

Teaching Higher-Order Critical Thinking Skills through Linguistics

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Abstract: Due to their scientific nature, courses in linguistics present a unique opportunity to teach higher-order thinking skills in the classroom and encourage students to interact and think critically about the material. In the present study, two courses of field methods for advanced undergraduate linguistics students were designed to target and both formally and informally assess the students' ability to understand, apply, and synthesize information. In both courses, the students showed marked improvement in their ability to use higher-order thinking skills to identify, analyze, and report information on a language unfamiliar to them.

Field Methods: Higher-Order Thinking Skills; Haya.

1. INTRODUCTION

During the academic years 2011-2012 and 2013-2014, I participated in a Faculty Learning Community¹ (FLC) at Stephen F. Austin State University. The program was run through the Office of High-Impact Practices as part of the Quality Enhancement Plan. The goal of both FLCs was to give instructors from different disciplines (we had about 16 participants each time with representatives from nearly all six colleges on campus) a forum to discuss and implement higher-order thinking skills (HOTS) and Mentoring Undergraduate Scholarship (MUGS) in their classrooms. It became clear that many of us were already doing this in various forms, but the FLC was a great opportunity to formalize the process and share ideas applicable across disciplines. In the fall semesters, we met biweekly and discussed elements of high-impact practices (HIP) and HOTS in order to formulate an implementation plan for an upper-division course in the spring that would allow us to teach and evaluate HOTS. In the spring semesters, we met periodically to discuss how our implementation was going. Both times, I implemented in a 400-level advanced linguistics course with a topic of field methods, which was a great opportunity for the students to learn higher-order thinking skills in linguistics.

My teaching philosophy has been informed by my years spent teaching Italian, French, and Spanish and, for the last five years, linguistics. What I have noticed in my teaching career is that students rarely go beyond rote memorization and a basic understating of the content matter. I feel that many students take the approach, "Just let me know what is on the test and how to answer it." In all my classes, my grades are based off take-home assignments, which test critical thinking and synthesis of information. I take the following approach to learning: rote, understanding, application, and synthesis. My goal has been to promote each step to all my students. For example, students in phonetics need to know that the sound /p/ is classified as a voiceless bilabial stop and that the sound /b/ is a voiced bilabial stop knowing that this information is the rote component. For understanding, they need to know what the terms mean: bilabial means the sound is articulated between the lips, voiced/voiceless refers to the state of the vocal folds, and a stop is a sound in which there is a full occlusion of two of the articulators. An example of application is students' ability to hear the sound /p/ and transcribe it as in the word /pit/ 'pit'. Moving on to synthesis, students apply the above, critically realizing that the words /pit/ and /bit/ differ in only one sound (and in only one feature of that sound), which occurs in the same linear plane in the word and constitutes a minimal pair in English as the words *pit* and *bit* hold different meanings. Once we move on to other units,

¹ For more on Faculty Learning Communities, see Cox (2004).

they need to rely on synthesis to carry over what they learn above to other areas of linguistics such as phonology and morphology.

For both classes, the students were all linguistics minors who had taken Introduction to Linguistics (which I teach every semester). Both classes were rather small in size--15 in Spring 2012 and 10 in Spring 2014. As part of the FLC, we were able to apply for an implementation grant through the QEP, which allowed me to compensate a speaker for a field methods course. I called the Office of International Programs in search of a speaker of a language that would be suitable for an undergraduate field methods course (of which there are not many). They had speakers of Mandarin, Arabic, Turkish, and a speaker of Swahili and Haya, a Niger-Congo language spoken in Tanzania, which I was not familiar with². Although Haya is spoken by roughly one million people, there is relatively little published on it which makes it a unique opportunity for young scholars to make a novel contribution to linguistics; however, Haya is tonal (meaning that rising and falling tones on the vowels can change the meaning), which doesn't make it an ideal candidate for an undergraduate field methods course. I then presented it to the students explaining that they could choose between a well-documented language (Swahili) and a language from the same family that was under-documented and typologically more difficult for English speakers. The advantage to the first choice was that we could verify their results in the literature (although any research outside of class on the language during elicitation was prohibited). Interestingly, both classes (near unanimously) chose the more difficult, less-documented language when presented with the options on the first day.

