each other. I was able to achieve how I wanted my language to sound by learning about both Hawaii[an] and Japanese languages. I learned that they are both open [syllable] languages meaning that their syllabic structures are CV [...] By mimicking this syllable structure and tweaking it just a bit such as adding the possibility of having consonant clusters in the middle of the word, I have created words that sound similar to Hawaiian and Japanese language [...] For example, the Hawaiian language has a lot of glottal stops, [ʔ], and by implementing this sound into the middle or end of words I have created more Hawaiian sounding words in my language. Another sound that I added to my phonology was labiodental approximant, /v/, this has helped to create that “vw” sound in Hawaiian and it was a super helpful consonant. Additionally, a sound that I added to my phonology that emphasized the Japanese language was alveolar flap, /r/. The Japanese language doesn't have the /r/ sound like in English but instead, it's more of an alveolar flap sound for the r's [...] All of these factors help to create a language that has the sounds I was going for in Mawari.*

In building her phonemic inventory (Figures 3 and 4), CY points to influences of Māori, Japanese, Mandarin, Korean, Hmong, and Hawaiian. She drew from Hawaiian (i.e., open syllables, CV) for the phonotactic constraints, demonstrating both knowledge and understanding of this element of a phonological system. She also describes the influences of other languages on specific sounds in her conlang. Particularly notable is CY's use of the linguistic concepts discussed in class while exploring languages of interest to her, a benefit of active learning (Helle et al. 2006, Felder and Brent 2009, Arthurs and Kraeger 2017). She explored languages that I likely would not have introduced, due to my own linguistic (in)experience.

| | labial | labiodental | alveolar | postalveolar | palatal | velar | glottal |
|-------------|--------|-------------|----------|--------------|---------|-------|---------|
| stop | p b | | t d | | | k g | ʔ |
| nasal | m | | n | | ɲ | | |
| flap | | | ɾ | | | | |
| fricative | | f v | s z | ʃ | | | h |
| approximant | | ʋ | | | j | | |

Figure 3. Mawari consonants

| | front | central | back |
|------|-------|---------|------|
| high | i | | u |
| mid | e | | o |
| low | | a | |

Figure 4. Mawari vowels

Between the first homework assignment, establishing the consonant and vowel inventories, and Exam 1, CY added a voiceless postalveolar fricative [ʃ] and voiceless glottal fricative [h], but otherwise the phonemic inventory stayed the same. No explanation is given for the addition of the two fricatives. An in-class presentation of languages garnered praise for the integrity of CY's sound system. Its linguistic influences are clear, and the target sonic quality was achieved by her selection of sounds and phonotactics. Furthermore, her phonemic inventory, for both consonants and vowels is well dispersed and balanced.

CY wrote a phonological rule that deletes a word-final vowel when affixation creates a sequence of three vowels. The rule works well in her language, but she misses the generalization of vowel deletion from a sequence of three vowels by presenting what is, in essence, the same rule in three different examples. All three rules achieve the same end.

3.2 Flupys (JN)

Flupys is spoken by intelligent and creative city- and suburb-dwellers interested in precision. JN entered the class with no linguistics experience but was concurrently enrolled in my introductory course and had experimented with language creation in the past. He created a phonemic inventory (Figures 5 and 6) composed of mostly

| | labial | labiodental | dental | alveolar | postalveolar | palatal | velar | glottal |
|------------------------|--------|-------------|--------|----------|--------------|---------|-------|---------|
| stop | p b | | | d | | | k g | |
| nasal | m | | | n | | | | |
| fricative | | f v | θ | z | ʒ | | | h |
| approximant | | | | ɹ | | j | | |
| lateral approx. | | | | l | | | | |

Figure 5. Flupys consonants

| | front | central | back |
|-------------|-------|---------|------|
| high | i, ɪ | | u |
| mid | e | ə | |
| low | a | | |

Figure 6. Flupys vowels

voiced consonants, except for /p, f, k, h/, covering the full range of places of articulation from labial through glottal, and vowels are clustered toward the front of the vowel space, spreading to the high back area but omitting the low back region.

JN’s goal was to create maximum distinction and precision in speech so that one “could hear someone speaking something behind the walls”. Only one vowel occurs in any area of the vowel space, thus no rounded counterpart to an unrounded vowel or vice versa. JN avoided voiceless obstruents for a “less heavy” language, but left [f] and [k] for variety and a “smooth and nice” sound. My comments to him suggested developing historical motivation for the absence of voiceless obstruent counterparts, and also noted the need for feature distinction between /i/ and /ɪ/.

Initially, JN included a rule that no consonant could come after a stop, but this was too restrictive. With feedback, he revised his phonotactics for the subsequent submission of his conlang materials, such that no consonant could follow an oral stop, but could follow a nasal stop. This revision demonstrates awareness of the distinction between oral and nasal stops and how they combine with other sounds. The revision, further, demonstrates awareness of the behaviour of sounds as natural classes.

