Peer Review Re-Viewed: Investigating the Juxtaposition of Composition Students’ Eye Movements and Peer-Review Processes

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While peer review is a common practice in college composition courses, there is little consistency in approach and effectiveness within the field, owing in part to the dearth of empirical research that investigates peer-review processes. This study is designed to shed light on what a peer reviewer actually reads and attends to while providing peer-review feedback. Fifteen participants peer reviewed a student’s essay that had both holistic and surface-level errors. Using eye-tracking technology, we collected detailed and informative data about which parts of the text the peer reviewer looked at, how long the peer reviewer looked there, and where the peer reviewer looked next. These data were analyzed according to eye-movement research methodologies and juxtaposed with each peer reviewer’s comments and suggestions about the essay being reviewed during a typical peer-review exercise. Findings include an unexpected mismatch between what peer reviewers focus on, spend time on, and examine multiple times when reading and peer reviewing an essay and what they choose to give feedback about during the peer-review session. Implications of this study include a rethinking of the composition field’s widespread use of a global-to-local progression during peer-review activities.

Peer review is one of the most widely used and pedagogically vexed practices in first-year college composition courses. Many compositionists feel that it is theoretically and pedagogically sound to have students serve as reviewers and editors for each other for a number of reasons: It potentially increases student involvement in the revision and editing processes, it may alert students to the importance of considering a “real live” audience or body of readers as they compose and revise, and it should help students see in others’ writing some of the common errors or patterns present in their own compositions (e.g., Berkenkotter, 1983). Numerous textbooks designed to train new writing teachers, such as Preparing to Teach Writing: Research, Theory, and Practice (Williams, 2003) and
The St. Martin’s Guide to Teaching Writing (Glenn, Goldthwaite, & Connors, 2003), offer examples and prompts for peer-review activities, arguing that such review can serve as one of the central components of the writing process. According to Glenn et al. (2003), “peer-review groups . . . allow writers control over their work but give them the benefit of several readers’ responses” (p. 63). Williams (2003) offers an entire chapter on “The Classroom as Workshop,” and argues that “the process model led to an important change in the structure of writing classrooms. It transformed them into workshops” (p. 131). Peer review is one of the chief features of the workshop model.

However, some compositionists also argue that peer review, whether scheduled as an in-class, electronically enabled, or out-of-class activity, generally falls flat (e.g., Broman, 2005). Instructors frequently point out the tendency of many students to focus on less-than-significant aspects of their peers’ papers, creating a mismatch between the instructor’s intentions and student outcomes (e.g., Danis, 1988; George, 1984; Neubert & McNelis, 1990). Additionally, students may rely on patterns of evaluation and critique from earlier educational experiences—a reliance that does not suggest further development of writing skills (e.g., Schaffer, 1996).

Given the wide usage of peer review in composition classrooms, as well as the fairly mixed reviews that it receives at times from both instructors and students, it is important to understand as fully as possible what aspects of peer review are useful, how it can be structured productively for students, and why it sometimes does not seem to work very well. Unfortunately, while much anecdotal and theoretical (i.e., what should take place) support for peer review exists, few scholars have undertaken empirical studies to explore what actually happens during a peer-review session and how such activities contribute to the development of writing skills.

To generate data that may be useful in understanding the potential—and limitations—of peer review, we used eye-tracking technology to examine what students were attentive to during a fairly typical peer-review exercise. This technology allowed us unobtrusively to observe exactly where and for how long students were focusing on any part of a text being read, including whether they read an item once or re-examined it multiple times. In undertaking this study, we believed that, through an analysis of the kinds of items peer reviewers concentrated on during a peer-review session, we might have a better understanding of how to structure peer-review activities, both to take advantage of what students are already focusing on and to prompt students to consider other composing issues. An empirical approach to studying peer review is vital, we believe, because of the dearth of research on whether students are utilizing peer review in the ways that their instructors intend. Because eye-movement analysis provides a reliable method of inferring readers’ moment-by-moment processing activities (Rayner, 1997), it...
would appear to be a powerful tool in investigating whether composition students are indeed attending to the parts of the text that their instructor intended, as well as illuminating the relationship between what composition students focus on and spend time on in the text and what they choose to talk about during the peer-review process. Additionally, through analysis of the kinds of textual items peer reviewers attend to, we will be able to provide research-supported pedagogical implications for this nearly ubiquitous composition-class activity.

Our approach of examining readers’ attention to aspects of the essay they are peer reviewing, as a method of informing our understanding of those readers’ peer-review responses, is a departure from the norm of current approaches to composition research, which have focused primarily in the last decade on the social dimensions of language. However, we are convinced that information gathered through eye-tracking technology may greatly assist compositionists in reconsidering and developing effective peer-review pedagogies. Further, our perspective is that peer-review is not a behavior that can be observed outside of a pedagogical and social context. Ultimately, what we hope to model in this essay is a form of empirical constructivism, situating empirical data in a rich description of a common classroom practice. Indeed, given the wide usage of peer review in composition classrooms, as well as its potential to assist students in becoming more familiar with composing as a largely audience-focused process, peer review should be understood as fully as possible. In our view, this means examining as many aspects of the process as possible, in as authentic a way as possible; this study approaches such an examination from the perspective of a juxtaposition of participants’ reading of an essay with their peer-review responses about that essay. We believe that such approaches can have wide-ranging ramifications if research can inform adjustments to writing pedagogies that may facilitate students’ progress through the first-year writing sequence and prepare them for success as they meet writing challenges in other courses.

History and Background of Peer Review

Nearly all first-year college composition instructors employ peer review in some form as an instructional tool. Despite its widespread usage, however, in practice, much confusion exists about what it is and what it should do, as well as how it is most effectively approached and why (e.g., Holt, 1992; Topping, 1998). Most literature about peer review simply recommends it, or gives suggestions for its implementation, without providing empirical research that supports its use (e.g., Schaffer, 1996; Spigelmire, 1981; Vatalaro, 1990). Research-based approaches to peer review have explored differences between oral and written peer review (McAlexander, 2000), peer review and writing anxiety (Murau, 1993), and ESL variations on peer review (Mendonca & Johnson, 1994). The available scholarship
on peer review provides some insight into the numerous inconsistencies that have led to the existing confusion.

**Peer Review Scholarship**

A variety of theoretical concerns and positions permeate the scholarship in this area, which generally falls into two categories: practical and empirical.

**Practical Texts**

The largest category encompasses the practical texts, which are primarily how-to texts written for and by practitioners with the goal of describing and endorsing a particular method of doing peer review (Berkenkotter, 1984; Dossin, 2003; Elbow, 1973, 1981; Holt, 1992; Johnson, 2001; Kastman-Breuch, 2004; Paton, 2002; Sitko, 1992; Topping, 1998). These methods vary considerably, but most focus on making peer review less daunting for students. In order to alleviate problems arising as a result of peer pressure or intimidation, for example, several scholars have recommended anonymity in peer-review situations (Bean, 1979; Johnson, 2001). Others have noted that the evaluative comments expected of most peer reviewers are not beneficial for either writers or reviewers. Instead, these scholars have argued that students should provide objective observations (Danis, 1988), write questions instead of comments (Schaffer, 1996), or summarize and discuss their papers (George, 1984). To develop students’ understanding of their audience’s expectations for and reactions to their texts, Sitko (1992, 1993) has suggested that writers listen as peer readers think aloud while reading their papers. Finally, several scholars have commented on more practical aspects, such as the time involved in a peer-review session. Although most peer-review methods are described as being intended for a single class period, some have suggested that students would benefit from being in their peer-review groups longer or more frequently (Paton, 2002; Schaffer, 1996). Even though the practical scholarship amounts to the largest category on peer review, the numerous different methods, topics, and issues explored make it difficult to reach any conclusions about a “right” or “best” way to do peer review in practice.

