"Distant Reading" L2 Writing: Speculations on the Use of Macroanalysis in the ESL Classroom

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Abstract

The past decade has seen the development of an exciting new subfield of English & comparative literature studies - quantitative literary analysis. Innovators in this field bring tools from statistics and corpus linguistics to the literary arena in order to conduct the "distant reading" of thousands of works at once. Inspired by such work in the digital humanities, this study seeks to speculate on potential uses for these macroanalytic tools in the writing-focused ESL classroom. We ask, what can teachers and students of ESL learn from the quantitative analysis and visualization of L2 writing? As corpus linguistics has for decades helped to establish the best practices of English-language teaching, a variety of scholars have already begun to explore student interaction with massively large sets of texts in the ESL context. However, the idea of a digital humanities pedagogy is still very much in its formative stages, and few if any scholars have considered what such a pedagogy would look like in an L2 learning environment, where the texts in question are less artifact and more active process. Using the open-source R programming platform, this study applies a set of basic tools from the digital humanities to texts produced by international L2 learners of English currently attending a South Korean university. Using this corpus of student-produced texts, this study explores how ESL educators can employ tools such as word frequency, lexical variety, cloud visualization, and topic modeling for the diagnosis and assessment of L2 writing both in and outside the classroom. Furthermore, we discuss how students themselves might harness these tools to self-assess their own writing. This study optimistically concludes that quantitative approaches to writing analysis can effectively supplement traditional writing pedagogy to help both students and teachers reflect more on how learners understand and deploy ESL writing instruction.

Keywords: Education, ESL, writing, assessment, text analysis, distant reading

Introduction

Among ESL instructors, it is a commonly shared opinion that teaching writing is a laborintensive endeavor. The labor in question is the close reading of page after page of studentproduced texts, followed by composing personalized feedback for each text, or perhaps even each draft of each text (Scorcinelli & Elbow, 1997). Certain technological innovations have facilitated new modes of assessment for both teachers and learners, from Microsoft Word mark-up to electronic peer review via blog posting to collaborative writing on cloud-based documents (Liu & Sadler, 2003; Liu, 2011). However, these new forms of assessment are still rooted in the close-reading of individual texts. Due to the constraints of both time and human cognition (Olson, Scarcella, & Matuchniak, 2013), both teachers and learners are unable to compare multiple texts in a systematic way and draw empirically-based generalizations about student writing via close reading alone. Instead, instructors are left with mere intuitions about 9th International Conference on Language, Innovation, Culture and Education

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how their students' writing is progressing (or not) and how they should adapt their pedagogy to student needs (Biber, 2001).

In light of the limits of close reading, the burgeoning field of the digital humanities has birthed what Franco Moretti calls "distant reading" – the use of statistical computer programs to process, compare, and analyze massive numbers of texts. Using these tools, scholars in the humanities, primarily literary critics, have revealed new and exciting information about classic texts, from the importance of characters in Hamlet to the gendered nature of Jane Austen's writing (Schulz, 2011; Silge, 2017). Critics do this mainly through visualizing this data in new and engaging ways. Indeed, one of Moretti's (2007) seminal texts in the field is titled *Graphs, Maps, Trees*.

Thus, it makes sense to conjecture that the problems inherent in an L2 writing classroom focusing exclusively on close reading as the mode of assessment may in part be ameliorated by "distant reading," refigured as "macroanalysis" by other scholars in the field (Jockers, 2013). Furthermore, much in the way that scholars in the digital humanities are uncovering new features of classic literature, it would not be bold to suggest that ESL instructors can use macroanalytic tools to discover previously hidden aspects of and trends within our students' writing. Taken a step further, these macroanalytic findings have the potential to reshape ESL writing pedagogy, possibly in radical ways.

Purpose of the Study

The purpose of this study is to investigate how tools from the digital humanities – namely, literary macroanalysis – may be used to benefit both teachers and learners of English writing in an ESL context.

