Academic English and Language-Related Technology

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Utilizing the framework of educational linguistics, we investigate ways to foster greater awareness of, and facility with, academic English for educators and students across disciplines by maximizing the popularity of language-related software packages, applications and websites, those already commonly found in and out of the classroom. Our work examines such technology to uncover assumptions made about language by these programs and thereby heightening meta-linguistic knowledge for educators and students, an awareness that can lead to more reflective and informed teaching and learning with–and about–academic English. At a time of growing linguistic diversity in our classrooms, and with the expanded pedagogical use of technology in higher education, linguistics and technology need to join forces.

Two Growing Trends in the Higher Education Classroom: Linguistic Diversity and Technology-Based Pedagogy

Academic English (also called academic discourse and academic register) is the required form of English in higher education, one largely founded on Standard English (Behrens, 2014; Zwiers, 2008). However, there are many obstacles to fluency that students face when they enter college. Primarily, academic English is a type of "invisible criterion," for it is rarely taught, or even overtly discussed (Zwiers, 2008). Therefore, students must conform to a type of English that is not well defined for them. In fact, Behrens, Johnson, Allard, and Caroli (in press) fault instructors for working on a type of "I know it when I see it" approach when they evaluate how academic is the writing of college students.

Another obstacle facing students is that academic English is not a form of English spoken or written outside of the world of education, i.e., no one really uses it at home (Snow & Uccelli, 2009; Wheeler & Swords, 2006). Students enrolled in developmental English courses, then, confront a form of English that might well seem unfamiliar, even unnatural (cf. Clark, 2013). Finally, academic English differs in substantial ways from the language that students are expected to produce in high school (Lenhart, Arafeh, Smith, & McGill, 2008). Both may be based on Standard English, but higher education demands a denser syntax with, for example, more embedded clauses; a higher degree of explicitness; more formal vocabulary; and specialized, often Greek or Latin-based terms (Swales, 2001; Wilkinson & Silliman, 2012).

To complicate the picture, today's college students represent a greater range of English diversity than ever before: more varieties of accents, dialects, and discourse traits (Behrens & Mercer, 2011; Behrens & Sperling, 2010; Canagarajah, 2006; Horner & Trimbur, 2002). With students using more varied speech and syntax, one would think that the bias toward Standard English in higher education would be called into question. Standard English, however, continues to remain the unchallenged model for the English used in academia (Schleppegrell, 2012; Zwiers, 2008).

Behrens (2012) addresses this problem in higher education, claiming that all professors (and students) should have a more overt (metalinguistic) awareness of English as it relates to the nature of academic discourse. Further, Reaser (2010) argues that the principles of linguistics should be incorporated into college classrooms beyond those in composition or English, such as courses in the social sciences.

Our work applies linguistic principles to the study of student learning. Specifically, we adhere to the mission of linguistics to uncover speakers' internal knowledge of the structure and use of language, including the grammar of non-standard dialects (e.g., Charity Hudley & Mallinson, 2011). Further, as do educational linguists, we acknowledge that our work resides in a real world context (education) that values a particular dialect of English over others (Green, 2009; Lindblom, 2006). We believe a more overt, metalinguistic approach to teaching about the English expected in college would be beneficial to all students. The goal here is to approach academic English from a more overt understanding of how language works. To help achieve this goal, we further believe that faculty can make good use of the comfortable placement of technology in our lives, both social and pedagogical (Fillion, Limayem, Laferriere & Mantha, 2009). Many technologies that are commonly available for smart phones, tablets, and laptops are being employed as both teaching tools and research

and study tools used by our students (Lotherington & Ronda, 2012). This agenda of heightened linguistic awareness can, we believe, be pursued using language technology familiar to both teachers and learners.

Our work, then, exploits the intersection of two movements: a rise in linguistic diversity in higher education (with the added call for awareness of this diversity and of language in general), and the infusion of technology into our daily lives (both in and out of the classroom) to address the need for fluency in academic English. We believe that now is a perfect time for a linguistic exploration of that technology, especially of programs related to language. We can harness students' comfort level with technology and simultaneously explore how Standard English is represented, all from a metalinguistic view, with the aim of more informed teaching and learning.

Language Technology: Where is the Bias?