**Empirical Research**

The studies in the empirical category primarily investigate the effects of a particular peer-review method, specifically effects on students’ revising practices (e.g., Berkenkotter, 1983; Freedman, 1992; Harris, 1986; Karegianes, Pascarella, & Pfau, 1980; Mendonca & Johnson, 1994; Neubert & McNeilis, 1990; Newkirk, 1984; Sherrard, 1994; Thomas, 1986; Zhu, 1995). Most often, these are case studies that follow a handful of students, and frequently, the purpose of the research is either to determine whether peer-review sessions are useful for students’ writing (Berkenkotter, 1983) or to investigate the effects of peer review on students’ composing and revising processes (Nystrand & Brandt, 1989). Others have
focused on student preferences, that is, whether peer review was preferred over self-evaluation (Harris, 1986) or instructor evaluation (Karegianes et al., 1980). Another strand investigated students’ verbal interaction during peer-review sessions (Freedman, 1992; Thomas, 1986). The last significant strand of empirical research on peer review examined its benefits for ESL students (Mendonca & Johnson, 1994; Zhu, 1995). As is the case with the practical scholarship, the literature in the empirical category is widely divergent, and we found no studies that actually investigate what students do during peer review.

Peer Review Themes in the Literature
We found two dominant themes running throughout this body of research that reflect two different theoretical orientations in the field of composition: the ongoing prevalence of social-epistemic approaches and a growing call for empirical studies.

Emphasis on Social Constructionism
First, many scholars recognize Vygotsky’s (1978) theories of development by emphasizing the socially constructed aspects of peer review; often such activities involve a mixture of written and verbal peer-review methods (e.g., Danis, 1982; Gere & Stevens, 1985; Hewett, 2000; Thomas, 1986; Wixon & Stone, 1977). Instead of limiting a peer-review session to a questionnaire-style worksheet, these scholars encourage more discussion-based sessions. In their study of student discussion in writing groups, for example, Gere and Stevens (1985) suggested that the benefit of oral response in peer-review sessions is its simplicity; because written comments are more structured, time-consuming, and elaborate, oral response tends to encourage more specific responses. Across the scholarship, in theoretical texts (e.g., Gere, 1990), empirical studies (e.g., Hewett, 2000), and practical texts (e.g., Wixon & Stone, 1977), another often-noted benefit to using discussion in peer-review groups is that it allows students to socially construct a much-needed language for talking about writing and a shared understanding of what that means (see Bakhtin, 1981).

Other scholars see additional pedagogical benefits ensuing from peer-review activities. In addition to helping students develop metadiscourses about writing, peer review might also assist students in taking ownership of their learning and becoming more effective agents in their own and others’ learning (e.g., Brooke, 1991; Wallace & Ewald, 2000). For instance, Wallace and Ewald (2000) argue for redesigning composition classrooms so that both teachers and students share power and input and students can find more rhetorically effective and empowering ways of voicing their concerns, issues, and ideas. One particular venue that Wallace and Ewald examine briefly is peer review, in which students have the opportunity to practice articulating their own thoughts and critiques. The authors assert that peer review can become more effective if it is part of a classroom architecture that
already favors “student input” and thus makes room for “student agency” (p. 84). Conversely, Tobin (1993) asserts that peer reviewers may hold back on their comments because they don’t want to hurt their classmates’ feelings and because they want to protect their own interests.

**Call for Research**

The other common theme is a nearly universal call for further research on peer review. Most scholars have recognized that, although the body of literature on this topic is immense, very few aspects of peer review have been investigated empirically. Topping (1998), for instance, has commented that more research is needed “with improved methodological quality and fuller and more detailed reporting of studies” (p. 269). Likewise, DiPardo and Freedman (1988) have noted the absence of any research on what students do during peer review and have suggested investigations of the social dynamics at work within peer-review groups and how these dynamics affect the learning situation:

Although practitioner endorsements commonly share the assumption that the writing process is somehow supported by having students gather together for the purposes of providing one another with feedback on writing, response groups have been seldom studied to illuminate just what processes are thereby supported, or how. Thus, although writing groups have assumed an important place in educational practice, teachers are left to reflect upon them mostly in light of their own experiences or those of colleagues. (pp. 119-120)

Beyond these two commonalities, however, there is very little consistency or agreement in the available literature on peer review. In fact, even the terminology used to describe peer-review activities is widely divergent. At least five different terms can be found in the scholarship to describe the act of having students examine each other’s writing: peer review, peer response, peer editing, peer critiquing, and peer evaluation (e.g., Harris, 1986; Holt, 1992; Karegianes et al., 1980; Neubert & McNelis, 1990; Rubin, 2002). Because these terms are neither defined nor distinguished from one another in the literature, it appears that they are randomly assigned and considered synonymous. This lack of consistency in terminology is reflected in the widespread variation in philosophies, strategies, theoretical frames, and research methods. As one scholar mentions, “The literature on peer assessment between students in higher education is at an early stage of development, very variable in type and quality, and scattered and fragmentary in nature” (Topping, 1998, p. 267).

With respect to research on peer-review activities, Smit (2004) asserts that “there is not a great deal of research being published on composing processes, and the reason may very well be that researchers do not know where to go from here” (p. 75). If peer review is an integral part of the composing process, then it deserves
our scholarly and critical attention—particularly given its widespread use in composition classrooms and the call for further research into it. Until relatively recently, we have been limited to research practices and methods that have focused on direct observation, studies in context, and case studies, the practices that Smit (2004) points out. By utilizing eye-tracking technology, however, we can be more attentive to what students are actually examining when they undertake peer-review activities.

The Possibilities of Eye-Movement Research: Some History and Background

For more than a century, the recording and analysis of readers’ eye movements have been a powerful research tool in literacy and reading studies that has revealed enormous amounts of information about, and insight into, the reading process (e.g., Huey, 1908/1968; Rayner, 1998). One reason eye-movement research has been such a fruitful line of inquiry revolves around its ecological validity; recording and analyzing a reader’s eye movements demands no extra task to be undertaken by the reader. Other common reading-research techniques, like think alouds, response-time tasks, cloze activities, or comprehension tests, all add an additional non-reading element to the reading process in order to provide data about the reading process. In contrast to these somewhat artificial additions to the process, an eye-tracking apparatus collects data about reading while the participant is doing nothing but reading.

How Eye Movements Reveal Reading Processes

Eye-movement research is an ecologically valid research tool, but importantly, it also reliably yields valid information about reading processes. The following section outlines the type of information eye-movement research provides.

Physiological Limitations

Understanding what the eyes can reveal about reading processes requires first understanding the physiological limitations of the eyes as an information source. Although we may have the perception that our eyes smoothly glide across the page as we read, our eyes actually make a series of very short pauses, called fixations, throughout the reading process. This phenomenon was first observed by Emile Javal in 1879 (reported in Huey, 1908/1968), and further research would demonstrate that the purpose of a fixation is to provide the reader with in-focus graphic information.

What is physiologically in focus during a fixation is much smaller than what might be expected. Of the three regions of viewing information to which the eye has access during a fixation—the foveal, parafoveal, and peripheral regions—in-focus information is limited to the foveal region. This small area of vision subsumes 1-2 degrees of visual angle, or about 3-6 letter spaces around the point of
fixation. The parafoveal region extends about 24-30 letters around the point of fixation, and the peripheral region includes everything in the visual field beyond the parafoveal region (Just & Carpenter, 1987). The fovea is concerned with processing detail, and the farther away from the fovea an object is viewed, the more difficult it is to identify it.

