Interfaces and Infrastructures

Examining New Media Objects in the English Studies Classroom

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This article is the result of a graduate seminar in English that took place at Wayne State University in 2010. That seminar was titled New Media Interfaces and Infrastructures, and it covered recent work in new media studies that examines the expressive and rhetorical possibilities of digital environments. Members of the seminar read a cross section of these scholars—Lev Manovich, Katherine Hayles, Matthew Fuller, Noah Wardrip-Fruin, Ian Bogost, and others. But in addition to reading new media scholarship, we also took a piece of software, Google Wave, as our central artifact. Google Wave is a collaborative writing platform that Google hoped would replace e-mail. It was launched in May 2009 amid much fanfare, and the members of the seminar both used and analyzed this experimental platform. At the time of our seminar, many others were also experimenting with Wave, and a great deal of the popular conversation about Wave revolved around how Wave might be best put to use. There was confusion among the user community about what exactly Wave *was*. Was it e-mail? Was it instant messaging? Was it a threaded discussion? In the end, Wave's moment in the sun was relatively short-lived, as Google announced in August 2010 (three months after our seminar ended) that it would suspend development of the application.[1]

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The confusion expressed by Wave users was one major reason that Google decided to discontinue development, but this confusion was actually fortuitous for us. Our use of Wave in the seminar and our study of it as an artifact happened amid a vibrant and far-reaching conversation about this new software.

In the pages that follow, we offer a description of the Interfaces and Infrastructures seminar in order to show how new media objects can act as both tools and objects of study in the English studies classroom. The seminar is an 8000-level course in which professors present students with a specific research question. While most of the 7000-level offerings are survey courses or methods courses (courses such as Rhetorical Theory or Postcolonialism and Globalization), the 8000-level courses are billed as "advanced topics" courses. Though they are not technically considered capstone courses, they do serve as a culmination of the graduate curriculum by providing an in-depth discussion of a specific research question. These seminars provide both professor and student an opportunity to examine new and emerging research questions. In this particular course, the professor was hoping that the seminar would be a space both in which students would get an introduction to new media studies scholarship and in which the professor would benefit from seminar conversations that would raise new and interesting questions about the role of the humanities in the scholarly examination of software.

The baseline assumption of the course was that studying digital environments requires a rich understanding of software. Most computer programs are still written by a relatively elite and specialized group of people. Open-source projects may in fact open the design process to more programmers, and they may also allow users to see the "guts" of the code. But access to code does not necessarily mean access to the skills and strategies required to understand, study, critique, or write code. This is why we see the work of new media studies as crucial to scholars in English studies — our pedagogies can and should address the complexities of software, its functions, and its procedures. Studying and using software does not require that humanists become software designers. We do think humanists should learn to write code, but in addition to working at the level of code, the analysis of new media objects requires that we take time to analyze the assumptions and affordances of such objects. Software platforms are more than mere tools; they are designed environments that express arguments about how we can or should interact with technology and with one another. English studies scholars have long studied cultural texts and contexts, and the study of software follows in

this tradition. In order to account for digital culture, we will have to understand the environments that serve as the backdrop for that culture.

In this article, we describe Google Wave and our uses of it, we cover some theoretical concepts that helped us analyze Wave, and we reflect on our experiences with Wave by applying these concepts. We offer this discussion in order to provide teachers in English studies with a pedagogical approach for treating the classroom as a laboratory for both ideas and technologies. The classroom we describe in this article is one in which students are free to explore and tinker with new media objects. Our experiments in this course fall into two categories. First, we experimented with Google Wave software by testing out its various functions. These experiments were focused on examining Wave's various possibilities, and we carried out these activities without worrying too much about how to most efficiently use it. We installed Wave gadgets (software extensions that can be installed within a wave) and bots (automated participants that carry out various procedures) and used Wave's playback function (a "recording" that allows users to recreate the trajectory of a wave).

However, our second set of experiments involved using Wave as a collaborative writing space. We recorded class minutes during seminar meetings, composed what we called "writing objects" in which we examined Wave through the lens of the theories we were reading, and collaborated synchronously and asynchronously on this article and other projects. This work was focused on *using* Wave (see fig. 1). Thus, we both examined Wave as an artifact and used Wave as a piece of productivity software. These activities obviously bled into one another as it is virtually impossible to cleanly separate analyzing a tool from using it. However, our goal was to be continually toggling between these two modes throughout the semester.[2] In the pages that follow, we examine a type of pedagogy that extends the boundaries of the classroom. We describe different writing spaces—our seminar as well as other situations outside of the classroom—and how our approach to this artifact allowed us to carry out the work of both analyzing and using a digital writing tool.