JN presented three phonological rules, two of which are specific to phonetic environment: intervocalic /f/-voicing, and [j]-epenthesis to break up hiatus. Why the voicing rule (Rule 1) does not generalize to other voiceless obstruents is not clear; although voiceless obstruents are few in this language, there are others to which the rule could apply. The vowel nasalization process (Rule 2) has a vowel becoming nasalized either before or after a nasal consonant. While the two related rules could be collapsed, the rule presents a natural assimilation process clearly; we covered only simple rule writing in class. The epenthesis rule (Rule 3) inserts [j] between [e] and [a]. Improvement could be found in generalizing it to all vowels, or in explaining why it does not generalize. These rules, nevertheless, demonstrate knowledge of common phonetic processes triggered by phonetic environment; their application is given in (4).²

²The examples for Rules 1 and 3 include /s/, which is not part of the given phonemic inventory. In both cases, the /s/ becomes [ʒ] after the application of the rule, but not as a consequence of the rule. I was unable

- (4) a. Rule 1. In between two voiced sounds, /f/ becomes [v] in voicing assimilation.
 /f/ → [v] / [+voice] __ [+voice]
 Examples: /se fudra/ → [ʒe vudʒa] ‘the Sun’
 /fei fepemnuer bavze/ → [fei vepemnu.eɪ bavze] ‘and I’m not’
- b. Rule 2. Before and after a nasal, vowels are nasalized in nasal assimilation.
 V → [+nasal] / [+nasal C] __
 V → [+nasal] / __ [+nasal C]
 Examples: /mein/ → [mēĩn] ‘to play (music)’
 /gamun/ → [gamũn] ‘to exist’
- c. Rule 3. Between [e] and [a], [j] is added in the pronunciation in epenthesis.
 Ø → [j] / [e] __ [a]
 Examples: /sea/ → [ʒeja] ‘to go’
 /zean/ → [zejan] ‘page’

JN’s process of creating a phonemic inventory is thoughtful, with attention to features and flouting universals with intention, but could be improved with clearer coherence. JN displays a basic grasp of phonological rules, which is notable given his lack of prior linguistics experience. Revisions he made to his sound system, in response to feedback and acquisition of new skills (see Helle et al. 2006), points to the effectiveness of learning in a student-driven project.

3.3 Krujoonya [kɹudʒuɲə] (KA)

Having completed an introductory linguistics course, and with prior interest in conlangs, KA created Krujoonya, the language of an intergalactic alien species of warriors. For these aggressive speakers, KA sought to create a harsh-sounding language. Unlike other students in the class, KA drew from other conlangs for her sound inventory (Figures 7 and 8), including Klingon, Dothraki, and Geonosian. A few errors in classification appear in the consonant chart: affricates listed as lateral fricatives; [ɬ], [m], [n], [ɲ], and [j] placed as voiceless rather than voiced. Outside of the high centralized vowels [i, ɨ] and a voiceless uvular stop [q] and velar fricatives [x, ɣ], KA’s sound inventory was similar to what she, as a native English speaker, was familiar with. She used this to her advantage. Rather than the phonotactics or the inventory alone, these pieces together produced the sound she sought; only two sequential consonants were allowed, but the allowable sequences of consonants challenge the vocal tract. Sample words appear in (5):

- (5) [ɛməziɲux] ‘armor’
 [natymʒin] ‘spaceship’
 [quɣjud] ‘freeze’
 [ɲdɑɲudʒu] ‘run’

to receive a response from JN prior to completion of this manuscript, but believe the appearance of /s/ is a residual error from a previous instantiation of the phonemic inventory.

| | labial | labio-dental | dental | alveolar | post-alveolar | palatal | velar | uvular | glottal |
|-------------------|--------|--------------|--------|----------|---------------|---------|-------|--------|---------|
| stop | p | | | t d | | | k | q | ʔ |
| nasal | m | | | n | | ɲ | | | |
| fricative | | f v | θ ð | s z | ʃ ʒ | | x ɣ | | h |
| lateral fricative | | | | | tʃ dʒ | | | | |
| approximant | | | | ɹ | | j | | | |

Figure 7. Krujoonya consonants

| | front | central | back |
|------|-------|---------|------|
| high | i | ɨ ʉ | u |
| mid | ɛ | ə | ɔ ʌ |
| low | | a | |

Figure 8. Krujoonya vowels

KA exemplified phonotactic constraints with both acceptable and unacceptable forms. Sequential vowels are allowed but cannot end a word unless the final vowel is [+back]; therefore, [qurpaɭ] is acceptable but [qurɸi] is not. This shows careful systematicity and comprehension of how the sound inventory and phonotactics interact.

The phonological rules KA wrote for Krujoonya, further, show attention to phonological detail and a willingness to experiment. For example, one rule prohibited two sequential nasal consonants, deleting the first nasal. Another rule prohibited two sequential same consonants as a consequence of affixation, inserting [i] between voiced same consonants, and [a] between voiceless same consonants. Explanation for why these particular vowels are epenthesized is not given; however, generalization of the structural requirement to the natural class “voiceless consonants” is met. Clearer motivation for these processes would further enhance the elegance of Krujoonya’s phonology.