Along with the language choice, on the first day I covered the syllabus and a few basic ground rules. We covered the IRB-H form that I had filled out regarding research involving humans, and I explained its importance to them. I explained that I was there to facilitate the course while they took turns eliciting data from our speaker (usually 15-20 minutes each). They were told that no outside research was permitted once they learned more about the language, but research about the language family was acceptable so that students could independently find linguistic phenomena that they might expect in a language based on others in the family. I explained the importance of taking good notes and writing in the International Phonetic Alphabet (IPA), especially since they didn't even know the language has a writing system. We also discussed the rights of the speaker; if she did not want to provide a word or phrase, it stopped there and that was the end of it. In some cultures, certain words or stories can't be told to outsiders or can only be told at a certain time (day, night, or a particular season). I explained that the lectures would be recorded so they could go back and listen to them and, finally, that collaboration was highly encouraged.

The first day with the speaker, I modeled an elicitation session. I introduced myself to the speaker and asked her to tell me in Haya how her weekend was. This allowed us to "tune our ears" to Haya. At first, the students found it pointless stating, "We have no idea what she is saying," but they quickly saw the point that if all we were after was sounds, it is all that we needed. I then asked the speaker if she would please give me the word in Haya for 'dog'. The students were quite nervous as they did not know if the speaker was going to speak English and, if so, how well. We had discussed the possibility that we may need to learn to use a contact language such as French, Swahili, or Spanish in order to communicate. The speaker responded *embwa*. I asked her if she could please repeat it: *embwa*. I said it out loud to her to make sure I had heard it correctly; she nodded in approval. I then asked if she could use it in a sentence. I explained my thought process out loud to the students: I wanted to see if the word's pronunciation changed in fast speech, but I was not interested in the meaning of each word in the sentence. Finally, I asked if anyone else needed the word repeated. The modeled elicitation was the expected format for the rest of the semester; I suggested the students begin with concrete nouns (and pointed them to the Swadesh list), but they were free to try out their own ideas or continue on the path of the students who elicited before them.

The course was divided into three sections of five weeks. During the first five weeks, their sole goal was to elicit words with the intent of learning what sounds were in the language since the sound inventory in Haya is not the same as in English; sounds which exist in Haya do not occur in English and sounds which exist in English are absent in Haya. The students relied on HOTS to develop a heuristic to obtain the information they needed. For the first part of the course, nothing was written on the board--students only transcribed what they heard and did not know if Haya even had a writing system. Eventually, they began to see patterns in meaning emerge. For example, students started to notice that if a word in

² Funding for the Haya speaker in both field methods courses was conducted under implementation grants from the Stephen F. Austin State University Office of High-Impact Practices Quality Enhancement Plan. Subsequent research on Haya was conducted under a grant from the Stephen F. Austin State University Research Enhancement Program.

Haya began in *om-* as in *omukazi* ‘woman’, the plural would begin in *aba-* as in *abakazi* ‘women’. These patterns were the focus of the next five weeks.

During the second part of the course, students were tasked to discover how words and sentences are formed in Haya. At this point, the students were allowed to write on the board during elicitation. During the first part of the course, students had already elicited some plural forms and were fascinated to find that not only is Haya pluralization accomplished with prefixes, but the prefixes change based on the word’s noun class. For example, ‘humans’ are in one noun class, ‘plants’ in another, ‘animals’ in another. In Haya, there are 18 of these classes. The students were able to recognize patterns with a bit of guidance and form hypothesis to test. For example, once they learned how to pluralize the category ‘humans’ (the prefix *om-* becomes *aba*), they asked for the word for ‘child’, *omwana*, and then, rather than asking the speaker for the form, asked the speaker if *abaana* meant ‘children’ thus confirming their hypothesis. Students also asked how to say ‘one X’ as in ‘one dog’: *embwa emo*. From this they hypothesized two things: 1) That in Haya, the word for ‘one’ follows the noun, and 2) Depending on the noun class, the word for ‘one’ changes e.g., *obuso bumo* ‘one face’, *omutwe gumo* ‘one head’ (this told them that ‘face’ and ‘head’ were not likely in the same noun class), *ekifuro kimo* ‘one elephant’, and *ebungo limo* ‘one kiwi’.