Objectives

This study aims to outline the features of literary macroanalysis and reinterpret them in the context of English-language learning. It will also introduce tools commonly used to carry out large-scale text analyses, with the goal of demonstrating their usefulness for both ESL teachers and learners. By presenting the process and findings of a small-scale experiment carried out in an ESL writing class, this study ultimately hopes to inspire reflection and innovation among ESL educators regarding the ways that technological advances in the digital humanities can improve the formative and self-assessment of L2 writing.

Research Questions

This study is driven by a number of research questions, each of which loosely corresponds to the following sections of this paper. Firstly (as noted in Introduction above), in the context of teaching L2 writing, what do we truly learn from our students' texts? Or, to reformulate the question more specifically – after we finish grading a round of first (or second, or final) drafts, or after we submit our grades for a recently concluded writing course – how to do we reflect upon the writing we've seen and attempt to improve our process, as educators?

Secondly, what tools exist that might permit us, as teachers of L2 writing, to productively and succinctly compare multiple samples of student writing? How can we include more – massively more – samples of student-produced text into the database from which draw conclusions about our students' writing? In other fields within the digital humanities, how are scholars deploying text analysis in order to learn more about their literary objects? Can we use these ideas and tools in the context of English-language learning? These questions are addressed in Theoretical Framework below.

Thirdly, how can we build upon ideas from the digital humanities to construct a modular, portable method of text analysis that ESL educators can deploy in their own writing classes?

What might this method look like when deployed in an ESL context? What analyses might be carried out, and what findings might they yield? Additionally, have other scholars tried to carry out similar analyses in an ESL context? These questions are addressed in the Literature Review, Methodology, and Findings sections below.

Finally, what are the implications of large-scale text analysis, were it to be deployed in an ESL classroom focusing on L2 writing? How might it affect teachers and traditional methods of writing assessment? Would students be able to use text analysis as a tool for self-assessment? What pitfalls exist in the use of large-scale text analysis in the context of education? What further avenues of study may help explore how large-scale text analyses can be used in the teaching of L2 writing? These questions are address in the Discussion, Limitations, and Recommendations for Future Research sections below.

Theoretical Framework

In the ESL classroom, as L2 writing instructors, we often assess the progress of our students' writing by carrying out the "close reading" of hundreds of texts each semester. This entails collecting or downloading our students' drafts, scrutinizing them for hours on end depending on the assignment, we may focus our attention on grammar, structure, argumentation, theme, or etc. - and returning them with various forms of feedback. While not universal, this method of assessment is considered labor-intensive and exhausting (Scorcinelli & Elbow, 1997). Additionally, while teachers may often have a "feel" for which areas have improved and which need work in their students' writing after assessing via close reading, the limits of human cognition prevent a true, valid comparison of the many, many texts we are asked to assess on a regular basis (Olson, Scarcella, & Matuchniak, 2013). Furthermore, bureaucratic or institutional circumstances may require an instructor to move to another round of assessment before being able to draw any general conclusions about students' writing, much less consider how such conclusions could positively influence teaching style or pedagogy. As Casanave (2017, p. 14) notes, "Teachers who hold very different beliefs from one another about assessment will not only assess their students differently; they will also teach differently from one another, given the natural washback effect of assessment on pedagogy."

Given the limits of assessment via close reading and subsequent narrative or in-line feedback, we may start by asking: what tools may permit writing instructors to productively and succinctly compare massively more samples of student writing? We might begin by asking ourselves: who else is tasked with reading a plethora of texts and evaluating or drawing conclusions from them? The literary critic certainly fits this description. In fact, the ESL instructor may even envy the scholar of Dickens, for example, whose central corpus consists *only* of Dickens has ever wrote, a total word count perhaps easily surpassed what the instructor is required to assess in a single academic year or two. So, have literary critics run up against the same wall that ESL instructors routinely bang their heads against?