3.4 Jêmoni (MM)

MM entered the class having completed multiple linguistics courses and with substantial interest in language. Jêmoni, spoken by islanders interested in penguins, was intended to sound Slavic. MM drew heavily from Polish, his petlang, to create his sound inventory (Figures 9 and 10). For consonants, he dispensed with palatal fricatives and added velar fricatives and a uvular stop. For vowels, he set a standard

| | Bilabial | Labiodental | Alveolar | Postalveolar | Palatal | Velar | Uvular |
|---------------------|----------|-------------|----------|--------------|---------|-------|--------|
| Plosive | p b | | t d | | | k g | q ʔ |
| Nasal | m | | n | | ɲ | | |
| Trill | | | r | | | | |
| Affricate | | | | tʃ dʒ | | | |
| Fricative | | f v | s z | ʃ ʒ | | x ɣ | |
| Approximant | | | | | j | | |
| Lateral Approximant | | | l | | | | |

Figure 9. Jêmoni consonants

| | Front | Central | Back |
|-------|----------|---------|------|
| Close | i y | | u |
| Mid | e ø ɛ | | o |
| Open | | a | |

Figure 10. Jêmoni vowels

five-vowel inventory, and added the front mid lax vowel [ɛ] and two front rounded vowels [y, ø].

In developing Jêmoni's phonological system, MM created three rules. Two rules entail the trill [r] becoming a flap [ɾ]; in one, the change happens intervocally (Rule 1) and in the other following a consonant (Rule 2). In a third rule, a palatalization process, the voiceless uvular stop /q/ becomes palatal [c] before [j]. While only one uvular sound was present in the language, a more general rule would expand to natural classes formed by place of articulation. Only Rule 2 appears in the final presentation of the language.

- (6) a. Rule 1: /r/ → [ɾ] / V ____ V
 Example: /ere/ → [ere] 'air'
- b. Rule 2: /r/ → [ɾ] / [+cons] ____
 Examples: /krat/ → [krat] 'he/she/it'
 /draoli/ → [draoli] 'tongue'
- c. Rule 3: /q/ → [c] / ____ [j]
 Example: /ijuqjom/ → [ijucjom] 'moon.INS'

MM was the only student who used a word generator to build his lexicon, which was permitted. Both Awkwords and Gen are free for use; conlangers can enter their vowel and consonant inventories, along with phonotactic constraints, and the site generates allowable word forms. The quality of the forms generated by these sites is readily detectable. Forms generated by students tend to become similar to one another, and sometimes similar to their native language, where auto-generated phonetic forms tend to have more phonetic range. The latter may attain a more naturalistic and richer phonetic quality. The conlanger must decide which forms to include, looking to the integrity of the language.

Successful use of a word generator requires that the conlanger understand the details of their own phonotactics, including allowable consonant-vowel sequences and where specific sounds are and are not permitted, along with what sequences trigger a phonological process. Jêmoni allows the syllable possibilities in (7):

(7) (C)(C)(C)V(V)(C)(C)(C)

Only a vowel was required in a Jêmoni syllable, with a possible two-vowel sequence, bookended by optional three-consonant sequences. This resulted in words like [juʃtʃ] ‘egg’, [xalʃtyk] ‘wet’, and [ipf] ‘warm’. Jêmoni allows for some phonetically challenging consonant clusters, as does Polish, which demonstrates MM’s ability to examine a natural language system and to abstract away from features he sought to use in his conlang.

3.5 ‘Oitânsû (TM)

‘Oitânsû is spoken by nomadic livestock herders living in the steppes and deserts. The language is tonal, and the sound system is influenced by Mandarin Chinese and Hawaiian, and contains the alveolar lateral fricative [ɬ], occurring in Welsh, which TM selected because he liked it. TM had completed my Phonetics & Phonology course and was learning Chinese.

‘Oitânsû’s consonant inventory (Figure 11) is relatively spare, including only voiceless obstruents, accompanied by two nasals, the labiodental approximant, and two laterals. The vowel inventory (Figure 12) builds on a standard five-vowel scheme, adding a high front rounded vowel /y/ and a series of diphthongs: /ai, ao, ei, ia, iu, io, ui, ua, oi/.

| | Bilabial | Labiodental | Dental | Alveolar | Velar | Glottal |
|-------------------|----------|-------------|--------|----------|-------|---------|
| Plosive | p | | | t | k | ʔ |
| Nasal | m | | | | n | |
| Fricative | | | θ | s | x | |
| Lateral Fricative | | | | ɬ | | |
| Approximant | | v | | | | |
| Lateral Approx. | | | | l | | |

Figure 11. ‘Oitânsû consonants

| | Front | Central | Back |
|-----------|--------------------------|---------|------|
| Close | i y | | u |
| Close-mid | e | ə | o |
| Open | a | | |

Figure 12. 'Oitánsū vowels

'Oitánsū allows for few syllabic possibilities, shaped by a single vowel with an optional preceding or following consonant: (C)V(C). Phonotactic constraints prohibit non-nasal consonants in the coda. Roots in 'Oitánsū tend to be monosyllabic, drawing from Sino-Tibetan languages. Adapting Mandarin's tone system, 'Oitánsū has high flat, rising, falling, and neutral tones, which allowed TM to generate a diverse range of word forms, despite the spare consonant inventory and limited syllable structure (Figure 13).