But while we provide a description of our various experiments, we do not provide a syllabus or a detailed series of assignments. Our article explains an approach to adopting new media in the classroom and then reports on the results of that approach with the hopes that other scholars in English studies might carry out similar experiments. While we do explain what we did inside and outside of the classroom, we are not arguing that other classes look

to recreate these specific activities. These activities emerged out of a loose plan—to explore the possibilities of a new media artifact. Our hope is that the approach we describe can inspire others to follow a similar path. Finally, this article also performs one more important argument: in collaborating on this text, professor and students worked together to produce something other than the traditional seminar paper. While the seminar paper is an important component of graduate pedagogy in English studies, we present this collaboration as an alternative model for the graduate seminar.

Interfaces, Infrastructures, and Multiliteracies

Our course was a laboratory for exploring new ideas and new technologies, and our experimentation with media technologies follows a long line of scholars who see the promise of theorizing digital reading and writing. Scholars and teachers in English studies have recognized how new media can be used to facilitate collaboration or to teach certain digital literacy skills. For instance, Peter Kittle and Troy Hicks (2009: 528) demonstrate how web-based technologies can be incorporated into collaborative writing pedagogies. In particular, they discuss how Google Documents can be used effectively in collaborative writing projects, and they provide various suggestions about how technologies like wikis can be used to "enact the types of collaborative pedagogy that most teachers have always wanted" (528). Tara Tharp (2010: 44–45) has also argued for the use of wikis in collaborative writing and has encouraged us to think carefully about how we might assess the work of individuals and groups in these collaborations. But in addition to understanding how technology can enable collaboration, scholars have considered how technologies are not only tools for getting the job done but also objects worthy of analysis. For instance, Paula Rosinski and Megan Squire (2009: 162) have suggested that we combine human-computer interaction research with writing pedagogy in order to get students thinking about the rhetorical nature of interfaces:

> As more and more of the information available to readers is mediated through digital interfaces, it becomes increasingly necessary for writing students to understand how an "audience" becomes a "user." How does the audience interact with the interfaces the writer creates? How is it that these "little machines" that translate human-readable programming code into zeroes and ones can also serve up faithful visual and auditory representations of a writer's ideas? How will our audience react to the interface that we design to express our ideas, and how will we know if our choices were successful?

Other scholars have addressed questions of design. In an insightful study of composition handbooks and interface design literature, Anne Wysocki and Julia Jasken (2004: 45) ask us to pay greater attention to the rhetorical qualities of all interfaces and to imagine how they see us.[3] We shape interfaces as they shape us. They argue that interfaces are a reflection of the "attitudes and backgrounds" of designers and that we should attend to those backgrounds. Wysocki and Jasken show us how the methods and theories of English studies link up with the project of cultivating the habits to see interfaces differently. This means examining how the events happening at the level of the interface are linked to the functions and procedures of infrastructures, a relationship that is of the upmost concern for Wysocki and Jasken: "We have to see interfaces as not just what is on screen but also what is beyond and around the screen if we want to understand how interfaces fit into and support the varied and entwined sets of practices that shape us" (36).

Danielle DeVoss, Ellen Cushman, and Jeffrey Grabill (2005) address these concerns as well in their "Infrastructure and Composing: The When of New-Media Writing." Further, DeVoss et al. provide a rich and useful understanding of infrastructure, one that we rely on in our own discussion of Wave. For these scholars, infrastructures involve various components, including computer networks, network configurations, decision-making processes and procedures for who gets access to computer classrooms, the design and arrangement of computer classrooms, and writing classifications and standards. Attending to this infrastructure means attending to the "when" of new media writing, an approach that accounts for the materiality of networked environments and computer classrooms while also connecting writing practices with "often invisible issues of policy, definition, and ideology" (16). New media composing is situated in a *when* and a *where*, and infrastructures "both rupture and create possibilities" (36). Our discussion of Wave as a media ecology is similar to the work of these scholars as we consider the components of that ecology to be not only technological widgets but also a wide range of objects and ideas, from notebooks to writing genres.

Finally, Stuart Selber argues that "simply understanding the mechanics of computing, particularly in decontextualized ways, will not prepare students and teachers for the challenges of literacy in the twenty-first century" (2004: 2). He provides a useful framework for understanding the overlapping literacies required in digital environments: functional, critical, and rhetorical. Functional literacy positions "computers as tools" and "students as users of technology" (25). Students certainly must be able to use various technologies, but by drawing on Carolynn Van Dyke, who emphasizes "exploration and

communication," Selber presents functional literacy as something beyond simply the mastery of software (72). Critical literacy identifies "computers as cultural artifacts" and "students as questioners of technology" (25). Additionally, "students should be able to recognize and articulate how power circulates in technological contexts" (133). Selber's multiliterate approach emphasizes that these literacies are not complete without each other and necessitates an intersection and a multiplication of practices when a computer or other digital technology enters the classroom. In this way, his framework connects to our argument that new media technologies can serve as both tool and artifact in both an English studies classroom and curriculum.