What the students did not know is that some of the words are being influenced by sounds (as in English where ‘a’ is used before words which begin with a vowel and ‘an’ before words which begin with a consonant). It was also interesting to see that even though we had “moved on” from eliciting solely sounds, the students were still coming across examples of phonological processes in the language (one such mystery they never seemed to solve was the use of /l/ and /r/, which in many languages including Haya, can be seemingly be used interchangeably).

Students then turned their attention to word order. I gave them some guidance here recommending they use transitive verbs (i.e., ones which can normally take a direct object) and use names rather than pronouns. The first sentence they asked for was “Chris sees Steve” to which the speaker responded *Krisi nabona Steve*. This led them to the hypothesis that, like English, Haya was a (S)ubject (V)erb (O)bject language. However, many of them immediately wanted to dig further to see if unlike English, other orders were possible. They asked the speaker, “Can I say **Nabona Krisi Steve*?” to which the speaker replied “No.” They continued the elicitations during the second part of the course by choosing from a list of suggested topics that I provided. The students examined how possession is accomplished, how sentences are negated, and how to form past and future tense (they were able with a bit of help to discover that Haya has two of each: one past tense for events earlier in the same day and another for events prior to sunrise the same day).

For the final part of the course, the students were given a story in Haya (she gave them a folktale), and they translated it one sentence at a time pulling as much information out of each as they could. This served two purposes: The first was to expose them to structures in the natural language and the second was to show them how culture and language are inseparable. The first class was given a story about a cheetah who stole a child who was wandering alone from a village, and the second class was given a story about a crow (in Haya, animals are often metaphorical for people) who in anger, walked away from dowry negotiations for a woman only to have his friend, dove, negotiate and receive the family’s blessing to begin to court the woman. The moral in the first case is the importance of sticking together. The moral in the second case is what happens when one acts in anger. From both stories, the students not only learned a great deal about the language through a longer, more complex narrative, but also Haya culture.

The students were both formally and informally assessed³ at each stage in the course. What is interesting about the process is that while I am familiar with the typological features of other languages in the same family as Haya, I myself had not worked with Haya when I taught the class in the spring of 2012. With the second group in the spring of 2014, I had to be very careful to stick to assessing what that particular class had elicited and not refer to the last class or two years of researching Haya with the speaker on my own. During the first stage, the students were formally assessed by submitting a chart showing the sounds they had heard in Haya and an example of that sound in initial, medial, and final positions. They were also asked to provide an IPA chart with the phonemes they had found in Haya. Figure 1 below is a student’s list of the sounds he or she had identified in Haya and Figure 2 shows the sounds placed into the IPA chart.

³ For more about assessment, see Kumar (2013), McMillian and Hearne (2008), and Bensley and Murtaf (2012).

| Phoneme | Initial | Medial | Final |
|---------|--------------------------|--------------------------|-------|
| /p/ | ----- | ninpulia 'I feel (cold)' | ----- |
| /b/ | bibili 'two (hands)' | ibili 'two' | ----- |
| /t/ | tatazara 'father-in-law' | ente 'cow' | ----- |
| /d/ | ----- | edu:ka 'store' | ----- |
| /k/ | kileki 'today' | akato 'kitten' | ----- |
| /g/ | gajgi 'many (stores)' | mukaga 'six' | ----- |
| /m/ | mukaga 'six' | embwa 'dog' | ----- |
| /n/ | ninkwenda 'I love you' | abantu 'people' | ----- |
| /ɲ/ | ɲegoro 'yesterday' | ekijoji 'bird' | ----- |
| /f/ | ----- | ɛɲfuru 'fish' | ----- |
| /s/ | ----- | ahansi 'ground' | ----- |
| /z/ | ziŋgi 'many (dogs)' | omukazi 'woman' | ----- |
| /ʃ/ | ʃubamɔ 'please' | ifætu 'three' | ----- |
| /h/ | ----- | ahansi 'ground' | ----- |
| /j/ | jobuino 'pen' | ɛɲjandʒa 'ocean' | ----- |
| /l/ | ----- | omulilo 'fire' | ----- |
| /w/ | wakola 'thank you' | mawe 'mother' | ----- |
| /dʒ/ | ----- | ɛɲjandʒa 'ocean' | ----- |
| /tʃ/ | tʃer 'no' | ɛɲfuma 'wood' | ----- |