TM's attention to syllable structure was necessary in his invented tonal language, carving out permissible sounds in onset and coda position. Due to the limitations of an introductory linguistics class, syllables are often only cursorily mentioned. The systematicity of TM's conlang, however, called for – and also facilitated – the creation of detailed syllable allowances, requiring TM to investigate material beyond class content in order to build a solid language.

The phonological rules that TM devised for his conlang show clear understanding of natural processes and their effect throughout the language.

(8) a. Rule 1: Nasal Place Assimilation Rule

n → m / __ [+bilabial]

m → n / __ [+alveolar, +plosive]

Examples: /vinpei/ → [vimpei]

/mənti/ → [mənti]

/penpia/ → [pempia]

| Tone | 1st | 2nd | 3rd | 4th |
|-------------|-------------------|-------------------|-------------------|---------|
| IPA | [a ¹] | [a ²] | [a ³] | [a] |
| Orthography | ā | á | à | a |
| Description | high, flat | rising | falling | neutral |

Figure 13. 'Oitánsū tones

b. Rule 2: Glottal Stop Deletion Rule

[ʔ] → Ø / [+nasal] ___

Examples: /θuam²ʔa/ → [θuam²a]/loim³ʔa/ → [loim³a]/neim¹ʔon³/ → [neim¹on³]

c. Rule 3: Voice Assimilation Rule

[-voice, +plosive] → [+voice] / [+nasal] ___

Examples: /θaim³pai¹/ → [θaim³bai¹]/neim¹kaon²/ → [neim¹gaon²]/kom¹tan²/ → [kom¹dan²]

While Rule 1 could be written more elegantly by collapsing the two rule notations, the process is clear and natural. Rule 2 deletes a glottal stop, easing articulatory effort after a nasal, and Rule 3 asserts progressive voicing when a stop follows a nasal. Taking Rules 1 and 3 together, the voiceless plosives in the data for Rule 1 would become voiced after the nasal consonant. While this change is not reflected in the data here, because the class did not cover rule ordering or interaction, an emergent elegance is seen in 'Oitánsũ's phonological system.

In 'Oitánsũ, TM demonstrates a thorough grasp of the systematicity of a language's sound system. Furthermore, he benefited from being able to design his own language over time, exploring his interest in tones, while learning concepts in the discipline (Helle et al. 2006). TM later expressed that this was his favourite college course and he felt that not being able to learn in this way might diminish his interest in a course. The other students also expressed positive responses to this active-learning, project-based course structure.

3.6 Pruzkiya (QL)

Pruzkiya is spoken by mountain dwellers who depend on agriculture and value art. Its sound inventory (Figures 14 and 15) is heavily influenced by Russian, QL's petlang, including palatal distinction among consonants; additionally, English, German, Finnish, and Spanish contribute sounds. The inventory includes /ɹ/ (English), /x/ (German), /ø/ (Finnish), and /β/ (Spanish). QL incorporated a series of centralized vowels with historical motivation, and contrastive distribution of reduced and non-reduced vowels. The goal was for the language to sound "hard".

| | Bilabial | Labiodental | Dental | Alveolar | Postalveolar | Palatal | Velar | Uvular | Glottal |
|---------------------|----------|-------------|--------|----------|--------------|---------|-------|--------|---------|
| Plosive | p b | | | t d | | c ɟ | k | q | |
| Affricate | | | | | tʃ dʒ | | | | |
| Fricative | β | f | θ ð | s z | | ç j | x | | h |
| Nasal | | | | n | | ɲ | ŋ | | |
| Approximant | | | | ɹ | | j | | | |
| Lateral Approximant | | | | l | | | | | |

Figure 14. Pruzkiya consonants

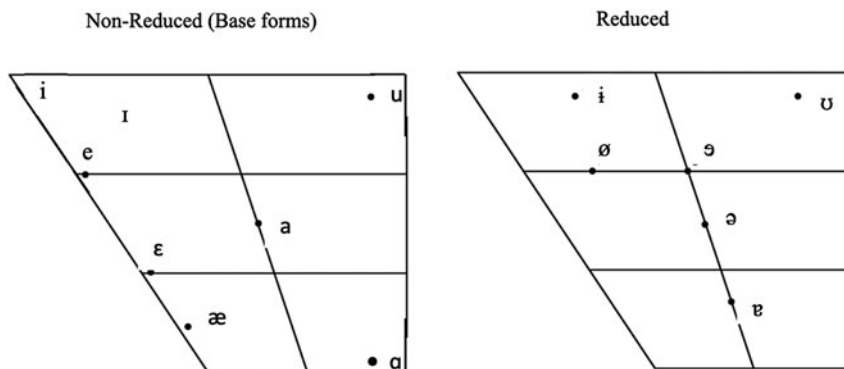


Figure 15. Pruzkiya vowels

Pruzkiya allows a (C)(C)V(C)(C) syllable structure, requiring that a syllable be built on one vowel, permitting up to two sequential consonants in the onset and coda, with a detailed description of palatalization processes. The sound system and phonotactics produced such words as [qirin] ‘to walk’, [qi.ɪk’æd.ɪn] ‘to come’, and [qirsk’vɪj’ɪn] ‘to fly (to walk the sky)’. QL marks stress, which was only briefly covered in class. Because QL’s phonological processes are experimental and not reflective of the points being made here, they are omitted.