In terms of reading, when letters are viewed within the fovea, they are distinguishable. When a random string of letters is viewed outside of the fovea but within the parafovea, it is much more difficult to distinguish letter information. In other words, what is physiologically in focus during a fixation is for the most part the word that is being fixated. Note that this is a physiological limitation, not a perceptual one. When letters in the parafoveal field are presented in context, as they are in a normal reading situation, they can be distinguished sufficiently to be useful under certain conditions. Nevertheless, it is because the in-focus viewing area is so small that one important function of eye movements during reading is to move words into this viewing area where they can be clearly seen by the reader.

In addition to a small in-focus viewing area, the eye is also limited as an information source by the fact that during reading it must be stationary to deliver usable data to the brain. Following each fixation, there is a saccade, or movement, that is extremely short and so fast that it allows no useful information to be gained from it (Just & Carpenter, 1987). That is why readers’ eyes make fixations instead of simply gliding over the text—no usable information is gained during the movement of the eyes, an early finding in the eye-movement field that has been replicated many times since (e.g., Dodge, 1900; Rayner, 1997; Wolverton & Zola, 1983). The combination of the eye having a small in-focus viewing area with the fact that the eye must fixate in order to retrieve usable information means that, physiologically, in order to “see” a word, it is usually necessary to pause and look right at it. However, strong syntactic and semantic contexts allow readers to perceive words that are in the parafovea, so that a portion of the words in the text, especially function words, do not need to be directly fixated. For this reason, readers typically fixate between two-thirds and three-quarters of the words in a text (Fisher & Shebilske, 1985; Just & Carpenter, 1987; Paulson, 2002; Rayner, 1997). During normal reading, the combination of reader expectation and prediction, and the context implicit in the text they are reading, allows readers to visually skip words but still feel as though they have seen and read every word (Ehrlich & Rayner, 1981). In terms of the present study, an important finding about word fixations from eye-movement research is that readers fixate problem areas of the text—ambiguous words, misspelled words, and so on—more frequently and for a longer duration than other areas of the text (Ehrlich & Rayner, 1981; Frazier & Rayner, 1982; Zola, 1984).

Readers make rapid decisions about where to move their eyes next and how long to keep them there, based on moment-by-moment attention allocation and
information processing. That is, where a reader fixates during reading is a reflection of the part of the text to which the reader is attending (Just & Carpenter, 1987; Morrison, 1984), and eye-movement data reflect “moment-to-moment processing activities of readers” (Rayner, 1997). So while eye movements cannot perfectly reveal whether a reader has comprehended a given word, “the time a reader spends on a word or a phrase can indicate when a process occurs and how its duration is influenced by characteristics of the text, the reader, and the task” (Just & Carpenter, 1987, p. 5). There is a strong link between where a reader fixates and moment-by-moment attention (Chaffin, Morris, & Seely, 2001), although this should not be interpreted as revealing what the reader is thinking. However, in terms of reading processes, “by examining where a reader pauses, it is possible to learn about the comprehension processes themselves” (Just & Carpenter, 1980, p. 329).

Readers Look Longer at Difficult Words

As mentioned previously, eye-movement research has found that readers skip a portion of the words in a text. However, that does not mean that readers simply skip every second, third, or nth word; on the contrary, the words that are actually looked at by a reader show a focus on gaining information from the most useful parts of a text. For example, content words, which carry much of the semantic meaning of the sentence, are looked at more often than function words, which have a more syntactic, grammatical role. The difference can be great: Carpenter and Just (1983) found that participants fixated 83% of the content words and 38% of the function words in their study. In short, readers tend to fixate words that provide the most information and are of the most use to them while reading. In general, readers’ fixations last around a quarter of a second, or approximately 200-250 milliseconds (msec) (Rayner, 1998).

Class of word (e.g., content vs. function) is not the only variable in determining whether a word gets fixated by a reader. An important aspect of reading processes that eye-movement analysis can reveal is that of difficulty. That is, eye movements are very good indicators of whether a reader found a word (or phrase, or sentence, etc.) difficult to process. A widely reported finding in eye-movement research is that low-frequency words receive longer fixations than high-frequency words (Rayner & Pollatsek, 1989), which simply means that the more unfamiliar a word is, the longer a reader has to look at it in order to process its meaning. The same thing happens when a reader reaches an ambiguous word in a sentence (Frazier & Rayner, 1982). Importantly, for the purposes of this project, eye-movement research has shown that readers look longer, and more often, at misspelled words (Ehrlich & Rayner, 1981; Zola, 1984). Note that this does not mean that a researcher can know for certain whether a given word was difficult for a reader to process. In general, however, eye-movement research has shown that anomalous,
ambiguous, or misspelled words receive more and longer eye fixations because of
the heavier processing load associated with making sense of that portion of the
text—in short, anything a reader notices as being difficult or wrong is apt to re-
ceive longer and more frequent eye fixations.

Because we are interested in what the peer reviewers actually pay attention to
while reading, eye movements provide an important source of data. By examining
our participants’ eye movements on the student essay they were peer reviewing,
we were able to understand what parts of the essay they focused on and examined;
whether the surface errors that are in the essay received more attention than other,
on-error parts of the essay; and how their reading processes paralleled, detracted
from, or otherwise reflected their peer-review processes.

Methods

Apparatus
Eye-movement data were collected with an Applied Science Laboratories Model
504 eye tracker that sits in front of a typical computer work station. The 504 uses
a remote pan-tilt camera, which negates the need for a chin rest or bite bar, though
a forehead rest was used to insure accurate data recording. This unit is unobtrusive
to the degree that if readers were not told that they were being eye tracked, they
would not be aware of the process. The eye tracker records eye movements by
tracking a reader’s pupil and corneal reflections with an infrared reflection source
and is accurate to within .5 degrees of visual angle. Spatial and temporal aspects of
readers’ eye movements were analyzed using Fixplot and Eyenal software supplied
by Applied Science Laboratories. In addition to having access to the data in
statistical form, fixations and saccades are plotted directly on digital reproductions
of the text and include fixation duration, fixation number, fixation location,
saccade direction, and saccade length.

Texts
All texts that students read were displayed on a 19-inch, flat-screen monitor with
normal text size and ratio. Participants sat in front of the computer screen and
keyboard as they would when normally reading from a computer monitor in a
computerized classroom. We chose the student text and peer-review assignment
texts so that they would resemble as closely as possible the kinds of texts that
students in first-year composition courses would encounter at our university.

To develop a typical peer-review assignment prompt, we surveyed approxi-
mately 20 in-print, first-year composition textbooks, paying particular attention
to the peer-review activities described in each. In almost all cases, students are
encouraged to first read their colleague’s work globally, commenting on major
issues of content and organization. Texts that prepare new instructors to teach
writing recommend much the same approach. For instance, Glenn et al. (2003) offer new composition instructors a list of 14 types of questions that can be used to structure peer-review sessions. The list begins with questions focusing attention on how well a draft meets the aims of the assignment, how evident its thesis and main purpose are, and how clearly it is organized. At the end of the list, questions about sentences, words, and tone ask students to pay attention to surface-level errors and comparable issues. Interestingly, based on our conversations with instructors both at our home institution and at a national writing conference, such a movement—from global to local or surface-level issues—often parallels many instructors’ grading priorities, with more weight often given to content as opposed to mechanical issues. With such an emphasis in mind, we ultimately decided to draw our peer-review activity from our university’s English Composition Program’s self-published Student Guide, which itself has a very similar approach—prompting students to focus first on global issues before moving to mechanical and grammatical issues. Based on such directions, we devised the following peer-review questions to ask our participants:

1. What advice would you give the author to help him or her improve the introduction?
2. Does the introduction seem to meet the requirements of the assignment?
3. Does the writer clearly express how or why this experience was significant?
4. Are there any problems with this paper that you would want to point out to the author?