As it turns out, they have, and literary critic Franco Moretti has become a sort of unofficial spokesperson for a particular solution to this problem. Kathryn Schulz (2011) sums it up: "What are we mortal beings supposed to do with all these books? Franco Moretti has a solution: don't read them." Schulz continues, noting that Moretti "tackles literary problems by scientific means: hypothesis-testing, computational modeling, quantitative analysis... He advocates what he terms "distant reading": understanding literature not by studying particular texts, but by aggregating and analyzing massive amounts of data." Despite preferring the term "macroanalysis" to describe quantitative text analysis, rather than the rhetorically effective but somewhat loaded "distant reading," Matthew Jockers (2011) suggests that,

To generalize about a "period" of literature based on a study of a relatively small number of books is to take a significant leap. It is less problematic, though, to consider how a macroanalytic study of several thousand texts might lead us to a better understanding of the individual texts.

By replacing "a period of literature" with "the progress of L2 learners' writing" and "books" with "student essays" (or similar) in the above text, we begin to see how this method may be applied to the context of ESL teaching. Citing Moretti (2007), Jockers continues by highlighting how such a method can help analysts grasp large-scale, systematic features of writing that may elude the piece-by-piece nature of comparative close readings, nothing that, "a field this large cannot be understood by stitching together separate bits of knowledge about individual cases, because it isn't a sum of individual cases: it's a collective system, that should be grasped as a whole." Jockers also notes that in many circumstances, close reading may also overlook the seemingly infinite minutiae of writing, "[The] macroanalytic approach reveals details about texts that are for all intents and purposes unavailable to close-readers of the texts... computational study brings the most common words such as "the" and "of" into our field of view."

Thus, macroanalysis may present ESL instructors with an alternative form of assessment, or at least a supplementary method through which they can gain more positive knowledge about their students' writing. Next, it would be helpful to survey exactly how these literary quants are applying macroanalysis to their own areas of study. In their comprehensive survey of digital humanities research, Jänicke, Franzini, Cheema, and Scheuermann (2015) highlight the fact that visualization is a crucial aspect of "distant reading" studies. This should not be surprisingly – pouring over endless spreadsheets would not be considerably different or more effective than pouring over endless essays. It is when this data is concisely and validly reproduced in graphic form that researchers and readers can effectively see new aspects of the texts being studied. Disregarding basic charts of word frequency or such – helpful in their own right – Jänicke et al list structure, heat maps, tag clouds, maps, timelines, graphs and more as visualization tools central to the digital humanities. This focus on visualization and the efficiency with which it can show both large- and small-scale characteristics of a group of texts should be of note to ESL instructors, who for years have highlighted the importance of visual stimuli and multimodal learning in the classroom (Royce, 2002).

As we move from a general understanding of macroanalysis to the consideration of how to implement it in the ESL classroom, it worth briefly pivoting to the related field of corpus linguistics. Corpus linguistics is and has been "distant reading" for decades, but with the goal of better describing the features of natural languages, as well as comparing them. In fact, the work of corpus linguistics informs the multitude of ESL texts that aim to teach the "most common" words, phrases, collocations, and idioms in the English language (Hinkel, 2016). The field's findings are also used to highlight (and hopefully rectify) common mistakes found in the English produced by particular sets of learners (Conrad, 2000), such common grammar errors among young learners in Japan, for example. In this sense, the quantitative analysis of texts has always been integral to the field of ESL education. However, with its focus on visualization, macroanalysis makes corpus linguistics more approachable, inviting ESL educators to engage in their own analyses, and possibly ESL learners as well.

Methodology

At this stage, this question is then how to implement macroanalysis in the classroom. To explore our hypothesis that macroanalytic visualization is well-suited for classroom integration and can benefit both teachers and learners of English writing, we decided to carry out some post-hoc analyses of a manageable sample – 26 short argumentative essays (roughly 700-1000 words) concerning the effects of social media, submitted by undergraduate students as part of a basic, introductory course on English composition. The student population was a mix of

international and Korean students – nearly all with significant experience abroad – attending a Korean university geared toward international study. The course was aimed at improving English writing skills across various genres and styles, and as part of the module on argumentative essays, students were prompted to present the advantages and disadvantages of using social media, then conclude whether it is beneficial or harmful for society, overall. The essays analyzed were produced through a process of in-class brainstorming and peer review, and students were encouraged to incorporate sources outside those read as part of the module.