Figure 1: Student Example of Phonemes in Haya and Example Words

| | Bilabial | Labiodental | Alveolar | Post Alveolar | Palatal | Velar | Glottal |
|--------------|----------|-------------|----------|---------------|---------|-------|---------|
| Plosive | p b | | t d | | | k g | |
| Nasal | m | [ɲ] | n | | ɲ | [ŋ] | |
| Trill | | | [r] | | | | |
| Tap | | | [ɾ] | | | | |
| Fricative | | f | s z | ʃ | | | h |
| Affricate | | | tʃ dʒ | | | | |
| Approximant | | | | | j | | |
| Lateral App. | | | l | | | | |
| Glide | w | | | | | | |

Figure 2: Student Example of Haya Sounds in an IPA chart

The first piece of content I was looking for in the assessment was whether the major sounds we had heard numerous times were present. Most students were able to identify the sounds found in Figure 2 above all of which are sounds in Haya. There were two sounds that we encountered in Haya that no student was able to identify: a voiceless palatal and voiced palatal plosive. These sounds don't occur in English, so the students heard various English equivalents in their places.

In terms of vowels, Haya has a five-vowel system shown in Figure 3.

| | Front | Mid | Back |
|------|-------|-----|------|
| High | i | | u |
| Mid | e | | o |
| Low | | a | |

Figure 3: Vowels in Haya

No student correctly identified the vowel system (most had between 7 and 9 vowels, not including diphthongs) because vowels are not articulated at the same place in all languages (for example in Haya the /e/ is lower and more back than in English, so many students heard /ɛ/). In terms of phonology (how sounds interact), all students were able to identify that in the vowel system vowels can be lengthened (which can change a word's meaning).

They also made observations as in Figure 2; the sounds in square brackets are sounds the students believed to be the result of sounds coming into contact (e.g., a very common process they saw was an /m/ before a /b/ assimilating to [mj]). There are also some basic observations that I expected the students to note. In looking at Figure 1, Haya does not allow consonants to occur at the end of words. Haya is a tonal language (e.g., /munana/ ‘eight’ and /munána/ ‘a type of root’), and I expected students to make some mention of this fact. Some students were able to identify words where a tone was present, but they weren’t sure which tone. Haya has three tones: a rising, a high, and a level. I asked the students to explain how they would continue research on sounds. Students also made observations of the stress patterns in Haya: the stress in Haya usually occurs on the penultimate syllable as in the word /amabáti/ ‘steel’ or /ebitó:ke/ ‘banana.’ Students also observed that vowel length was phonemic (i.e., changes meaning) as in /enjúe:ra/ ‘butterfly’ and another word, which the speaker declined to translate /enjúera/. The final portion of the assessment was for the students to provide a short narrative of how they would continue elicitation. Many students mentioned more work with /l/ and /r/, learning the tonal system, and looking to fill gaps (e.g., in Figure 2 often times sounds come in pairs; students wanted to search for a /v/ to complement /f/).