Before beginning the peer-review session, these questions were introduced to the participants so they would have an idea of the focus of the peer review. During the peer-review session, these questions were then asked directly of the participants in addition to any other participant-generated questions or feedback that arose.

The essay text, which was the focus of the peer-review session, is the introductory section of a larger essay (hence the use of the word “introduction” in the first peer-review question, above). This introductory section is comprised of two paragraphs and is 366 words in length (see Appendix). Using the two-paragraph introduction as the text the participants peer reviewed allowed us to focus on both surface-level issues as well as holistic issues (holistic mismatches between the prompt and the essay being more pronounced in the introduction than in the body of the essay, for example). The essay is an actual student’s essay that we solicited from an experienced composition instructor with the student’s permission; in addition to the introductory paragraphs, we provided an essay assignment prompt, set off in italics at the top of the text to be peer reviewed. The assignment prompt read as follows:
Write a narrative essay about a single experience or event that has had a significant impact on you. Be sure to focus on just one moment or occasion; don’t try to recall a series of events in an essay of this length.

The essay itself was left unaltered and included a holistic mismatch between the prompt and the essay, as explained in detail in the Data Analysis section. Essentially, the assignment prompt we provided called for a narration of a single experience; the essay, however, did not quite follow that prompt and instead related numerous experiences. In addition, there were 10 surface-level errors in the essay, including errors of capitalization, spelling, and incorrect word forms. For example, in the following sentence from the essay, the author wrote the word “were” instead of “where”: “My days and nights at the Quarry are some of the best memories, and it is the place were we all watched each other grow up and this summer we watched everyone move away from the small town.”

Participants
Seventeen students (eleven females and four males) from a first-year composition course at a Midwestern university volunteered for this project and were paid an honorarium of a $25 gift card to the university bookstore. All participants had prior experience with college-level peer review and had successfully completed other composition courses at the college level. These students were all native English speakers and were traditional college-age students. Two participants were unable to be eye tracked with sufficient accuracy and were not included in the pool of participants; a total of 15 students were thus eye tracked and analyzed. Peer-review sessions were done individually and lasted less than one hour.

Procedure
When participants arrived for their session, the project was explained to them, including a familiarization with the four broad peer-review questions (above). The eye tracker was introduced and then calibrated to their eyes, a process that insures reliable and accurate data collection. Participants then read two practice texts while being eye tracked in order to make them comfortable with the set-up. After the practice texts, the student essay that participants were to peer review was put on the computer screen, and participants were encouraged to read the essay one time through before beginning the peer-review session.

When participants were ready to begin the verbal peer-review session, this article’s third author and an experienced composition instructor, asked them the open-ended questions described above, in addition to follow-up questions and anything else the participants wanted to talk about regarding the essay. The text remained on the screen, and participants’ eye movements were tracked during this portion of the peer-review session; participants were encouraged to refer to the essay throughout. This portion of the peer-review session was designed to
parallel an in-class verbal peer-review session, where the peer reviewer reads the student’s essay and then has a discussion with that student about the essay. This was an organic discussion that followed up paths of inquiry suggested by the peer reviewer, using the four questions as guides. In addition, each participant had an opportunity to add additional comments or to converse in general about peer review at the conclusion of the session. While this project took place outside of the classroom environment, every effort was made to replicate an actual peer-review activity and to make the experience as authentic as possible for the participants.

Data Analysis and Results
This section combines information about data analysis with the results of that analysis. Aggregate eye-movement and peer-response data are presented first with an emphasis on places where the two types of data intersect. Following this overview of all the participants’ data, we provide an in-depth analysis of one of the participants, using thick description and qualitative analysis as means of presenting the data and findings.

Aggregate Data
As noted earlier, participants responded to four basic peer-review questions verbally during the peer-review session. Before they began reading the essay, participants had the questions read to them; they then responded to these same questions during the peer-review session itself. The questions asked of these peer reviewers lent themselves to two overall types of feedback: feedback that focused on holistic issues and feedback that focused on surface-level or mechanical issues. Because participants were providing peer-review feedback verbally in a discussion-type environment with the interlocutor, questions were also followed up with more questions and requests for more feedback as the peer-review session progressed. That is, while the participants had access to broad, guiding questions before and during the peer-review session, the peer-review session was also organic in that all participants’ questions and comments were part of a larger dialogue with the interlocutor.

The text to be reviewed contained 10 specific surface-level problems ranging from capitalization errors to misspellings, as well as two holistic issues stemming from the mismatch between the assignment prompt and the essay. The first holistic issue revolved around the question of whether or not the writer focused “on just one moment or occasion.” The other issue was a question of whether or not the writer “clearly expresses how or why this event was significant.”

Because we were interested in collecting and analyzing eye-movement data during the entire verbal peer-review process, the eye-movement record of each reader spans not only the initial reading of the essay—each reader read the essay
once through before beginning to give peer-review feedback—but also what parts of the essay the participant examined while giving feedback about the essay. While the totality of each reader’s eye-movement record was considered for most aspects of the analysis, some parts of each eye-movement record were separated out for additional analysis where doing so would illuminate aspects of the participants’ peer-review feedback.

**Eye Movements during the Initial Reading**

The participants in this study were asked to read the essay one time through before beginning peer review, and this initial reading is analyzed here in order to provide information about the participants’ reading processes. The average percentage of words all readers fixated in the initial reading of the essay was 62.09% (SD 9.21%), and the average duration of all readers’ fixations on the initial reading of the essay was 209 milliseconds (msec) (SD 18 msec). Both of these figures are well within the normal fixation percentages found in existing eye-movement literature, as described previously. Based on eye-movement measures, the initial reading of this essay appears to have been read normally—that is, reading the essay for the purposes of subsequent peer review did not appear to alter or disrupt what are usually considered to be normal reading processes.

**Eye Movements during the Peer-Review Process**

In “normal” reading, readers fixate about two-thirds of the words throughout a given text, and this is approximately the number of words participants fixated when they read the essay one time through (as described in the previous section). During the subsequent verbal peer-review process, however, a completely different reading process was observed, as participants examined the essay, searched for problems, thought about what advice to give the reader, and so on. During this aspect of the peer-review process, participants fixated many words multiple times in an atypical eye-movement pattern. The fixations were short—averaging 177 msec (SD 13 msec)—and instead of a fairly regular spacing of fixations across the text, participants would look at a given word or phrase several times, and then skip to another word or phrase in a different area of the text that would then again be fixated multiple times, and so on. This is a different eye-movement pattern overall than the initial reading of the essay—and what we usually think of as “normal” reading—but it is reasonable to expect this type of pattern of eye movements since participants were reading the text multiple times while examining it for items on which to provide peer-review advice.

Below, we begin to weave in our participants’ peer-review feedback to the data presentation. Although our inclination is to begin our presentation of participants’ peer-review feedback with holistic issues and move from there to more surface-level issues, we instead follow our participants’ overwhelming predilection for foregrounding surface-level issues. As will become evident, our partici-
pants were more likely to center their comments around word-level errors in the text as opposed to overarching mismatches between the prompt and the essay.