Using plug-ins freely available for the open-source R programming platform, we decided to generate graphs illustrating word frequency, color-coded word clouds, and charts outlining different topic models derived from the texts. For each of these analyses, we compared the results of two randomly selected individual texts to those generated when processing the entire corpus. From these analyses, we hope to speculate about the use of macroanalysis and visualization in the ESL classroom, presenting both potential benefits and possible pitfalls for both instructors and learners.

Literature Review

Overall, the ideas of "distant reading" and macroanalysis – as conceptualized and implemented in the field of literary criticism – have found little to no influence in the fields of second-language or English-language learning. Admittedly, it is a big jump to move literary macroanalysis from the field of scholarly research to the "applied" setting of the classroom. However, scholars such as Jakacki and Faull (2016) outline fruitful ways to bring the digital humanities into the classroom. After narratively summarizing courses in which they required undergraduate students to use various visualization tools common in macroanalytics studies and concluding that learning objectives were met overall, they characterize the learners' experiences as such:

How well did we do in the students' eyes? They realized they were doing something really new and very transportable to other courses. Furthermore, despite the highly structured nature of the syllabus, students did not feel as though they were being forced through a machine. Rather, they experienced a growing sense of agency as [digital humanities] practitioners (Jakacki & Faull, 2016, p. 369).

This is precisely the reaction we are chasing in our attempt to integrate the tools of literary macroanalysis into the ESL classroom. Jakacki and Faull also unwittingly touch upon the urgency of such a praxis, noting that, "Another challenge to the class design was the high number of L2 students... who were enrolled in the course (2016, p. 362)." They then briefly describe how they accommodated L2 learners by creating space for error correction in the students' required blog reflections. This moment gestures toward the possible integration of the digital humanities, L2 pedagogy, and classroom praxis.

However, if we refigure macroanalysis as corpus linguistics, we see many more studies that have focused on bringing quantitative text analysis tools into the classroom. The first subset of relevant studies concerns using such tools as a supplementary form of diagnosis or assessment for ESL instructors. Scholars such as Kim (2014) and Crossley, Kyle, Allen, Guo, & McNamara (2014) focus on the diagnostic possibilities of macroanalysis – can this technology recognize significance differences in L2 writing and classify students' ability levels accurately? While the latter study focuses specifically on identifying linguistic features of L2 writing that correlate with human assessment, Kim's conclusion shows how this data can inform pedagogy, noting that his data indicates "it is necessary to ensure that Korean L2 learners develop a range of rich, diverse, and sophisticated vocabulary knowledge through explicit vocabulary instruction" and "students need to practice to vary their sentence structures in writing compositions" (Kim, 2014, p. 44). Park and Nam more directly state the implications of their analyses of theme for L2 teachers:

Findings of this study, when considered from a pedagogical perspective, imply that teachers should offer an explicit instruction of the thematic structure at an appropriate timing in later units of curriculum. Through the explicit instruction of the theme, students should be able to understand that some sentences flow logically while some do not; and the 'flow' can be controlled by the effective use of the theme. This way, instead of telling—and wishing—them to write logically, teachers can show straightforwardly how they can produce a logical text with concrete examples of the theme (Park & Nam, 2015, pp. 83-84).

Still, while gesturing in the direction of the classroom, these studies do not directly consider the effects of using corpora as part of an ESL curriculum. Luckily, some studies have taken steps in this direction.

Yoon and Hirvela (2004) provide one of the more developed accounts of integrating corpus linguistic tools into teaching materials and curriculum. In reference to pedagogical suggestions such as those highlighted in the previous paragraph, they confirm that, "little attention has been paid to the use of corpora from the perspectives of learners" (Yoon & Hirvela, 2004, pp. 259-260). Building off the work of Biber (2001), Yoon and Hirvela note that the kind of empirical data produced by quantitative analysis at the very least produces a more solid basis from which both learner and teacher can describe and subsequently improve language use. Students also benefit from exposure to multitudes of authentic texts that comprise the corpora used the classroom. Perhaps most importantly, the use of quantitative text analysis in the classroom also creates possibilities for inductive learning, or student-centered self-discovery of particular errors or features in their writing.