A linguistics major in his final semester, QL had completed every other linguistics course available in the department and had begun work on his conlang prior to the announcement of this course. That he is the only student to introduce a term like “contrastive distribution” in the formation of his sound system prompts consideration that the hefty load of terminology a student encounters in introductory linguistics may be too much too soon. Engagement in the details of a sound system itself, instead of jumping headfirst into terminology such as “contrastive/complementary distribution”, may lead to greater success in guiding students toward understanding these relationships.

4. Results

While the phonological rules produced for each of the conlangs do not reflect mastery on the students’ part, the creation and use of the rules do reflect a deepening understanding of intersecting elements in a phonological system. This includes knowledge of the sound system as a *system*, a grasp of phonotactic constraints, and an awareness of the relationship between morphosyntax and phonology.

In a traditional introductory linguistics course, phonology, morphology, and syntax are compartmentalized in separate units. That is also the case in this constructed language course, but because students constructed a single language over the duration of a semester, awareness of the relationships among grammatical parts of their conlang was crucial. Furthermore, in a typical introductory linguistics course, students are taught the basics of phonetics (e.g., the vocal tract and IPA transcription), then move on to solve phonology problems, perhaps with a nod to phonotactic constraints,

and learn about finding minimal pairs and identifying the complementary and contrastive distribution of sounds. In the conlang class, having to make decisions about which sounds should be phonemic in the language and what syllable structures and sound sequences are allowed requires that students truly understand phonotactic constraints and their systematic effect throughout a language. The most common obstacles I see in the phonology unit of my introductory linguistics classes are the following:

1. **Terminology:** Difficulty wading through the terminology (e.g., featural descriptions, *phoneme*, *allophone*, *contrastive and complementary distribution*, *minimal pair*), which can stall an understanding of key concepts;
2. **Natural classes:** Struggle knowing how to group sounds into a class where relevant;
3. **Systematicity:** Lack of understanding that a rule applies throughout the data as motivated by the rules and constraints of a given language; and
4. **Motivation:** Uncertainty about why we are looking for patterns and writing rules in the first place.

This course, built around constructing a language from the bottom up, reveals the following about these challenges:

1. **Terminology:** As noted in the analysis, QL was the only student to reference phonological terminology. Other students in the class, some of whom had demonstrated an understanding of these concepts in my Introduction to Linguistics and Phonetics & Phonology courses, did not describe their sound system in this way. Doing so was not required; the students were, nevertheless, developing a set of sounds and relationships among them, unhindered by terminology, motivated by close attention to their sound inventories and to the phonological rules they had created.
2. **Natural classes:** All students pointed to natural classes in the development of their phonemic inventories. To some degree, all students captured generalization to relevant natural classes in their phonological rules; some students wrote rules that captured a natural class of sounds and also had rules that did not.
3. **Systematicity:** Most students exhibited awareness that phonological rules affect forms throughout the language. In the future, the return to phonology after the establishment of morphosyntax will include an activity focused on reassessing lexical items with phonological rules in view.
4. **Motivation:** Many of my introductory linguistics students have questions about phonology, but do not have the foundation to know what to ask. In contrast, because the conlang students were actively engaged in constructing their language at all structural levels, questions they had were practically motivated, and answers to those questions concretely impacted the material of their language. The conlang students knew what to explore further, with the goal of implementing it in their project. The complicated nature of some rules, however, points to incomplete realization of why and how phonological processes surface.

Table 2. Comprehensive data on linguistic experience entering the course and skills demonstrated during the semester

| Student | One Ling class completed | Additional Ling classes completed | Phonemic inventory | Phonotactic constraints | Phonological rules | Systematicity |
|-----------|--------------------------|-----------------------------------|--------------------|-------------------------|--------------------|----------------|
| Student 1 | Black | Black | White | White | White | White |
| Student 2 | Black | White | Diagonal lines | White | Diagonal lines | White |
| Student 3 | Black | Black | White | White | Diagonal lines | Diagonal lines |
| Student 4 | Black | Black | White | White | White | White |
| Student 5 | Black | White | White | White | White | White |
| Student 6 | White | White | Diagonal lines | White | White | White |

(Students have been anonymized in this table.)

Black: Yes, White: No. Gray: Achieved, Diagonal lines: Developing.

Phonemic inventory: Did student create an accurate and clearly justified sound inventory?