**Surface-Level Issues**

According to eye-movement research, anomalies or misspellings in text should result in more fixations and longer durations on those misspelled words relative to other words in the text (Ehrlich & Rayner, 1981; Zola, 1984). Indeed, in this study, the average number of fixations readers made on error words was significantly higher than the average number of fixations readers made on all other words in the text (paired \( t \) test, \( (14) \) \( p = .0124 \)). Likewise, comparing readers’ fixation durations on error words versus all other words in the text demonstrated that fixations on error words were significantly longer (paired \( t \) test, \( (14) \) \( p = .0005 \)). In other words, participants made more and longer fixations on words in the text that were misspelled or otherwise not used correctly than they did on all the other words in the text, as the eye-movement literature would predict. However, while the study participants visually examined the errors in the text thoroughly and repeatedly, their peer-review feedback did not reflect this level of attention. Typically, despite the majority of participants beginning the peer-review session by commenting in general on surface-level errors, only one or two participants would comment on a given error, even when prompted for specifics.

This is not to say that participants ignored surface-level errors; in fact, they foregrounded them. However, they tended to talk about surface-level issues in broad terms rather than by identifying specific errors, even when directly prompted. In fact, more than half of these peer reviewers began the verbal portion of the peer review by commenting on general mechanical concerns without specifically naming any errors. Nine of the 15 participants responded to the first question, “What advice would you give to help the writer improve the introduction?,” by offering suggestions on such general surface-level concerns as grammar, punctuation, spelling, and mechanics. A representative response by one of our participants to that first question is, “I’d tell them to look at their spelling and punctuation.”

However, even when they initially suggested revision to “spelling and punctuation,” as the above participant did, they chose to point out a capitalization error instead: either the lowercased “the” at the beginning of a sentence, or the all-capitalized “LOVE” in the last sentence.1 This focus on capitalization errors was typical of all the peer reviewers during the verbal portion. Of the 10 surface-level errors, the two most commonly identified were these same two capitalization “errors.” Spelling, punctuation, and grammar—the most frequently named general problems—were rarely, if ever, identified as specific examples of surface-level errors. Even though these peer reviewers were commenting on the general “spelling and punctuation” concerns, they were mostly limiting themselves to feedback about capitalization errors when they were asked to identify specific errors.
Because of the mismatch between what participants paid attention to in the text, as reviewed by eye-movement analysis, and what they articulated during the verbal peer review, we added another level of analysis to the initial eye-movement analysis of the error words. In addition to the above contrast of error words to the other words in the text, we also chose a “comparison” word for each error word that was similar to the error word in order to examine whether there was some aspect of the word itself (or its features) that was attracting attention by the participants but not being viewed as an error. For example, the comparison word for the error word “play” is another instance of the word “play” in the essay, but where it is used correctly:

**Error word “play”:** We grew up outside play sports, games, swimming, and just sitting outside and talking.

**Comparison word “play”:** the sand pit is close to the house and is soft beneath our feet when we play late night games of volleyball.

This gave us another dimension of comparison for each error word where we were able to directly compare how participants responded to an error word by examining it in contrast to a similar, “control” word that is used correctly in the essay. In comparing how each reader viewed the “error” words and the “comparison” words, we found that the number of fixations on error words was significantly higher than the number of fixations on comparison words (paired t test (14) p=.0020). Similarly, the duration of fixations on error words was significantly higher than the duration of fixations on comparison words (paired t test (14) p=.0029). Therefore, as a whole, readers spent more time and attention on errors than they did on comparable, non-error parts of the text. This further supports the eye-movement supposition that mistakes will garner more and longer fixations than other parts of the text, as well as our original analysis that readers were responding to the error words as errors. The amount of time and attention participants gave the errors in the essay while reading is reflected in their foregrounding surface-level issues in their peer-review responses; they did not, however, articulate many specific errors. That participants were spending so much time attending to these errors during their reading, then voicing general concerns about errors in the text, but were not able, or willing, to discuss specific errors may be an indication of a lack of ownership in the peer-review process or uncertainty about their abilities to respond in general. This issue is revisited in subsequent sections.

**Holistic Issues**
While several participants responded generally about the writer’s description of the setting, less than one third of the participants began the peer-review session by
suggesting holistic revisions; that is, identifying their concerns with how the writer handled the assignment prompt. As described above, the assignment prompt appeared in italics directly above the body of the essay so that participants could refer to the prompt during the entire peer-review session. This was particularly important because there is a holistic mismatch between the prompt, which the researchers provided, and the essay in that the prompt calls for a single experience and the essay relates numerous experiences and memories. Only two of the participants immediately identified a mismatch between the assignment prompt and the essay. However, even when participants didn’t begin their peer-review discussion by identifying such holistic concerns, these concerns did eventually come up during the course of the peer-review session, usually in response to the peer-review questions that directly addressed holistic issues: “Does the introduction seem to meet the requirements of the assignment?” and “Does the writer clearly express how or why this event was significant?”

Only four of the 15 participants initiated some sort of discussion of the assignment prompt and text mismatch, while six other participants were able to identify the mismatch between the prompt and the essay when directly asked. Five participants neither initiated a response nor offered a supported response to the holistic questions. With two-thirds of the participants noticing the problem, it is interesting that they chose not to pursue the topic in their discussion unless directly prompted for that information.

One possibility for this lack of discussion may be that these peer reviewers were simply unsure about how to revise such a global problem, so they opted not to discuss it in any kind of depth. Indeed, these global concerns triggered uncertainty for the participants. Nearly half of the participants changed their minds when asked the two questions that dealt with adherence to the assignment prompt; for example, the peer reviewers would respond to the first question with a yes-or-no response, but would later change that response, either after being prompted to explain their responses or after being asked the second question. One participant, when asked “Do you think this introduction meets the requirements of the assignment?” exemplified this trend by responding, “for the most part.” She then continued by commenting on the writer’s focus on more than one situation or occasion in the essay: “She’s [the writer] combining on the times they went there, so it’s not really just one moment or occasion, it’s kind of many.” While it would appear that she was still a bit unsure of her response at that point—especially with her use of phrases like “not really” and “kind of”—in the next sentence, she commented more confidently that the writer instead focused on “a series of events in the sense that she used all the different times that correlate all these memories.” At that point, it appears that this participant had convinced herself of the problem, and she therefore changed her initial response to the question about the essay meeting the requirements of the assignment: “So, I guess not.” A similar approach
to the holistic-mismatch questions was identified in other participants as well; five others had similar patterns in which their initial responses were amended as they talked through their reasoning. Indeed, it should be noted that these students, based on previous experiences with peer review in the classroom, may have felt that the original prompt for the peer-review exercises was not particularly important—hence their seeming lack of attention to it initially. That is, they may have felt that their advice as readers was more significant than adhering to a particular prompt—a point that should be kept in mind by instructors when developing peer-review exercises with particular rhetorical or content issues in mind.

The participants’ eye-movement patterns lend some explanation to the participants’ tendency to avoid initiating discussion of the assignment prompt/essay mismatch. In contrast to the essay itself, in which participants fixated an average of 62.09% of the words, only 35.4% (SD 22.38) of the words in the prompt were fixated during the initial reading, a significant difference (paired t test, (14) p=.0002). Interestingly, the fixation percentages of the prompt ranged from zero to 71%, with 11 participants fixating less than 50% of the words in the prompt and three of those fixating less than 1%. This type of eye-movement pattern is generally not found during normal reading and is more indicative of a skimming or scanning approach overall. In short, participants did not read the prompt in the same way they read the essay during the initial reading of both.