In this article, we are particularly interested in the movement between two of Selber's categories: functional literacy (technology as tool) and critical literacy (technology as artifact). We discuss a pedagogical approach that can be used in both undergraduate and graduate courses. This approach can help students develop software and interface literacies by providing a laboratory-like environment in which they are free to tinker with both technologies and ideas. In our seminar, we used Wave to take collaborative notes, to collaborate in face-to-face situations, and to interact synchronously and asynchronously. In fact, a great deal of this article was written in Google Wave. But in addition to using Wave as a tool for collaborative writing, we treated our classroom as a laboratory in which we could experiment with Wave as an object of study. We tinkered, played, and attempted to explore all of Wave's different possibilities. Given free rein to try out these possibilities, we often conducted this work without considering Wave as a tool or utility. As end users, we are often accustomed to treating software as a tool for getting certain jobs done, but in this pedagogical experiment, we viewed software not only as a tool but also as an object of study, much like a novel, a poem, an op-ed piece, or a literary essay.

"Live, with no control sample"

While tinkering with Wave, we read texts such as Lev Manovich's *The Language of New Media* (2002), Matthew Kirschenbaum's *Mechanisms* (2008), and Terry Harpold's *Ex-foliations* (2008). Each of these texts gave us useful vocabularies for examining Wave, but Matthew Fuller's work in *Media Ecologies* (2007) was particularly useful given that he discusses technologies in terms of how they interconnect and interact with people, environments, and other technologies. Fuller's notion of "media ecology" is similar to DeVoss et al.'s notion of infrastructure, and our analysis draws on both of these texts.

In our discussion below, we use Fuller's theoretical framework to explain our uses of Wave, our analysis of it as a cultural artifact, and our reflections about how these uses and analyses inflect one another. Software is ubiquitous, and it shapes many of our everyday experiences. Whether visible or not, software plays a role in virtually all contemporary reading and writing situations. In fact, as Katherine Hayles argues in *My Mother Was a Computer* (2005), computation leaves its mark on texts that we would not typically tag as "electronic." In her analysis of texts such as Neal Stephenson's *Cryptonomicon*, Hayles demonstrates how "digitization leaves its mark even on print texts that remain entirely conventional in appearance and functionality" (31). Studying the digital impressions left on cultural artifacts requires that we study not only texts themselves but also the environments and tools that leave these impressions. As a collaborative writing environment, Wave was a particularly rich site for such research.

Fuller's work in *Media Ecologies* (2007) provides a useful vocabulary for such research and is guided by the assumption that understanding technological interactions happens best through hands-on observation of media ecologies: "The only way to find things out about what happens when complex objects such as media systems interact is to carry out such interactions—it has to be done live, with no control sample" (1). This focus on interaction is especially apparent in Fuller's explanation of the term *media ecologies*. He notes that the term *media ecology* circulates with differing meanings in various discourses, among them organizational theory, quality control, environmentalism, educational criticism, software and media studies, and critical theory. Fuller refuses to offer a stable definition of the term, arguing instead for a sense that acknowledges its multiple uses. This refusal is important because it is precisely this sense of dynamism that most consistently marks Fuller's use of the term. He thus offers a sense of media ecology "to indicate the massive and dynamic interrelation of processes and objects, beings and things, patterns and matter" (2). Media ecologies are marked by the unexpected and unanticipated interactions that emerge among complex media systems, the infrastructures that support them, and the subjects who use them within embedded, material, and cultural contexts.

Fuller, for example, describes British pirate radio as a media ecology that emerges from the dynamic interrelation of various technologies, objects, and processes: "transmitter, microwave link, antennae, transmission and studio sites; records, record shops, studios, dub plates; turntables, mixers, amplifiers, headphones; microphones; mobile phones, SMS, voice; reception

technologies, reception locations, DJ tapes; drugs, clubs, parties; flyers, stickers, posters" (2007: 14–15). He also discusses these ecologies as "cascades of parasites" that intermingle with one another, "roiling around inside each other's stomachs . . . grab[bing] hold of each other, gain[ing] purchase and insight by means of their particular capacities" (174). The components of such ecologies are not always easily separated, and thus studying them always requires us to think carefully about the constant making and breaking of possible connections in the "soup" of a media ecology.

Fuller discusses technologies in terms of their *affordances*, a key term that also helped us examine Wave as both an artifact and as a tool. Borrowing the term from J. J. Gibson's work in ecological psychology, Fuller finds it useful because "it takes up the possibility of detailed exploration of the material qualities of things-in-arrangement, rather than of their essence" (2007: 45). A discussion of technological affordances focuses on the potential interactions of that technology: "[Affordances] are not what an object is 'of itself' but what it might become in composition with other elements" (45). Thus, affordances are the "predispositions, capacity to combine, and inherent forcefulness of objects and organisms," and Fuller uses this concept to explain how different components "shift and combine as part of thriving inventive scenes" (7). In other places, Fuller describes the "desires" of technologies, a notion that is similar to this concept of affordances. Fuller's approach helps us think about how technologies might express preferences for certain kinds of connections, and it provides a way to conduct experiments on the fly. In toggling between functional and critical literacies, we were following Fuller's suggestion to piece together media ecologies "live, with no control sample" while also pausing to reflect on what we were learning along the way.