Phonotactic constraints: Did student create and abide by a clear set of phonotactic constraints?

Phonological rules: Did student present rules that reflect clearly motivated phonological processes?

Systematicity: Do students' phonotactics and phonological rules reflect awareness of structural requirements throughout the conlang?

Table 2 visualizes the following information for each student: prior linguistics experience upon entering the class and my subjective rating of their achievement in the concepts described. I acknowledge that a table of this nature would be more informative with a comparison to baseline data. Because this analysis is based on observations made during and after the course had ended, a quantifiable comparison at this stage is regrettably not possible.

The precision with which students made choices for their sound inventory, matching vocal tract features to their impressionistic goals, suggests that a similar activity may be helpful to beginning linguistics students learning about the relationship between the vocal tract and a phonological system. Close attention to the design of phonemic inventory, supported by personal interest in a selection of languages spurred the students' developing grasp of the systematicity of sound in a language, in relation to the rest of the grammar, and inspired attentive exploration of languages that interested them. They were, furthermore, motivated to experiment with topics not thoroughly covered in class if doing so fit the needs of their conlangs.

5. Discussion

Prior to this conlang course, I had used a project-based model in advanced writing courses, where students work in groups on a project topic of their choice for the duration of the semester, but I had not tried this in linguistics. The benefits of doing so are apparent in the students' engagement with a diverse range of languages, in the depth at which students examine languages of their choice, and in the resulting skills students demonstrate.

Compared with teaching a standard introductory linguistics course, incorporating phonetics and phonology lessons into a semester-long creative project necessitates instruction not only on a greater number of concepts, but also on the relationships among them. Furthermore, students were exposed to a greater variety of languages in this conlang class than students in a typical introductory linguistics course, because they needed to familiarize themselves in a focused way with the grammatical details of languages that influenced the language they were constructing. This contrasts with introductory classes, where it is often easier to introduce linguistic concepts using native-language examples – in my case, English – and students are therefore not able to benefit from built-in comparison and contrast across a diversity of languages. The conlang students, thus, gained a more comprehensive grasp of language systems. Because the material is integral to the construction of a language, learning happens organically, with the practical motivation for students to both understand and apply the material (see Blumenfeld et al. 1991, Krajcik and Blumenfeld 2005).

This effect may be due, in part, to the type of students the course attracted. This pedagogical approach may not be as effective for the type of introductory linguistics class population I usually teach at UMD. Many students enroll in introductory linguistics at this institution for a quantitative reasoning credit in place of a math course. The motivation to explore may be weaker in these students than in students already interested in language. In fact, language study already appealed to all students enrolled in the conlang course; most had completed a linguistics course, and some had tried creating a language in the past. However, while prior linguistics experience likely enhances a student's ability to construct a rich and systematically sound language, it may not be necessary. I have since taught the Constructed Languages course a second time, to four students who had no prior linguistics experience. They faced obstacles (e.g., learning phonetic symbols, understanding phonological rules), but their interest in language seems to have propelled their drive to learn in order to create. The data in Table 2 also suggest that prior experience in linguistics is not necessary, but that students can learn linguistics concurrently with, and by way of, language construction. Rather, established interest and course design may hold more weight in determining the successful acquisition of linguistics concepts from a conlang course. To gain a more completely detailed understanding of the benefits of using conlang strategies to teach linguistics, a future project that directly compares concepts taught and student outcomes in introductory linguistics and conlang courses would be valuable.

While conducting a semester-long conlang course may not be feasible for all instructors, conlang activities can, nevertheless, further enrich established courses. For example, students in my undergraduate introductory course have invented details for phonetic variation in an imagined geographic area as a way to discuss dialect. Discussing phonological processes, I introduced Snurp (discussed in section 2.1.1) in the introductory course as well as in the Constructed Languages course. Given a simple set of phonotactic constraints and few invented phonemic forms, students were asked to use common phonological processes to resolve disallowable sequences. Furthermore, in my undergraduate combined phonetics and

phonology course, students have worked in groups to invent phonemic inventories to become familiar with articulatory description, natural classes, and phonemic inventories of languages new to them. Integrating smaller-scale conlang activities in an introductory course could spark interest in students unaware of linguistics as a field by placing problems to be solved ahead of unwieldy terminology. Moreover, bringing conlang assignments into established courses can supply hands-on experience for linguistics students and serve to reinforce traditionally presented material.

Another consideration in offering a course driven by a semester-long conlang project is how the course could be realized differently with various class sizes. I had what I consider the benefit of a small class of nine students. Students received some one-on-one attention in the synchronous version of the class delivered remotely. In a small class delivered in person, new elements of each student's conlang could be submitted for workshop feedback from everyone in the class. This would be a valuable addition to the course. A larger class would require a different strategy but could still benefit from similar alternation between lecture and group work. Even if students in a larger class were not able to receive regular feedback from the entire class, students in the class could nevertheless be divided into groups within guided workshop environments, both providing and receiving feedback from peers and the instructor on a given element of the language construction process. The use of in-class activities in conjunction with in-class feedback could help to manage workload for instructors of large classes.