After the initial reading, during the verbal peer-review part of the session, there was a marked rise in interest in the prompt. Throughout the peer-review process, participants fixated aspects of the prompt an average of 69.07 times (SD 53.55). In addition, they “entered” the prompt—made a fixation on one of the words in the prompt from a location elsewhere in the body of the essay—an average of 30.07 (SD 13.27) different times. This indicates that an average of 30 different times during the peer-review process, participants decided to get information from the prompt, presumably to assist in evaluating holistic aspects of the essay. That this amount of activity in the prompt during the peer-review process was so markedly different than the amount of activity in the prompt during the initial reading suggests that peer reviewers may approach a peer-review situation from a perspective that does not foreground holistic issues, as we take up in the Discussion section, below.

**Issues of Ownership**

Nearly all of the participants in the study expressed uncertainty about their peer-reviewing abilities on both surface and holistic levels of feedback. For example, three participants mentioned that they had concerns about punctuation, but were unsure what the problem was. In fact, not only were participants uncertain about how to correctly identify specific examples of a broad problem they had identified—“punctuation,” for example—but they also seemed reluctant to take
ownership for their recommendations. Few peer reviewers used directive, unapologetic comments like “this writer needs to . . . .” Even though the actual writer was not present during this session, these participants’ responses were cautious and reflected a consideration of the effects on the writer’s ego. For example, a few participants carefully phrased their responses to focus on what “I would do” instead of what “the writer should do.” This strategy could be a way for peer reviewers to make clear that they are not providing “the answers,” but only advice. In that way, these participants may have been enacting a form of the tacit cooperation that allows for both saving one’s own face and protecting the face of others (Goffman, 1967). Along those same lines, many participants chose to talk mostly about right-or-wrong issues such as the emphasis on capitalization errors discussed previously. While a third of the participants used “right-or-wrong language” when they discussed spelling concerns, other participants used this language when moving beyond spelling errors to imply that there is a right way and wrong way to write; in the section that follows the summary, below, we focus on a participant who exemplifies these trends and provides examples of these issues.

Summary of Eye-Movement and Peer-Feedback Data

When participants read this essay one time through, before beginning to give peer-review feedback, the process was typical by eye-movement standards for reading at the college level. That is, participants fixated on just under two-thirds of the words in the text for an average of a little under one-quarter of a second per fixation—typical eye-movement measures for reading. When they read the text during the peer-review part of the session, however, participants examined the text extremely thoroughly, looking at the vast majority of words multiple times. As eye-movement analysis would predict, participants looked at the errors in the essay far more often, and for far longer, than any other words in the essay. This level of scrutiny reflects the participants’ focus on surface-level errors in the text. However, although these peer reviewers foregrounded surface-level errors in their feedback, and spent large amounts of time and attention on the errors compared to other words in the text, they were still reluctant or unable to draw out specific errors. While they typically only glanced at the assignment prompt before beginning to read the text (looked at one-third or fewer of the words), while offering peer-review advice, they tended to look at the assignment prompt an average of 30 different times. That is, they would read part of the essay, look at the prompt, look back at the essay, re-read the prompt, and so on. In most cases, participants did not pay attention to the prompt, or discuss holistic issues, until well into the peer-review session when they began the essay-prompt-essay pattern of eye movements; this aligns with the participants’ peer-review feedback regarding holistic issues and reflects the participants’ approach as one that does not foreground holistic issues. These findings are discussed in the focus on one of the participants, below, as well as the Discussion section that follows the case study.
Carla’s Peer-Review Approach

In this section, we focus on one of the participants, Carla, whose peer-review processes exemplify the strategies, approaches, and struggles typical of most participants in this study, and, perhaps, most students in peer-review situations.

First, Carla provides a good example of a student who may not have a clear understanding of the goals of peer review. Her comments during the peer-review session implied a belief that peer review should focus primarily on surface-level concerns and right-and-wrong notions of writing. Also, perhaps because she was unclear about the goals, the uncertainty she demonstrated about her peer-reviewing (and writing) abilities—an uncertainty that was noticeable in nearly all of the peer reviewers studied—was even more pronounced.

Carla began the peer-review discussion by asking for clarification on what kind of advice to offer, though her question clearly limited the possibilities to two equally surface-level options: “Like grammatically, or like punctuation and stuff?” Without waiting for the clarification, though, she quickly moved on by identifying some specific examples. In this regard, Carla’s peer-review response was unique: Of the 15 participants, Carla was the only one who responded to the first question by identifying a specific surface-level error, while others began by talking in generalities about surface-level errors. Even so, Carla’s emphasis on surface-level issues exemplifies the trend noted in most other participants.

Surface-Level Issues

First, Carla said that she “noticed” a capitalization problem: the “the” capitalization error, a word she fixated 14 times for 3,225 msec, which is more than six times the average duration for all non-error words. In contrast, Carla fixated another “the” in the text (one that was correctly capitalized) near her average fixation duration. These data indicate that Carla did more than merely notice this error. In fact, not only was her attention drawn to that error for a much longer time than it was with other words, but it was also drawn there much more frequently. Carla only fixated twice on the comparison word, but fixated the error word 14 times, a clear indication of continued cognitive attention. Carla’s increased attention to the “the” error is not unusual, however, and is, in fact, predicted by eye-movement research as outlined previously and as observed in the other participants.

Carla’s eye-movement pattern with the “the” error was not an anomaly; in fact, she had very similar patterns on half of the other errors. For example, she fixated the misspelled word “vollyball” 10 times for a total of 2,624 msec, which is far longer than other, non-error words in the text. Like the “the” error, she spent a significantly longer time attending to this word, including returning to the word from other parts of the text multiple times, which indicates that it bothered her at least enough to distract her when she tried to move on to other parts of the text. However, unlike the “the” error, she chose not to say anything about the “vollyball” error. While multiple re-examinations for long periods of time did not necessarily
mean that Carla had identified the item as an “error,” the peer-review discussion was designed to allow participants the opportunity to talk about any and all questionable areas they found. Carla understood this, as her verbal feedback about the “the” error indicates. However, even when directly asked, she expressed her belief that there were no more problem areas to discuss, which reflected the approach taken by most of the other participants as well.

Like the “the” and “vollyball” errors, Carla re-examined other error words multiple times for long durations as well. Table 1, below, depicts the number of fixations and amount of time Carla spent on five of the errors in the text, compared with the number of fixations and amount of time she spent on the error comparison words (the words used for intratextual comparisons of eye-movement measures during analysis).

Table 1: Carla’s Examination of Error Words Versus Comparison Words

<table>
<thead>
<tr>
<th>Error</th>
<th>Number of Fixations</th>
<th>Length of Fixation Duration (msec)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fixations on Error</td>
<td>Fixations on Comparison</td>
</tr>
<tr>
<td></td>
<td>Duration on Error</td>
<td>Duration on Comparison</td>
</tr>
<tr>
<td>play</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>were</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>the (cap.)</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>volleyball</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>the (that)</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 1 illustrates Carla’s much longer durations and more frequent rate of examination on the error words as compared to the non-error comparison words. Clearly, Carla found the error words problematic, yet did not mention any of these errors beyond the capitalization of “the,” even when directly asked if there were any more errors to discuss.