Using the popular Collins COBUILD Corpus, Yoon and Hirvela focus primarily on integrating concordance tools for students explore linguistic features such as collocation. From student surveys and follow-up interviews, their findings "suggest that, overall, the students perceived corpus activity to be beneficial for their English writing, particularly for learning common usage and collocates of words and for building confidence in their writing" (Yoon & Hirvela, 2004, p. 278).

Findings

Below, we present the visualizations generated from our modest corpus of short argumentative essays. In order to tabulate uses of a particular word across multiple inflections, words have been stemmed, with -s, -ing, nominalizations, and etc. removed. We emphasize that this is not an examination of the students' performance on this assignment, nor is it a content-based discussion of their opinions regarding social media. Instead, we present the visualizations below for heuristic purposes – namely, to help imagine what an ESL curriculum that integrates macroanalysis may look like, from both the teacher's and the students' perspective. To start with, Figure 1 shows basic graphs illustrating the ten most frequently used words in the corpus, student 7's text, and student 18's text, labeled accordingly.



Figure 1. Word frequency visualized in graphs.

When looking at the overall results, this type of visualization can give instructors a sense of what keywords students grasped onto, as well as a more general sense of whether they stayed on topic. From this, instructors or students themselves may compare individual results to the corpus results in order to draw conclusions about their own content.

Figure 2 used this frequency data to generate word clouds in which both color and font size illustrate a given word's importance to the text. Both Figure 1 and Figure 2 were generated using the "text mining" and "wordcloud" packages for the R platform. Word clouds present more word frequency data than the graphs above, and do so in a more colorful and engaging manner. They can be used much like was described above regarding frequency graphs, but may more readily encourage and facilitate side-by-side comparison given the vibrancy of the visualizations. Instructors can use these to illustrate what a lexically varied text looks like compared to a lexically repetitive text, or what an on-topic essay looks like compared to one that is off-topic, for example.



Figure 2. Word clouds generated from frequency data.

In some cases, particularly when dealing with larger classes writing across many different content areas, topic modeling may be useful to pre-sort essays for grading, or perhaps simply see what students are writing about. Topic modeling is the process of using text analysis tools to presort a mass of texts about which the analyst knows nothing. Using the same "text mining" package along with "topicmodeling" in R, we sought to identify four topics in our corpus, each of which is characterized by six terms, as outlined in Figure 3. We see that while overlapping,

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each of these topics has a somewhat distinct take on social media, highlighting certain aspects of an unwieldy area of content.

	Topic 1	Topic 2	Topic 3	Topic 4
term 1	inform	network	social	peopl
term 2	use	teenag	media	time
term 3	sns	social	can	friend
term 4	also	communic	peopl	facebook
term 5	tool	use	make	becaus
term 6	even	get	use	feel

Figure 3. Four topic areas derived from the corpus.

Using this data, we then assigned each individual text a topic area, the results of which are shown in Figure 4. This gives us an idea of how these different takes on social media are distributed across the class.

Student	Topic	Student	Topic
File1.txt	1	File21.txt	2
File10.txt	2	File22.txt	3
File11.txt	2	File23.txt	1
File12.txt	3	File24.txt	2
File13.txt	4	File25.txt	3
File14.txt	1	File26.txt	4
File15.txt	3	File3.txt	2
File16.txt	3	File4.txt	4
File17.txt	4	File5.txt	3
File18.txt	2	File6.txt	3
File19.txt	4	File7.txt	2
File2.txt	3	File8.txt	3
File20.txt	1	File9.txt	3
Topic 1	Topic 2	Topic 3	Topic 4
4	7	10	5

Figure 4. Assigning texts to topics.

Re-emphasizing what was stated at the beginning of this section, it is important not to view these modest data as important in of themselves, but instead to imagine how the tools used to produce them might be implemented in other ESL classrooms, with different students, class sizes, objectives, and content areas. From this simple heuristic analysis, with such imagination, we may productively speculate and brainstorm possible uses for macroanalysis in the teaching of L2 writing. Thus, these findings confirm our hypothesis that macroanalytic visualizations show promise as an assessment tool in the ESL classroom.