For the second stage of the course assessment, students were asked to provide information about word and sentence formation in Haya. Haya accomplishes negation by altering prefixes attached to the root verb. This is demonstrated by a student’s assessment in Figure 4 below with his/her accompanying explanation:

| | |
|----------------|--------------------|
| Nin-tambuka | Tin-ku-tambuka |
| 1s.pres-walk | neg.1s.pres-walk |
| No-tambuka | To-liku-tambuka |
| 2s.pres-walk | neg.2s.pres-walk |
| Na-tambuka | Ta-liku-tambuka |
| 3s.pres-walk | neg.3s.pres-walk |
| Nitu-tambuka | Titu-liku-tambuka |
| 1.pl.pres-walk | neg.1.pl.pres-walk |
| Nimu-tambuka | Timu-liku-tambuka |
| 2.pl.pres-walk | neg.2.pl.pres-walk |

Figure 4: Student Example of How Haya Negation is Accomplished

These examples show the multiple prefixes that Haya uses for negation. In the present tense, Haya changes the initial ‘n’ to a ‘t,’ and also adds on the ‘ku’ or ‘liku’ affix.

The student reported that data that he/she had. In the Spring 2014 section of the course, the students discovered that the *ku* affix carries the meaning of ‘to begin to’ and is attached to action verbs. *Nintambuka* could be translated, therefore, as ‘I began to walk’. On assessment two, I also began to take into account the students’ elicitation methods. For example, after gathering the data in Figure 4, many students would test their hypotheses. They had seen *nabona* ‘he/she sees’, so they asked the speaker if *ninbona* was ‘I see’ and **tinkubona* was ‘I don’t see’. In the first case, the speaker replied that was correct; in the latter, she corrected the form to *tinbona* (since it is not a verb of motion, the *ku* affix cannot be applied. The students also reanalyzed *nabona* and understanding that *na* is a prefix indicating ‘he’ or ‘she’, that the verb carries the marker of the subject (e.g., in *Krisi nabona Steve*, *na* is affixed to the verb due to the subject *Krisi*). When the students changed the subject to something non-human, for example, *Embwa nebona Krisi*, they discovered that Haya uses a different prefix when the subject is non-human.

For the final stage, the students provided a word-by-word gloss and translation along with any observations they had regarding that particular sentence as in Figure 5:

| | | | | |
|---|-------|-----------|--------------------|-------|
| omwana | mwojo | ogwo | ni-kwo yalokok-ire | atyo. |
| child | boy | boy child | he-how rescue-PAST | that |
| ‘That is how the little boy was rescued.’ | | | | |

Figure 5: Student Gloss of a Line of the Folktale and Observations

The multiple names for the boy in this section are shown as *omwana mwojo ogwo*, which directly translates to ‘child boy boy-child.’ This could signify a formal title for the character, since he is the main focus of the story and this sentence in particular. Also, the presence of the interrogative suffix [-kwo] on *nikwo* shows a similarity to other interrogatives present

in SECTION 3. In addition, *yalokokire* contains the past tense suffix [-ire] that is different than the historical past shown throughout the rest of the tale, because the narrator is directly addressing the audience in the present. It is interesting to compare the presence of the demonstrative *atyo* ‘that’ appears at the end of the sentence, unlike in English.

During weeks 3, 8, and 14 a non-graded informal assessment was performed to evaluate and track the progress of the students’ higher-order thinking skills. For each assessment, I took into account both a written artifact from the students (e.g., a few pages of their notes and a summary of what they had found to date) as well as their performance in the classroom (e.g., how they elicited). Some students when faced with an aberration in the data would just move on while others would probe further to see if they could formulate a hypothesis. The students also had to come up with inventive ways to elicit data. For example, a very common occurrence in field methods is pronoun reversal. If a speaker is asked, ‘How do you say *I am sick*’ in a language, we don’t know if he/she will answer in the 1st person (which is what we are looking for), or, with the 2nd person (because he/she believes that we are asking us to address them). Looking above, if we ask a speaker how to say *I see*, the answer we are looking for is *ninbona* ‘I see’ rather than *nobona* ‘You see’. The students were scored on a scale of 1-4 (4 being the highest) in four categories using the following rubric in Figure 6:

| | Capstone 4 | Milestone 3 | Milestone 2 | Benchmark 1 |
|-----------------------------|---|---|--|---|
| Organization and Evaluation | Evidence is well-organized and multiple viewpoints are presented in depth | Evidence is organized and multiple viewpoints are presented | Evidence is somewhat organized and multiple viewpoints may be presented | Unorganized evidence and only one viewpoint is presented |
| Problem Solving | A clear heuristic is presented as well as evidence of reevaluation is presented and multiple, novel connections are made | A clear heuristic is presented and multiple, novel connections are made | Considers more than once approach to solve a problem and makes novel connections | Relies on intuition alone to solve a problem and/or does not recognize connections |
| Support of Findings | Information is presented with an abundance of supporting evidence and a clear connection between the claim and evidence | Information is presented with supporting evidence and a clear connection between the claim and evidence | Information is presented with supporting evidence | Information is presented as fact without question |
| Communication of Content | Issue/problem is clearly stated and described comprehensively and supporting analysis significantly supports the conclusion | Issue/problem is clearly stated and supporting analysis is included | Issue/problem is stated but may be impeded by omissions and analysis may or may not be present | Issue/problem is stated without clarification or description and offers little or no evidence or analysis |

Figure 6: Rubric Used to Score Informal Assessments

The maximum score a student could receive was 16 and the minimum was 4. Scores of .5 were given due to the subjectivity of the rubric. Both classes (25 student’s total) patterned nearly identically, so they will be addressed together. On informal assessment one (sounds), the average score was 7.5. For informal assessment two (word and sentence formation), the average score was 10.5. For informal assessment 3 (the story and translation) the average score was 13. In both classes, the area which showed the most improvement was problem solving with support of findings showing closely behind. Students became increasingly skilled at developing skills to elicit the information they sought, form a hypothesis, verify that hypothesis, and present that hypothesis to their classmates so that it was subject to falsification. There was also a great deal of improvement from the first to the third assessment in supporting their findings. At first, many students would present their findings as fact and offered one or two examples from the elicitation data for support. In the later

assessments, students would present their findings with numerous examples (including aberrations in the data) and offered alternative solutions to explain the data. The area in which the least improvement was demonstrated was organization and evaluation. Students seemed to struggle with organizing data. Many of them stated their hypothesis and presented data to support it; however, while explaining the connection they would often jump to a different conclusion that they lacked evidence for and explain how they would elicit for it. For example, a student would present something similar to Figure 4 above and then explain how he/she believed that Haya would mark the past tense (based on very limited data) and how it could be elicited. I addressed this in class recommending that the students ask themselves with each example or comment how it related to the hypothesis being presented.

The formal and informal assessments indicate that as the semester progressed in both courses, students' HOTS improved. In addition to understand, applying, and synthesizing information, students improved at the following tasks associated with HOTS:

- 1) Apply a rule: Students were able to negate present tense verbs in Haya
- 2) Demonstrate: Students were able to elicit data from the speaker
- 3) Distinguish: Students were able to recognize a hypothesis with adequate support from one that lacked adequate support
- 4) Evaluate: Students were able to examine at several hypotheses and determine which presented the most merit
- 5) Interpret: Students were able to recognize patterns in the data
- 6) Predict: Once a pattern was discovered, students were apply to apply it to a novel form

Through the incorporation of strategic assessments designed to measure student aptitude on assignments completed throughout the semester, I was able to better monitor student progress and target strategies for incorporating HOTS into the classroom. The students' work showed higher levels of HOTS as the semester continued; not only could I see the higher performance on assessments, but students also commented on their own progress in the course evaluations. One student wrote that the course "encourages critical, higher-level thinking skills, and for students to discover, explore, think for themselves, and almost even teach themselves," which illustrates my goal for students to become more active in the learning process. Several students noted that the course aided them in analytical skills, as well as teamwork skills since so many aspects of the course required students to work together as one collaborative group.

These strategies can be incorporated into any collegiate course to better encourage student participation, involvement, and lifelong learning. One student's comments on the course evaluations perhaps best sums this up: "the skills, more-so even than the information, learned in this class...transfer to many aspects of life that will be of benefit in the work world or in graduate school. These include teamwork, analysis, critical thinking, and cultural awareness." The ultimate goal of implementing strategies to increase HOTS is not to help students in a single course but to help them become lifelong learners.

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