Squires and Queen (2011) offer a pedagogical model of employing technology to make many all-too subjective assumptions about language behavior more objective, specifically exploring social media and popular culture via linguistic tools. For example, they use speech analysis software with their students to test and challenge stereotypes of pitch patterns in gay male speech, compare grammatical structures of African American English as represented in films to data from linguistic research, and analyze Spanish language influence on English in the speech of popular Latino(a) performers.

The benefits of technology can be wider-reaching than we might realize. Munson and Babel (2002) use acoustic analysis on voices of those identifying as LGBT, moving beyond the stereotype of a single voice pitch pattern to signal identity. Cook (2004) believes that language-based technology "alters the way we interact as social beings," arguing for a more accepting society by uncovering and questioning language stereotypes (105).

Similar to the work above, we explore the relationship between language-based technology and the concept of academic English. Specifically, our work examines ways that this technology in education can uncover assumptions about Standard English (the basis of academic discourse) that are often left unspoken. We are interested in the extent to which current technology creates and reinforces standards that go unchallenged, i.e., prescriptive rules that have not kept pace with the rise of English dialects in the classroom, nor with the natural changes that occur in any language form.

We ask the following questions: What assumptions are made by this technology about correct and incorrect English? How can linguistically-based pedagogy move students toward a more informed place in order to master academic English (without losing their own language identity)? And can we make current language-based technology work for us as educators? We posit that the technology, far from being the means to, and measure of, an objective depiction of Standard English, is itself largely biased and perpetuates a rigid view of language, one not only unhelpful but potentially harmful to a student's mastery of academic discourse. Thus, we employ our linguistic training to evaluate various tablet and smart phone applications and computer software packages that are currently used by educators and students as sources of authority, to assess what is "correct" standard English in both grammar and mechanics, such as punctuation. Such exploration can lead to more overt awareness of the language demanded in higher education, which in turn can lead to deeper teaching and learning.

In terms of technology, we ask:

What grammatical patterns are considered correct?

What messages about grammar are students receiving from their technology, and how binary (right vs. wrong) is the nature of those messages?

(NB: This study is part of a larger exploration that includes speech/accent related-technology.)

Our hypothesis is that language-based technology fosters a prescriptive view of linguistic correctness; yet, it can be the very basis of an exploration and lesson in academic discourse. The workings of this technology can generate discussions, lead to comparison/contrast exercises across English dialects, and supply examples of the type of English deemed "correct" in order to explore it more closely. Both students and educators can be more empowered with this linguistic understanding.

Methodology I

Investigating Common Grammatical Errors

Instruments and Stimuli

To test how grammatical patterns are treated by grammar checking programs, we used four popular ones: GingerSoftware, Microsoft Word, GrammarBase, and PaperRater. These programs scan documents for grammatical patterns and determine what is correct and incorrect in the sentence structure.

We first introduced eight sentences, each containing one of the top eight non-standard grammatical patterns most often corrected by teachers on student papers, as reported by Noguchi (1991); see below. See Appendix A for test sentences. Note that some "errors" are those of mechanics, that is, punctuation issues.

- Run-on sentences
- Passive voice
- Sentence fragment
- Subject-verb agreement error
- Misused comma
- Misused apostrophe
- Misused period
- Which/that confusion

We tested each sentence, in writing, with each grammar checker program.

Results

Table 1 shows responses to these sentences by the four grammar checkers. A check mark in a box indicates that a grammar structure was detected as an error. The "revision" notation in a box means that the program provided its own "correct" version of what was deemed an error.

Our results demonstrate inconsistency in the different programs as to what is considered correct versus incorrect grammar. Looking by program, we find that no program identified all sentences as containing errors. MS Word came closest, flagging five out of eight sentences. Looking by error type, we find that a missing apostrophe was flagged the most often, by three of the four programs. A misplaced comma was next, flagged by two of the four programs. When a program offered a revision, it was into the standard form. Structures that were purely syntactic (i.e., passive, subject/verb agreement, and which/that substitution) seemed to be flagged slightly less often than those of mechanics.

Students who look to such technology to shape their academic writing are thus receiving inconsistent messages. While Noguchi (1991) notes that the run-on sentence is the structure most corrected by educators, it was not detected at all by these four programs as being non-standard.

Methodology II

Investigating Grammar of Non-Standard English Dialect

We next tested grammatical patterns found in a non-standard dialect of English.