Tinkering with Bots and Gadgets

Google Wave is an open source collaborative software platform. Google explains Wave as "equal parts conversation and document," and Wave can be seen as a conglomerate of the functions of e-mail, wikis, bulletin board systems, and chat. Despite the familiarity of these functions, however, Wave has what many believe is a counterintuitive interface, and it will be helpful to provide brief definitions of the different functions we encounter there:

- wave: A threaded conversation
- Google Wave: An open source collaborative software platform
- wavelet: A threaded conversation embedded in a larger conversation
- blip: A single message (Wave's smallest increment of information)

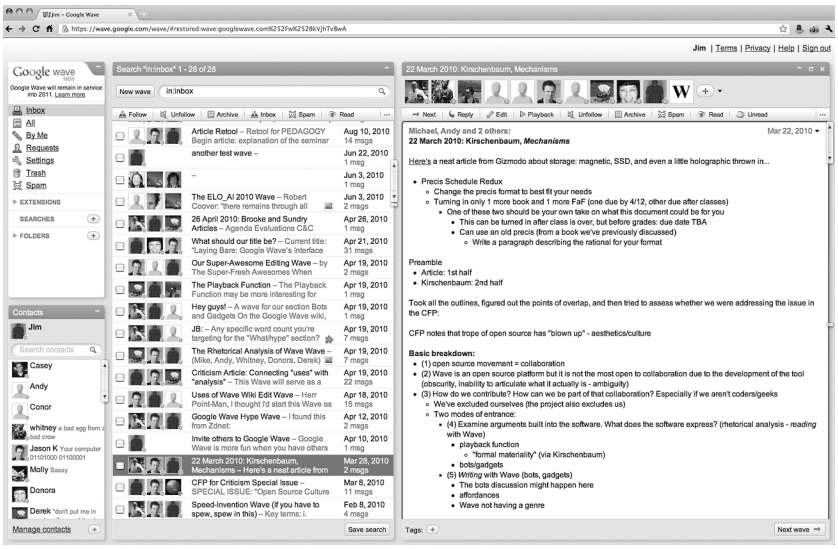

Figure 1. A screen shot of class minutes using Wave in which students took collaborative notes

- document: The content within a blip
- gadget: An application that runs within a wave (similar to Facebook applications)
- robot: Automated participants that operate on information in the wave and on outside sources of information (for instance, one bot called "Wikify" retrieves and provides links to Wikipedia articles)

In addition to these different kinds of information, the Wave interface also offers a "Playback" function, which provides a timeline of edits (much like the edit history provided by many wiki platforms). Wave also allows users to chat with select contributors to a wave. The typical user of Google Wave creates a wave and invites other participants, some of whom can be automated bots. Users exchange blips within various wavelets, and they install gadgets and bots to facilitate interaction. For most users, waves are stored on Google servers, much like user-generated Google Documents.[4]

Members of our seminar explored the possibilities of each of these functions. One of the most productive aspects of using Wave as a live tool in the classroom was the open environment for experimentation. The members of the seminar took advantage of this environment by experimenting with various bots and gadgets during class meetings. When looking back through the waves created during the semester, moments of this free experimentation are visible among the regular day-to-day classroom activity, and it is within

these moments that the class discovered Wave's utility and value and also its traps and pitfalls. Wave was primarily used as a preclass discussion forum (to bring up questions and discussion points for that week's text) and in-class note-taking software. But the course also provided the freedom and encouragement to experiment—to use Wave as a tool and object of study (see fig. 2). This meant that we tinkered with tools and functions without worrying too much about the purpose of such tinkering. In fact, in another type of seminar, such tinkering could have been seen as a distraction from the proceedings of the classroom. However, we tried to allow as much leeway as possible in this area. By exploring the technology without too much concern for what did or did not count as "productive," we were able to examine Google Wave's various idiosyncrasies.

In one particular class, several students were experimenting with bots (programs designed to interact with the users of the wave to various degrees) and gadgets (programs installed within a wave that users can access). While the class discussion was taking place and notes were being taken in the wave in real time, members of the class would do searches for different bots and gadgets, install them in the wave, and we would discuss how these programs changed, enhanced, or detracted from the ways we were using Wave. A bot called ELIZA (based on the influential AI program of the same name) was installed at one point, giving the class a concrete example of the function of the original program. Joseph Weizenbaum's ELIZA program was the precursor to today's chatbots and featured a Rogerian therapist with whom users could converse. ELIZA was mentioned in many of the texts read during the semester, and in the case of Noah Wardrip-Fruin's *Expressive Processing* (2009) was examined in detail. After installing the bot, students could conduct conversations with ELIZA within Wave. ELIZA was later deleted because she made Wave exceedingly hard to use. She interrupted discussions and was a somewhat unruly participant to the classroom proceedings. Another bot, called "Wikify," was also installed during a class meeting and proved to be much more useful, allowing any term, name, text, and so on, to be automatically linked to the corresponding Wikipedia page. This bot made frequent appearances in waves throughout the semester. The most interesting (and disruptive) bot, however, was one that made all of the text in the wave appear upside down, causing quite a shock in the classroom and bringing class proceedings to a halt. After some time, the text was recovered and reverted to the right orientation. However, we did lose all formatting of the text.