Carla also identified a punctuation concern, but she expressed some difficulty when explaining it: “There’s a lot of semicolons, but I don’t know if that’s supposed to be there.” It appears that she was struggling with the language of writing critique at that point; in fact, she identified it as the language of “other” when she confirmed her response: “A lot of semicolons, or commas; however they call them, the period and the comma” (emphasis added). In this way, Carla seemed to be distancing herself from the more specific language likely to be used by composition instructors, who are, presumably, the “they” she mentions. Perhaps this distancing was simply a result of her uncertainty or lack of knowledge about the specific grammatical rules involved in semicolon usage. Alternatively, perhaps Carla was attempting to adopt the persona of teacher—or at least what she perceived as
that persona based on her prior experiences—a possibility that we raise again in the Discussion section of this article.

Additionally, Carla’s attention to the semicolons in the text made it clear, too, that, like most of the other participants, she was focused on surface-level, right/wrong issues: “I noticed that there were a lot of them. I mean, maybe they’re not incorrect but . . . ” (emphasis added). She revisited this point later when she added, “Also, there is a significant number of semicolons and although they may be correct they are something that catches the reader’s attention.” Interestingly enough, there were only two semicolons in the peer-reviewed text. This fact offers a strong indication that Carla was indeed being a careful peer reviewer in the sense that she was not merely glossing over the text looking for blatant misspellings or other surface-level errors, a complaint frequently reported by the participants of this study about their own experiences with classmates peer reviewing their papers; rather, she was considering the kinds of surface-level errors that the writer may have missed and that the teacher would likely acknowledge.

**Holistic Issues**

Carla also exemplified a trend noticed in many of the participants for offering quick and possibly ill-considered responses to the closed question, “Does this introduction seem to meet the requirements of the assignment?,” by responding “Yeah.” Not until she was further prompted to explain, “In what way?” did she continue to explain, and, in the process, change her initial response. She added, “It talks about it. Well, no I guess it really doesn’t. It says a single experience or event, but it’s not really talking about a single one. It’s talking about all the times that they went to the quarry and how it impacted them all the time that they went.” Of course, it’s possible that she simply needed more time to respond, or that she only came to understand the mismatch by talking herself through it. In any case, just as the capitalization error she introduced at the beginning of the peer-review session, this holistic mismatch prompted considerable attention. For example, during the course of the session, Carla looked back and forth between the essay and the prompt 40 times, above the average number of entrances made by the other participants (30.07). Her continued attention to the assignment prompt indicates that she was actively and deliberately seeking out and comparing the information in the prompt with the text throughout the peer-review session, as was the norm with this group of participants.

**Safety Language**

Although she never offered any overly critical or harsh comments, when the discussion started to wind down, she returned to a more emotion-driven approach, making it seem as though she were trying to soften the blow for the writer’s ego. When asked, “Would you say anything else to this writer?” she commented, “I liked it. I thought it was good.” Carla’s affirmation was not unusual;
in fact, several participants made such approving comments. There seems to be both a sort of safety net as well as a built-in disclaimer in these kinds of responses. For Carla, this comment seemed to be positioned as a way to conclude the peer-review discussion. In that way, “I liked it” seemed to be a safety net or a way to maintain a friendly relationship despite the “criticism.” Carla may have felt that writing is such a personal act that any criticism of it, however constructive or warranted, may be taken personally, and her comment seems strategically placed toward the final words of the discussion in order to “apologize” for any hurt feelings.

These “like” comments also seem to have a built-in disclaimer. In short, this appears to be code for dismissing the language of the “other” (the teacher-language). “I liked it” might mean, simply, “I’m only criticizing because I have to, but if it were up to me, I would keep your writing the way it is,” which could be a direct example of the kind of tacit cooperation in face-saving that Goffman (1967) discusses. When Carla said she liked it, she also added, “I thought it was good.” When prompted to explain further—“What’s good about it?”—Carla explained, “It’s very descriptive. It makes you see things, surrounded by a small forest and large rocky walls rise from the surface. It gives you a picture. I like that.” This may be more instances of safety language, or possibly that she is actively searching for something positive to say about the writing.

What is most interesting about Carla’s comments is that despite her hesitancy to claim ownership over her suggestions, many of her comments suggest that she was offering sound advice. For example, when asked what other advice she might give the writer, she began, “I don’t know.” She continued by evaluating the effectiveness of the introduction as an attention-getter, though, which indicates that she understood the purpose of an introduction: “Nothing really like makes me want to care; most introductions start with something that grabs somebody.” Immediately following this point, though, she seemed to lose confidence again, and returned to her self-questioning comment, “I don’t know. Something that would make them—the readers—want to keep reading.” Even though she was making an insightful observation about the purpose of introductions that most composition instructors would encourage, she was still hesitant to own her comment. This may reflect more “safety language” intended to protect the feelings of the writer, or it may offer further evidence that Carla was struggling to adopt the kind of persona needed to be a successful peer reviewer.

Discussion

Our findings suggest that students are tentative about offering commentary, frequently doubting their ability to provide feedback about the essay despite the fact that eye-movement analysis demonstrates that students clearly identified areas of the text rich with feedback opportunities where the surface-level errors
were. These participants’ hesitancy, coupled with what eye-movement analysis revealed as marked attention to both surface-level errors and the assignment prompt during (though not necessarily before) the peer-review situation, suggest some general ways in which we can understand how students might approach a peer-review activity. Interestingly, it was the analysis of eye-movement data that revealed students’ multiple examinations of and attention to both the surface errors and the prompt. And while eye-movement analysis cannot provide evidence of comprehension for any specific word, it does provide striking data about the number of examinations and re-examinations of the error words in the essay, as well as the length of time participants chose to scrutinize those errors.

**A Rethinking of Global-to-Local Progression**

In general, our findings lead us to question the fairly typical peer-review protocol of having students attend first to global issues and then move steadily to more specific—for example, surface-level—issues. As noted earlier, students spent a lot more time paying attention to the essay assignment prompt during the peer-review process than before it, which suggests that these students might have approached the peer-review situation from a perspective that did not foreground holistic issues. Indeed, even during the follow-up discussion with students, few participants initiated a discussion of the assignment prompt and text mismatch. As Tobin (1993) and others suggest, students might feel uncertain about their abilities to peer review successfully or appropriately.

There seemed to be genuine concern on these students’ part about their ability to correctly identify assignment/text mismatches, and thus offer the kind of peer-review critique that many typical peer-review activities call for. Remember that identifying such mismatches is often one of the first items in a peer-review checklist (see Glenn et al., 2003). Is such concern with identifying mismatches representative of true inability or lack of confidence? It may be the case that students need to develop and adopt particular personae as readers—readers who put on a “teacherly hat” to approach a piece of student writing. Certainly this would require some explicit discussion in the classroom, not only to help students recognize the kinds of issues they are being asked to identify, but also to enable students to realize the perspective they are being asked to adopt while peer reviewing. We also believe that students should be encouraged to admit hesitancies if they are unsure of how to respond, either to content or a mechanical issue. Particularly in terms of content issues, hesitancies can mark passages in student texts that are troubling because of lack of clarity, lack of audience consideration, or lack of development. Encouraging students to be aware of when they are hesitating to offer advice and then to voice those hesitancies may further enrich students’ experience of peer review and boost their confidence levels. If anything, students need to know that encountering and expressing their own hesitancies is not necessarily an indication of lack of knowledge, skill, or insight. Rather, such hesitancies are a
natural part of the reading and meaning-making process that all readers encounter. Voicing them may be useful for those whose work we are peer-reviewing; as such, the “teacherly hat” we may ask students to adopt should not be understood as asking students to adopt an “all-knowing” role—or to pretend to such. Further, we should keep in mind that students in a regular classroom situation might adopt such personae more readily than in the research situation in which these students participated. It is difficult to tell at this point in our research, and we suggest further inquiry into this specific aspect of the peer-review process, particularly with first-year students. At the very least, our findings suggest that students do indeed find an initial holistic approach difficult at best.