The potential for the use of constructed languages at different levels of linguistic experience cannot be overlooked. Creating a language with limited knowledge of linguistics is challenging. The resulting language will necessarily be simple, but still instructive on fundamental linguistics concepts, like phonemic inventory, natural classes, articulatory description, and phonological processes. Because this special topics course included students with a range of experience, the onus was on me to modulate the level of detail provided and expected. The more advanced students independently sought material at a level of complexity that met their needs. A conlang course delivered at a more advanced level could instill a yet deeper understanding of complex concepts, requiring the integration of detail at various levels of language. Outcomes would surely be easier to generalize in a class designated as either introductory or advanced, and materials could more effectively be tailored to a more uniform level of experience.

The pilot run of this course revealed advantages to supplementing linguistics instruction with a semester-long conlang project. Taught when the Covid-19 pandemic necessitated remote learning, the course could not easily benefit from interactive group work. A future iteration of the course will integrate group work and workshop scenarios, while maintaining independent final projects. Another change that may benefit students is to begin with a small set of invented vocabulary, from which they extract a phonemic inventory and set of phonotactics, as in Anderson et al. (2020). Student feedback at the end of the semester was valuable. One student suggested working with other students' languages to create words and phrases in accordance with the specified rules. This activity would enrich collaborative experiences in the course (see Johnson and

Johnson 2018, Lombardi et al. 2021), and likely also serve to refine students' aptitude with phonological rules.

I began the course by asking students to imagine speakers for their language, to describe a geographic space in which they live, and to envision what they wanted their language to sound like. We discussed connections between language and culture as a way to get inside the speakers' mental space. The purpose was to situate the language within a community of speakers and to prompt vocabulary selection, but we did not carry this line of inquiry far. Incorporating a sociolinguistics component could enrich a conlang course, by asking students to explore connections between language and social identity and by explicitly addressing the potential influence of real-world language ideologies on the construction of a language. Indeed, in asking students to select sounds by identifying specific linguistic influences, there is a risk of the language creator encoding their attitudes toward the speakers of those languages into the invented system. The course I taught introduced a range of sound systems, from which students identified and extracted patterns that informed their own system. In a class with less experienced students who need to learn fundamental linguistics concepts, a sociolinguistic unit may be too much to incorporate within a single semester. As such, a more fully developed sociolinguistic unit may be better suited for an advanced conlang course. Nevertheless, a discussion of ideology in the creation of a language could aptly frame an introductory course by encouraging students to ground their conlang more realistically and thoughtfully in its speakers and also to prompt consideration of their own language ideologies so that they carefully consider why, for example, they might be inclined to choose particular sounds to form a sound inventory for a society of warriors.

All students, at the end of the semester, wanted more. Not all wanted the same thing, but many of the concepts they expressed interest in were more advanced and would have been impossible to include as an instructional unit within the constraints of a single semester. Two students wanted tone, three students wanted to explore the influence of culture on semantics, and three students wanted more pragmatics. One student expressed interest in tracking historical change across multiple dimensions of language, including phonology and meaning. The fact that students were eager to learn more about concepts in linguistics, which they could identify by name, suggests that constructing a language in a project-based curriculum effectively introduced them to the material and instilled in them an enthusiasm to pursue the field further.

Student performance and engagement in this project-based course support the use of constructed languages as a pedagogical tool in linguistics. Compared with standard introductory linguistics courses, a course organized around an ongoing language construction project builds in focused problem-solving opportunities and processual thinking, where students learn phonology from the inside out. This leads students to a comprehensive understanding of core areas in linguistics and generates interest in topics beyond class material. Future research in this area should begin with a structured comparison of goals and assessment strategies in constructed language and introductory linguistics courses, in order to quantify learning, identify successful techniques, and build on the present observations.