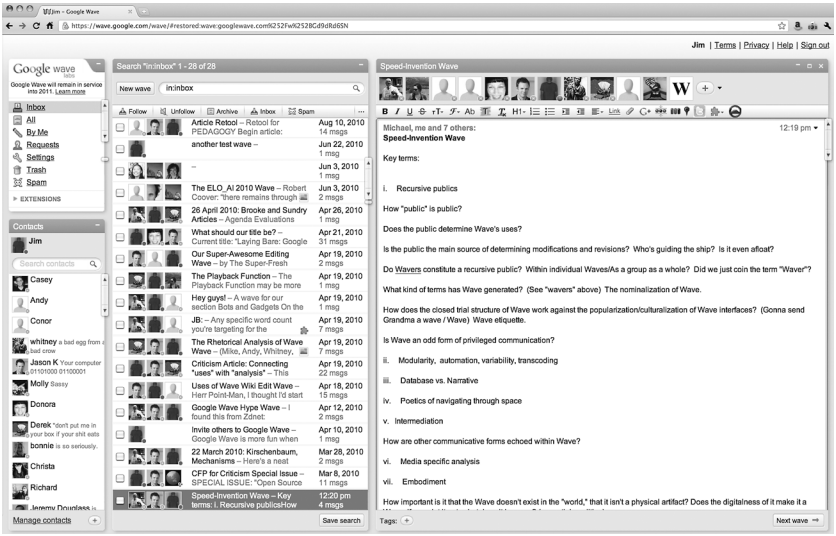

Figure 2. A screen shot of a Wave we created during the early stages of writing this essay. We called this the "speed-invention Wave," and it reflects our attempt to generate as many ideas as possible within the same space. Students met in pairs for two minutes, generated ideas, and then met with another partner. We called this a "speed-dating" approach to invention.

If the only directive in the classroom laboratory had been to use Wave as a tool, this incident would have been nothing but a distraction, causing the class to lose valuable and productive time. However, because the directive was to use Wave as both a tool and an object of study, this incident raised many interesting questions and sparked productive discussion about the nature of open-source technologies. Why create such a bot? The class discussion turned to discussions of hacking and exploration. Software hacks are often merely attempts to find out what a software platform allows us to do.[5] They do not necessarily focus on function or productivity. Rather, they demonstrate what can or cannot be done within a given platform. We extended this discussion of hacking to a discussion about what kinds of bots or gadgets we might design for Wave. Later in the semester, the class even broke into groups and brainstormed these possibilities. Such brainstorming sessions were only possible because we had researched the platform and tinkered with it.

Once we understood the basic affordances of this space, we were able to think through what kinds of bots and gadgets might be both possible and useful. In a future iteration of this course, we imagine that a collaborative product of the seminar could be an actual piece of software. There is prec-

edent for such work in the humanities. For instance, the Center for History and New Media at George Mason University conducted a "digital humanities barnraising" during summer 2010 with their "One Week, One Tool" institute. Funded by the National Endowment for the Humanities, this institute resulted in a WordPress plugin called "Anthologize," which allows users to transform their blog into an e-book. While members of a graduate seminar in English studies may not have the coding expertise to complete such a project, there is no reason that members could not solicit help from those outside of the classroom. Given that we were able to use this seminar to produce an article manuscript, we can imagine exciting possibilities for the production of a new media tool.

Writing Conventions

Because we decided early on to collaborate on an article manuscript, the professor had to think through what kinds of writing assignments made sense for this seminar. The assignments broke down as follows:

- Class minutes: During each class meeting, students collaborated on the minutes in a Wave. At the beginning of the next class meeting, one student was responsible for synthesizing those minutes and presenting them to the class.
- Writing objects: Prior to each class meeting, students composed writing objects. Early in the seminar, we needed a way to generate text for this article manuscript, and we needed to do this without knowing exactly what we would be arguing in the manuscript. Writing objects were brief chunks of text that explored an idea without too much concern for how that idea would be incorporated into our manuscript. Wave works better with small chunks of texts that lead to threaded discussions. These writing objects were a way to generate content prior to knowing the shape of our manuscript. This was especially necessary given how many voices were contributing to this article.
- Précis: For each book or article that we read as a class, students composed a précis. Précis comprised a one-sentence statement explaining the author's focus, a one-sentence explanation of the argument's logic, and a brief (roughly 250 words) discussion of the implications of the argument. These were more formal writing assignments, and they were designed to help students develop a sustainable way of summarizing and synthesizing academic arguments. This was especially geared toward students who were beginning to prepare for comprehensive exams.