Instruments and Stimuli

To test how a particular non-standard dialect of English is treated by these same programs, we tested grammatical patterns found in the most studied non-standard English dialect, African American English (AAE) (Roseberry-McKibbin, 2002). Below are six constructions we obtained from a text on non-standard grammatical forms. See Appendix B for test sentences. (Note that all of these structures are syntactic, not irregularities of mechanics.)

- Multiple negation
- Use of past participle for simple past tense verb
- Additional preposition
- Deletion of helping verb in progressive tense
- Omission of third person singular 's' marker on helping verb
- Omission of third person singular 's' marker on main verb

Results

Table 2 shows our results. A check mark indicates that a program detected an error. We see from our data that programs were inconsistent when determining what syntactic patterns were considered incorrect. Looking by program, Ginger flagged the most sentences (five out of six), while GrammarBase flagged no sentences as having grammar errors. Looking by grammatical structure, sen-

Table 1. Responses to Sentence Errors with Four Grammar Checkers

	Run-On Sentence	Passive	Fragment	Sub→Verb Agreement	Comma	Apostrophe	Period	Which vs. That
Ginger gingersoftware.com					✓	✓		
MSWord Microsoft Office 2010: Microsoft Word			✓	✓		✓R	✓R	✓R
Grammar Base grammarbase.com		✓						
Paper Rater paperrater.com (powered by Ginger)*					✓	✓		

✓ – Program detected a grammatical error
R – Suggestion was provided to correct the error

tences with multiple negation, helping verb omission and uninflected helping verb were flagged by more programs than were the other constructions. Uninflected third person singular present tense was flagged the least, by only one program. No one particular error was detected by all programs, largely due to GrammarBase's acceptance of all structures. All revisions changed the sentences to the same Standard English form.

Further, comparing data in Table 2 to Table 1, we see that AAE structures are called into question more often, by more programs, than the prior set of sentences containing a mix of syntactic and mechanical irregularities. Three verb phrase constructions in our AAE data--past participle for simple past, helping verb omission, and absence of third person 's'—are similar to the subject/verb agreement error of Table 1. The AAE constructions were flagged 50%, 75%, and 25% of the time (respectively) as errors; the corresponding error in the first set of sentences was only singled out by one program. We take note that the same error seems to be considered more linguistically irregular when represented in the context of AAE.

These two analyses of grammar show that the four grammar checking programs overall demonstrate inconsistency in noting grammar errors. In addition, each takes an all-or-none, right-or-wrong approach, failing to capture or convey the nuances of dialectal differences, without allowing students to understand the reason behind a determination, i.e., offering no explanation. Students, who often rely on such technology to "smooth out" their grammar for academic assignments, thus receive mixed messages about what is grammatical.

Limitations

Our study has the following limitations. First, we did not examine all grammar checkers on the market. And of those we did include, software is periodically updated, so our results are specific to these versions. Secondly, we did not examine other dialects of English beyond AAE. Nor did we investigate less common grammar issues or other aspects of language such as speech patterns. Further research can explore such mechanics as spelling via Word's spell check system and autocorrect programs. Finally, in our motivation for this project, we assume that most students have access to, and make use of, these language-related technologies. Given a continuing digital divide, however, in this country, such an assumption might be an overstatement (Baron, 2008).

Conclusion

In general, language technology demonstrates a good deal of inconsistency related to grammatical variation. While the grammar of Standard English might be a hallmark of academic discourse, and the consequences for a student using non-standard grammar severe, four popular grammar checkers demonstrated a great deal of variation in their criteria of correctness. These findings suggest a failure of technology to validate linguistic variation, especially with written English grammar associated with academic usage.

Grammar checkers have been found wanting in previous investigations. McGee and Ericsson (2002) show a programmed bias against the passive voice to the point of absurdity with the checker in Microsoft Word: The sentence *Bill was left on the side of the road* is "corrected" to *The side of the road left Bill* (459). Zuber and Reed (1993), over 20 years ago, questioned the authority of the premier technology at the time—grammars—saying that they "promote rules of standardization outside the students' linguistic experience" (p. 518), and are too concerned with preserving language forms, as opposed to being "responsive to the variety and growth in a language" (p. 527).