Discussion

A survey of previous studies, including those from the digital humanities/macroanalysis perspective and from the corpus linguistic perspective, indicates that scholars are generally optimistic about the idea of bringing varieties of quantitative text analysis into the classroom.

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These tools may provide teachers the opportunity to pre-assess large amounts of data in the contexts of large courses, long essays, or online environments such as MOOCs. They also allow instructors to observe long-term or wide-scale trends in student writing, view multitudes of data in concise, statistical snapshots via visualizations, and back up generalizations about student writing performance with empirical data – whether those generalizations are being presented to colleagues, students, or administrators. Overall, they can help instructors explore aspects of student writing unavailable via the traditional close-reading style of assessment.

Macroanalysis can also offer students data and/or visualizations as a form of selfassessment or reflection. This data may reveal progress or room for improvement regarding different aspects of writing, such as sentence length or lexical variety. Macroanalytic tools, with their basis in machines, help to eliminate instructor bias, which may also comfort students. Furthermore, macroanalysis can reveal common trends among a set of writers, provoking students to explore new avenues of creativity imagine topics or arguments that don't appear in a given corpus.

Given that such possibilities are conceivable only after carrying out a short, heuristic exercise on a small corpus, we agree with the optimism expressed by scholars such as Jakacki and Faull, who conclude that if courses integrating forms of macroanalysis "are well planned, modestly ambitious, [and] truly collaborative in both conceptualization and execution, they can promote radically new ways of understanding the goals of humanistic enquiry; a new pedagogical hermeneutic for both teachers and students" (Jakacki & Faull, 2016, p. 370).

Limitations

While maintaining such optimism about the pedagogical possibilities of macroanalysis, it is equally important to be aware of potential pitfalls. Firstly, it is important not to let activities or assignments involving macroanalysis dominate your curriculum. One common thread throughout both the digital humanities and corpus linguistic research is that the human perspective remains necessary, whether it be explaining a network visualization mapping characters in piece of creative writing or using a word cloud to supplement written feedback on a student essay (Crossley et al, 2014; Jockers, 2011).

Furthermore, as multiple authors have also pointed out, the learning curve for macronanalytic tools among both teachers and learners may be steep, impeding the creative integration of such tools into pedagogy. Finally, there is the fear without proper contextualization or supporting research, teachers and students may see macroanalysis as cumbersome tool merely tangential to their praxis, and disregard it as a waste of time.

Recommendations for Future Research

In order to prevent such a scenario, more research gauging student reactions to opinions on the use of macroanalytic tools is urgent. Yoon and Hirvela (2004) and Jakacki and Faull (2016) have already made important contributions to this area of research and should serve as models going forward. Perhaps even more urgent is to simply produce and share visualizations based on the macroanalysis of increasingly large corpora of L2 writing. It is only through such shared experimentation that we, as instructors, can discover exactly which aspects of macroanalysis are most useful for our specific classroom applications.

Conclusion

This study has, in a purely heuristic manner, suggested that the macroanalytic tools of "distant reading" that have been developed in the digital humanities may serve to innovate the L2 writing classroom for both teachers and learners. While the field of corpus linguistics has had a significant impact on ESL pedagogy and even crept into the L2 writing classroom, its

tools and activities lack the engaging, syncretic nature of macroanalysis's colorful visualizations. By switching the object of study from classic literature to texts written by L2 learners, the field of ESL teaching may open itself up to new paths for growth and development. Furthermore, if students can also learn to harness these tools, they may serve as important modes of self-assessment and reflection. By generating a few visualizations based on an extremely modest corpus of L2 writing, this study has hopefully illustrated the potential usefulness of macroanalytic tools in the ESL classroom. The remaining work is to encourage other ESL instructors to apply these tools to different and possibly larger corpora, share results, and discover how teachers and learners can together innovate L2 writing pedagogy through the distant reading of our texts.

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