These various writing assignments attempted to balance the tinkering ethic of the course (exploring ideas and technologies without worrying about an end

point) with the traditional pedagogical concerns of a graduate seminar.[6] In addition, these assignments (with the exception of the précis) were completed in Wave, giving us yet another opportunity to explore Wave's various functions and possibilities. The writing objects exercises provided the primary "fodder" for this article, and they served as the germinal beginnings of the ideas explored in this manuscript. When writing objects gained momentum and traction, we expanded them using Wave's threaded discussion function.

As we attempted to balance these various types of writing, we also found ourselves keeping certain writing genres out of our waves. We used Wave for class minutes, writing objects, and for drafting this article, but we also maintained a course wiki in order to archive précis and synthesized versions of the minutes. This separation actually works against what Google claimed to be Wave's greatest strength—the integration of various writing genres into one interface. Wave purports to create a fluid integration of a wide spectrum of digital communication media: e-mail, chat, social networking, and so on. Even though Wave looks like a threaded conversation, the software's lukewarm reception (and Google's decision to abandon development) was most likely connected to the lack of a clear writing genre. Wave is clearly remediating message boards, e-mail, chat, wikis, and other writing technologies, but this conglomeration of genres means that there is no clear set of practices for this writing space.

We found, as did many of Wave's earliest adopters (and dissenters), that though developers claimed to have successfully aggregated these features, we were still inclined to keep functions and practices like e-mail, collaborative writing, chat, and the scheduling of meetings separate. Though using Wave as a "one-stop shop" for all of this work might have allowed for brand new practices to emerge—hybrid practices that would emerge out of the cascade of parasites—our hesitation to put all of our collaborative practices within the Wave space suggests that we sensed (and avoided) this possibility. If e-mail, chat, research, scheduling, outlining, and writing had been placed in close proximity to one another (all within Wave, intermingling and combining with one another), they might have devoured one another. Keeping these practices and technologies separate is often necessary for users. And even though we hoped to push the limits of Wave with our Google Wave "laboratory," we resisted the difficulties of completely collapsing all of these different writing genres into one space.

Many users didn't know how to treat this space or act in it. While a number of affordances were built into the Wave interface, this is both the promise and the difficulty of Wave. Wave can be "plugged in" to various media

ecologies, making it a versatile piece of software. Given Fuller's far-reaching notion of media ecologies, we consider such ecologies to include a vast array of components such as wireless network connections, cameras, cables, classroom power dynamics, writing conventions. However, that same versatility makes it difficult to determine how collaborators should go about using it.

The lack of constraints can cause users to lose their footing. As we've mentioned, Fuller (2007: 174) describes a media ecology as a "cascade of parasites." By this he means that each interacting technology and its affordances are affected by each of the other components in conversation with it. In Wave's interface, chat, e-mail, and threaded forum discussions all devour one another. The comfort of separate writing genres and the separate rhetorical situations tied to those genres is taken away in such an interface. But rather than blaming Wave for not "doing" e-mail or chat well, we began to question how our experience of Wave would have been different had we not been as inclined, as we were, to keep certain components of our media ecology separate.

E-mail and forum discussions have established meanings in a classroom setting. While each classroom varies, instructors will often set up rules and expectations for these technologies. While the most detailed syllabi and course instruction will not stop students from posting a discussion topic in the class wiki instead of on the class forum, or using e-mail when a different technology would be more appropriate, these types of mistakes are recognizable as mistakes because we associate certain writing genres with certain technologies. Wave scrambles these various writing situations, and we found that our own assumptions about genre and established classroom practices were difficult to unseat. Whether or not this is a good thing is up for debate. Perhaps new writing practices could have emerged from this kind of situation. But what is most important for our study of how to incorporate new media objects into the classroom is how our assumptions about writing in the classroom were an important part of the media ecology. Following DeVoss et al. and Fuller, we consider our assumptions about writing conventions to be part of the media ecology.

Singular Ecologies

In addition to experimenting with Wave in class, we conducted experiments outside the context of our weekly meetings. In these experiments, we were able to once again plug Wave into various media ecologies and observe the results. For Fuller, people, technologies, desires, and forces are all part of a media ecology, and in our various tinkerings Wave was but one component

of complex collaborative writing situations. In these various interactions with Wave, we saw concrete examples of how media ecologies are singular groupings of technologies, desires, and assumptions about the writing situation.

For instance, we participated in a collaborative rhetorical analysis activity with undergraduates at the University of Texas. The goal was to conduct a real-time rhetorical analysis of political advertising for 2010 Michigan and Texas gubernatorial candidates in two groups of four (two graduate students, two undergraduate students). The focus of the undergraduates was on situated knowledge: How does our city of residence influence the way we analyze political advertisements? Our focus was on analyzing Wave as a real-time collaboration tool. We used a combination of video chat and Wave to conduct the analysis.