Table 2 Responses to Non-Standard Dialect Errors with Four Grammar Checkers

	Ex. 1	Ex. 2	Ex. 3	Ex. 4	Ex. 5	Ex. 6
Multiple negation: She doesn't want none.						
Use of past participle: I been here.						
Additional Preposition: Where is the house at?						
Helping Verb Omission: They gonna be there.						
Uninflected Helping Verb: It do make sense.						
Uninflected Present Tense: She walk to the store.						
Ginger gingersoftware.com	✓R	✓R		✓R	✓R	✓R
MSWord Microsoft Office 2010: Microsoft Word	✓R		✓R	✓R	✓R	
Grammar Base grammarbase.com						
Paper Rater paperrater.com (powered by Ginger)*	✓R	✓R		✓R	✓R	

✓ – Program detected a grammatical error
R – Suggestion was provided to correct the error

Is today's market of apps and software any better than "authoritative" handbooks, though? Our results suggest that students will obtain from this technology information that is contradictory. Further, some structures flagged as errors actually occur in students' own speech. Thus, students' voices are not being validated (or are being revised) by technology, with no opportunity for discussion or explanation. Where, then, do students turn? To whom do they look as language authorities? Many academic publications (ironically) might not offer good writing models. Cox (2009) considers much academic discourse to be unnecessarily dense. Graff (2003) faults academics for producing prose that sounds intelligent but is actually empty. Again, where do our students turn for models and guidance?

Language technology can play a vital role in higher education by increasing metalinguistic awareness—in both students and teachers. Such an exploration is important because "youth are the vanguard of linguistic changes resulting from new technologies" (Cook, 2004: 109). Our students are leading the way in language and technology use; the more informed those students are about academic English, the better their odds of mastering the discourse and minimizing frustration. Of course, being fluent in technology does not mean one is a critical user of that technology (Lotherington & Ronda, 2012). Teachers need to explore and exploit the intersection of language use and technology in the educational setting, side by side with students. Technology can be put to better use in terms of academic English. That is the next challenge for educators.

Educational Application

The necessity of mastering academic English is a given for today's students. However, the invisible criteria of its nature can be made more visible (Zwiers, 2008). Such an endeavor allows for many classroom exercises, all of which allow educators (jointly with students) to explore and question the nature of what is deemed grammatically correct. Instead of introducing a new layer of unchallenged criteria to students assimilating to higher education, the technology can be the basis of lessons in meta-linguistic awareness.

Dunn and Lindblom (2011) pursue such an agenda in their book *Grammar Rants*. They make linguistic bias itself the basis of lessons and allow students to see the data behind assumptions of grammatical correctness. In addition, students can keep error logs, specifically recording their own aptitude with academic English using Noguchi's (1991) common error patterns. Lessons can be devised for students to compare and contrast results found across different language-related technology, and to what current usage handbooks report about academic English. They can survey their professors to tease out the subjective nature of academic style (i.e., What is personal preference vs. a rule?). Issues of what constitutes a linguistic expert can be raised and applied to courses with a research component. How does one validate a source? Ultimately, we hope that conversations happen, dialogues between students and teachers, as well as between users and their technology.

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Appendix A: Top eight grammatical errors, sentences tested, with given revisions

Run On: I love to write papers I would write one every day if I had the time.

Passive: The entire highway was paved by the crew.

Fragment: The entire stretch of highway.

Subject-Verb Agreement: The ball roll across the floor.

Which vs. That: Diamonds, that are expensive, often elicit forgiveness.

Comma: In principle these, although they were arranged differently, these sentences have the same meaning.

Period: I am going home

Apostrophe: They went to the boys house.

Revisions from MS Word

Sentence tested: I am going home

Sentence revised: I am going home.

Sentence tested: They went to the boys house.

Sentence revised: They went to the boy's house.

Sentence tested: Diamonds, that are expensive, often elicit forgiveness.

Sentence revised: Diamonds, which are expensive, often elicit forgiveness.

Appendix B: AAE sentences tested, with given revisions

Sentence 1: "She doesn't want none."

Ginger revision: She doesn't want any.

MS Word revision : She doesn't want any.

Paper Rater revision: She doesn't want any.

Sentence 2: "I been here for two hours."

Ginger revision: I have been here for two hours.

Paper Rater revision: I have been here for two hours.

Sentence 3: "Where is the house at?"

MS Word revision: Where is the house?

Sentence 4: "They gonna be there."

Ginger revision: They are going to be there.

MS Word revision: They are going to be there.

Paper Rater version: They are going to be there.

Sentence 5: "It do make sense."

Ginger revision: It does make sense.

MS Word revision: It does make sense.

Paper Rater revision: It does make sense.

Sentence 6: She walk to the store

Ginger revision: She walks to the store.

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