References

- Anderson, Skye J., Shannon T. Bischoff, Jeffrey Punske, and Amy V. Fountain. 2020. Learning about language through language invention. In *Language invention in linguistics pedagogy*, ed. Jeffrey Punske, Nathan Sanders, and Amy V. Fountain, 208–238. Oxford: Oxford University Press. <https://doi.org/10.1093/oso/9780198829874.003.0013>
- Arthurs, Leilani A., and Bailey Zo Kreager. 2017. An integrative review of in-class activities that enable active learning in college science classroom settings. *International Journal of Science Education* 39(15): 2073–2091. <https://doi.org/10.1080/09500693.2017.1363925>
- Berry, James A. 2020. Teaching invented languages as an introductory course. In *Language invention in linguistics pedagogy*, ed. Jeffrey Punske, Nathan Sanders, and Amy V. Fountain, 125–136. Oxford: Oxford University Press. <https://doi.org/10.1093/oso/9780198829874.003.0009>
- Blumenfeld, Phyllis C., Elliot Soloway, Ronald W. Marx, Joseph S. Krajcik, Mark Guzdial, and Annemarie Palincsar. 1991. Motivating project-based learning: Sustaining the doing, supporting the learning. *Educational Psychologist* 26(3–4): 369–398. <https://doi.org/10.1080/00461520.1991.9653139>
- Brame, Cynthia J. 2016. Active learning. *Vanderbilt University Center for Teaching*. <https://cft.vanderbilt.edu/guides-sub-pages/active-learning/>.
- Carpenter, Angela C. 2020. Teaching invented languages to the undergraduate major: A capstone course. In *Language invention in linguistics pedagogy*, ed. Jeffrey Punske, Nathan Sanders, and Amy V. Fountain, 107–124. Oxford: Oxford University Press. <https://doi.org/10.1093/oso/9780198829874.003.0008>
- Dryer, Matthew S., and Haspelmath, Martin, eds. 2013. *WALS Online* (v2020.3). <https://wals.info/>
- Felder, Richard M., and Rebecca Brent. 2009. Active learning: An introduction. *American Society for Quality Higher Education Brief* 2(4): 1–5.
- Gillon, Carrie, Edward Delmonico, Randi Martinez, and Spencer Morrell. 2020. Bringing language construction from the classroom to the community. In *Language invention in linguistics pedagogy*, ed. Jeffrey Punske, Nathan Sanders, and Amy V. Fountain, 137–168. Oxford: Oxford University Press. <https://doi.org/10.1093/oso/9780198829874.003.0010>
- Goodall, Grant. 2020. The design(ing) of language. In *Language invention in linguistics pedagogy*, ed. Jeffrey Punske, Nathan Sanders, and Amy V. Fountain, 69–85. Oxford: Oxford University Press. <https://doi.org/10.1093/oso/9780198829874.003.0006>
- Helle, Laura, Päivi Tynjälä, and Erkki Olkinuora. 2006. Project-based learning in post-secondary education: Theory, practice and rubber sling shots. *Higher Education* 51(2): 287–314. <https://doi.org/10.1007/s10734-004-6386-5>
- Index Diachronica*. 2016. <https://chridd.nfshost.com/diachronica/index-diachronica.pdf>
- Johnson, David W. and Johnson, Roger T. 2018. Cooperative learning: The foundation for active learning. In *Active learning: Beyond the future*, ed. Silvio Manuel Brito. London: IntechOpen. <https://doi.org/10.5772/intechopen.81086>
- Kokotsaki, Dimitra, Victoria Menzies, and Andy Wiggins. 2016. Project-based learning: A review of the literature. *Improving Schools* 19(3): 267–277. <https://doi.org/10.1177/1365480216659733>
- Krajcik, Joseph S., and Phyllis C. Blumenfeld. 2005. Project-based learning. In *The Cambridge handbook of the learning sciences*, ed. R. Keith Sawyer, 317–334. Cambridge: Cambridge University Press. <https://doi.org/10.1017/CBO9780511816833.020>
- Lombardi, Doug, Thomas F. Shipley, Astronomy Team, Biology Team, Chemistry Team, Engineering Team, Geography Team, Geoscience Team, and Physics Team. 2021. The curious construct of active learning. *Psychological Science in the Public Interest* 22(1): 8–43. <https://doi.org/10.1177/1529100620973974>
- Mejzlik, Petr. 2018. *Awkwords*. <https://github.com/nai888/awkwords>
- Okrent, Arika. 2010. *In the land of invented languages: Adventures in linguistic creativity, madness, and genius*. New York: Spiegel & Grau.
- Pearson, Matt. 2020. Using language invention to teach typology and cross-linguistic universals. In *Language invention in linguistics pedagogy*, ed. Jeffrey Punske, Nathan Sanders, and Amy V. Fountain, 86–106. Oxford: Oxford University Press. <https://doi.org/10.1093/oso/9780198829874.003.0007>
- Peterson, David J. 2015. *The art of language invention: From horse-lords to dark elves to sand worms, the words behind world-building*. New York: Penguin.

- Punske, Jeffrey, Nathan Sanders, and Amy V. Fountain**, eds. 2020. *Language invention in linguistics pedagogy*. Oxford: Oxford University Press. <https://doi.org/10.1093/oso/9780198829874.001.0001>
- Rosenfelder, Mark**. 2010. *The language construction kit*. Chicago: Yonagu Books.
- Rosenfelder, Mark**. 2012. *Gen*. <https://www.zompist.com/gen.html>
- Sanders, Nathan**. 2016. Constructed languages in the classroom. *Language* 92(3): e192–e204. <https://doi.org/10.1353/lan.2016.0055>
- Sanders, Nathan and Christine Schreyer**. 2020. The interdisciplinarity of conlangs: Moving beyond linguistics. In *Language invention in linguistics pedagogy*, ed. Jeffrey Punske, Nathan Sanders, and Amy V. Fountain, 169–185. Oxford: Oxford University Press. <https://doi.org/10.1093/oso/9780198829874.003.0011>

Cite this article: Sowers-Wills S (2024). Phonology from the Inside Out: Constructed Language as a Pedagogical Tool. *Canadian Journal of Linguistics/Revue canadienne de linguistique* 1–26. <https://doi.org/10.1017/cnj.2024.21>