The first group interacted via video chat on a Mac laptop computer (which had an internal camera) and a hardwired Internet connection. This group passed off the transcription of the conversation to a third graduate student who typed into Wave on a separate laptop. This group ended up using Wave less like a tool for real-time collaborative text generation and more like an easel with butcher paper for public documentation. The video chat went smoothly and the group was able to have a face-to-face conversation while Wave served as a note-taking space. The second group, however, had issues with the video chat and with lag time in the Wave interface. Audio and video were choppy, and typing in Wave did not appear in real time. They used a Dell laptop with a peripheral webcam, and they connected to the Internet via a wireless connection. The affordance of Wave that was most touted by Google was its real-time collaborative interface. In other collaborative writing spaces, such as wikis, differing document versions provide a challenge for collaboration. Wave's interface solves this problem by allowing multiple writers to collaborate on the same document at the same time. However, this affordance was negated in the second group, which experienced numerous technological troubles. The real-time function had difficulty keeping up, and the group ended up communicating out of turn, accidentally overwriting each other's contributions, and losing track of the conversation.

It would be easy to blame this problem on the Wave interface, and this was in fact the tendency of many during our "debriefing" conversation after the interaction—both graduate and undergraduate students complained of the clunky Wave interface. But a closer look at this group's media ecology reveals that the main culprit was in fact a faulty wireless Internet connection. This slow connection meant that the video chat and Wave were rendered nearly unusable. As we've mentioned above, the first group was able to use

a hardwired Internet connection (the only one available in the room). The resulting collaborative rhetorical analyses reflected the collaborative processes. The first group had a relatively well-rounded analysis based on the guidelines of the assignment, and the second group had a series of disconnected comments about the advertisement under analysis.

These interactions were instructive for a number of reasons. For one, we were able to observe how technologies like Wave are more than tools for getting the job done. As we've noted, the success and failure of these two groups was intricately linked with their complex media ecologies. Wave may in fact be a way to address certain challenges of collaborative writing situations, but in this case it was more than an efficient collaborative space. Wave and the other components of these media ecologies shaped everything about this collaborative writing experience, and the affordances of these components enabled and constrained writers in various ways. These writers were surrounded by what Fuller would call standard objects, each one as part of the ecology: laptop computers, wireless routers, network cables, and webcams. While our central focus may have been on how Google Wave affected this interaction, it was but one component that affected how these ecologies were able (or unable) to function.

Two members of our seminar decided to experiment with Wave in another context by using Wave to collaborate on a group project for a different graduate seminar. The tinkering ethic blurs the boundaries of the classroom by inviting students to use these tools in other spaces. While this exercise was not an "assignment," it did provide one more experiment for the members of the seminar. These two students saw an opportunity to plug Wave into a new media ecology, and they used that opportunity to conduct yet another experiment. The collaborative project on which these two students were working was already under way when they decided to use Google Wave. The group discovered that scheduling face-to-face meetings that all members could attend was virtually impossible. As with any group project in a graduate seminar, demanding schedules and other coursework make face-to-face meetings difficult to orchestrate. In this particular group, one member had a very demanding schedule. This led the two members of our seminar who were taking part in the project to suggest Wave as a solution. They suggested that the group meet in "meatspace" as much as possible but that other business (drafting presentation notes, etc.) could be conducted in the composition space of Wave. This way, group members could easily communicate with each other, all have access to the documents being worked on, and always have access to the most current version.

Wave proved a useful space for collaboration. Whenever users logged into the Wave space, they could immediately see whether editing had taken place because changes to a wave are highlighted in yellow. In addition, members of the group could use the "Playback" feature to recreate a timeline of the collaboration. Users were also able to make further changes directly without having to download the newest version of the document. Real-time updating ensured that the current document was always the most recent. In drafting, the group created a primary wavelet containing the draft of their presentation and used in-line comments or reply wavelets for metatext about the presentation, noting where a section still needed work, or asking for a second opinion on a section. Users were not only immediately able to see changes to the document but were also alerted to changes in the conversation. These capabilities focused their attention on sections of the draft that most needed work and allowed for revisions to be made on the fly from any networked computer.

However, in the end, the implementation of Wave did not solve this group's problems with regard to coordinating and getting contributions from all members. While Wave's affordances were seemingly a perfect fit for the problem of coordinating schedules and tracking collaborative work, in this situation the momentum of the collaboration was too difficult to reverse. The group member who was unable to attend meetings was also unfamiliar with Wave and had difficulty following the collaborative writing happening in Wave. This project was already under way when the group decided to implement Wave, and a media ecology was already in place. This might provide one explanation as to why Wave did not necessarily solve the problem. While Wave addressed certain problems in this situation, it was "plugged in" to a complex ecology. The use of Wave might have been more successful if there was a commitment from the outset to use it as a primary collaboration tool, but this would have created an entirely different writing situation. Our analysis of Wave through the lens of Fuller's theories showed us that every media ecology is a singular collection of components, and plugging in a new component reconfigures the ecology in unpredictable ways.

New Media in the English Studies Classroom

In addition to revealing the complexities of media ecologies, our various interactions with Wave showed us how difficult it can be simultaneously to use and analyze a writing technology. Holding both of these approaches in mind is a challenge, but we believe it is a useful approach for scholars of English studies hoping to incorporate new media technologies into pedagogy. The pedagogy we're describing gives teachers and students in both graduate

and undergraduate courses a way to reflect on the uses of a new media object in the classroom. That new media object can be introduced into the classroom setting as a curiosity. The professor in "Interfaces and Infrastructures" chose Wave because it was ill-defined and because it was the center of a great deal of public discussion. That is, Wave was a novelty, a tool that many users were not sure how to use. This confusion allowed the members of the seminar to let go of the desire to treat technology only as "problem solver" or as a way to collaborate more efficiently.

The English studies classroom can act as a laboratory where students examine the various affordances of technologies and in which they plug those technologies into a variety of media ecologies in order to explore a broad range of possibilities. As Fuller argues, the best way to understand a media ecology is to carry out interactions between various components. The pedagogical approach that we are suggesting allows students to carry out interactions (both within the classroom and outside of it) without always pointing those activities toward a clear goal or task. While we did in fact put Wave to use for particular ends (the writing of this article, for instance), at times we allowed ourselves to explore possibilities and play. We took this same approach when reading and responding to texts such as Fuller's *Media Ecologies*. In our various "writing object" exercises, we tested out theories, bounced them off one another, and explored possibilities. But just as our technological tinkering was balanced with the clear goal of completing an article manuscript, our theoretical tinkering was balanced with the précis exercises. If writing objects encouraged experimentation, the précis assignments reined us in and ensured that we were able to summarize and synthesize theories of new media.

The approach we've described here is not radically different from what English studies scholars often attempt. We often introduce texts and objects into our classroom in order to let students analyze and explore ideas. What we are suggesting is that new media technologies can be offered up to students in similar ways. We can expose students to such technologies as cultural artifacts that combine with other technologies and people. Students can then study the dynamic media ecologies that emerge. In this way, the English studies classroom can be a space in which we explore both interface and infrastructure. We can examine technologies, explore their affordances, and tinker, but we can also conduct such experiments with a rich understanding of the infrastructures in which such technologies are situated. These infrastructures include not only new media objects but also assumptions about writing and human bodies (among various other components). By moving

back and forth between functional and critical literacies, we can think of our classrooms as laboratories for pushing the limits of various new media technologies. The English studies classroom is obviously not a space in which students or teachers will become experts in software design or computer programming, but it can encourage students to approach new media critically and ask them to think of new media technologies as more than just tools.

Notes

1. While certain elements of Wave development will be discontinued, Google is not abandoning the project altogether. Recently, Google has announced that it will develop "Wave in a box," a complete and downloadable application that will "give developers and enterprising users an opportunity to run wave servers and host waves on their own hardware" (North 2010).
2. Richard Lanham's work in *The Electronic Word* (1995) and *The Economics of Attention* (2007) is helpful here. His discussion of the at/through *oscillation*—oscillating between looking "at" a text to notice style and looking "through" a text to read for meaning—offers a useful way of thinking about the toggling we performed during this seminar.
3. While some might argue that this account of the interface anthropomorphizes technology, the theorists we draw upon in this article (in particular, Fuller 2007) examine the drives and desires of technology. Such an approach does not make technologies into another human or ascribe human intention to such inanimate objects. Instead, it considers humans and technologies to be part of complex media ecologies.
4. Wave also offers users the ability to run their own wave servers and to control where and how their data is stored. This is because Wave is both a web application and a web protocol. In the same way that companies and universities run their own e-mail systems, the Wave Federation protocol allows companies, institutions, and individuals to run their own wave servers. Understanding Wave as both software and protocol is important. Wave is not only a piece of software like Google Docs (Google's office productivity suite). It is also a set of rules and procedures that govern how communication happens in this space. A deeper "tinkering" with Wave might have involved getting server space from our department and installing Wave.
5. In *The Exploit* (2007), Alexander Galloway and Eugene Thacker push against the view that networks are egalitarian spaces, arguing that networks exemplify "protocological control." In a network society, "political acts generally happen not by shifting power from one place to another but by exploiting power differentials already in the system" (81). Galloway and Thacker use the hacker term *exploits* to name the possible acts of resistance that can happen within the network. These exploits are about exploring the possible and are often not concerned with the immediate utility of what is hacked or created.
6. Students in the seminar were offered the option of working on an individual project

(either a seminar paper or some other project that addressed the course material). However, all members of the seminar chose to work on this article. During the revision process, two members of the seminar decided to stop working on the project. We would like to thank those colleagues — Wendy Duprey and Amy Metcalf — for help on early drafts of this piece.

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