How then are we to understand students’ much greater attention, in terms of the sheer number and duration of fixations, to surface-level errors? Such attention and multiple examinations might corroborate our sense that first-year students are not particularly expert—or do not feel themselves to be particularly expert—at holistic peer-review approaches; they focus instead on the kinds of errors that they can readily and easily identify. In a way, particularly for first-year writing instructors, it may be gratifying that a group of fairly typical first-year students can in fact note surface-level problems. However, though they comment freely in a general sense about such surface-level errors, they are not as adept at articulating what the errors are, even though analysis of their eye-movement patterns indicates that they re-examine and attend to such errors to a much greater degree than nearly anything else in the essay. But even if such students cannot actually articulate what is specifically wrong about the error, they notice that something is happening—and they notice enough that their reading is interrupted.

Again, such scrutiny of surface-level errors prompts us to question the protocol of beginning peer-review activities with global and holistic issues and ending them with editing and surface-level scrutiny. It may be more beneficial to have students articulate first their understanding of what is happening to the student text at the level of editing and then move on to more holistic issues. Doing so would accomplish a number of things. First, it would offer the students the opportunity to talk about “errors” that they are clearly able to identify—or, at least, parts of the texts under review that the eye-movement data show they are stumbling over during their initial readings. Allowing students to work first with what they are able to identify as “wrong” should help them build confidence in their ability to offer constructive and important feedback. Second, it may be vital as part of the reading process to have such errors corrected first, before asking students to move on to more holistic critiques. Shaughnessy (1977), in her classic study of basic writing students, argues that “Errors . . . are unintentional and unprofitable intrusions upon the consciousness of the reader” and that “even slight departures from a code cost the writer something, in whatever system he [sic] happens to be communicating, and given the hard bargain he must drive with his
reader, he usually cannot afford many of them” (pp. 12-13). Our data suggest that Shaughnessy is absolutely right; if students’ reading is constantly interrupted by surface-level errors, then their ability to comprehend the text more globally and holistically may be compromised. This may be particularly true for more basic writers. In this regard, attending to such errors first may be crucial in enabling students to become adept at identifying more global issues, such as prompt/text mismatches. Our findings may corroborate Williams’ (1981) assertion that addressing errors of grammar and usage entails a shift from the objective “correctness” of an item on a page to a consideration of the transaction between writer and reader.

Interestingly, the peer-review protocols that we have found to be most typically used—moving from global issues to editing tasks—seem to mimic, broadly, the “steps” in a traditionally accepted writing process, which begins first with global invention and moves steadily through revision to final editing. However, it is useful to remember that composing processes do not necessarily follow such a linear path. For instance, Smit (2004) notes the potential fallacy of adhering doggedly and without reflection to a straightforward, linear writing “process”—a process that might not meet the needs of student writers. If the composing process is potentially so circuitous, then perhaps the peer-review process should be, if not circuitous, then a little less linear. Revising the peer-review process to foreground mechanical issues might, as we have suggested, both take advantage of student strengths in offering feedback and provide them with opportunities to build confidence as peer reviewers.

We offer such advice with some hesitancy, for we believe that writing is a process, a complex, multifaceted and densely social act, and we do not want to value product over process. As such, we do not offer our findings as corroboration of current-traditionalist approaches to the teaching of writing. Rather, our findings suggest much more clearly and accurately exactly what first-year students are attentive to in peer-review activities and where their hesitancies and difficulties lie. Such information can be used, we believe, to help redesign peer-review protocols and activities to ensure that students are learning how to become effective peer reviewers. In other words, our data suggest that students can learn to identify global issues and holistic mismatches—but such ability must be learned and should not be assumed as part of the “toolkit” that first-year students bring to the writing class. Remember, for instance, that Carla, the student whom we used as a case study above, was very hesitant about offering holistic advice; at the same time, she looked back and forth between the essay and the prompt 40 different times during the peer-review process. We believe that such activity means she was actively and deliberately seeking out and comparing the information in the prompt with the text—attempting, perhaps, to offer holistic feedback.

Furthermore, it might be useful not to separate out the “stages” of writing into distinct “tasks,” such as editing or focusing on organization. For instance,
students could be instructed to think about the relationship among editing, style, and rhetorical issues. Consider how several of the participants fixated the all-capi-
talized word LOVE multiple times, with some commenting that it is clearly an “error.” Technically, such capitalization is not necessarily erroneous, but, rather, reflects a stylistic choice most likely designed for a particular rhetorical effect. Being attentive to such “errors” in the early stages of peer review need not mean that students are focusing first on simple proofreading; in this case, as an example, a useful discussion of the connection between stylistic choice and rhetorical effect can open up students’ thinking to the possibilities of textual communication and the relationship between grammar and rhetoric (see Micciche, 2004).

The participants in this study scrutinized the surface-level errors in the essay to a high degree, but other first-year writers may, of course, not examine such errors to the same degree; eye-tracking research with a variety of writers needs to be undertaken so we can better understand the kinds of textual cues and reading processes that are used to navigate texts. Again, as we have suggested here, such information may be crucial in redesigning pedagogical activities and reading and writing assignments. In general, we need to be more attentive to the kinds of tasks we are asking students to perform, particularly if, as Wallace and Ewald (2000), among others, contend, we wish to engender more mutuality in the classroom so students can effectively voice their interests and build from their strengths. While composition instructors may be able to quickly and effectively read and peer review an essay, many of our students will not be as proficient at that task.

One caveat concerning the implications and suggestions that are based on this study is that they stem from, for the most part, this single study. While our research raises these issues and supports our pedagogical suggestions, we see a strong need for more research of a similar nature. The greater the variety in such research (of classroom contexts, genre responded to, peer-review purposes identi-
ified, types of essay prompts used, types of peer-review questions asked of the participants, and more), the richer our understanding of these issues will become.

In terms of other research avenues, we should be increasingly attentive to the ways in which students read on the screen as opposed to in print. All of the student participants in this exercise read from a computer screen. More and more instruc-
tors are putting material for students to review online or sharing such materials, including student work, electronically, and it may be useful to note how reading on screen and reading in print prompt differing reading processes. Indeed, text-
book companies are increasingly putting online instruction materials accompa-
nying print publications. For example, Alexander and Barber’s (2005) textbook, Argument Now, has readings and discussion questions online, and students are prompted to submit answers electronically; again, noting how students read (e.g., what they look at, and pay attention to) might aid tremendously in the future design and pedagogical use of such venues. Other examples include Kemp’s (see
Foreman, 2000) TOPIC at Texas Tech University, and Schunn’s (Cho & Schunn, in press) SWoRD at the University of Pittsburgh. While such online systems provide innovative ways for students to submit work and receive feedback, we believe that only more specific analyses, such as those offered through methods like eye tracking, can alert us to how students are actually using such forums—and the texts they are manipulating through them.

Ultimately, we feel that research at this level—exploring specifically the reading and composing processes of our students—can be most beneficial in helping us reconsider and redesign key elements of writing instruction pedagogies. They can also attune us to what our students are actually doing with the texts that we give them and that they generate. Such attention may be particularly useful in peer-review activities and other group work, where we attempt to cultivate and nurture student voices and agency. Paying attention to students’ abilities and working from them is a powerful way to honor students and their voices. In part, this means that we must continue to actively investigate their abilities with peer review (and beyond) by employing cross-disciplinary research methods and approaches—like the juxtaposition of eye tracking and peer review reported here.

Finally, honoring our students means making a commitment to furthering our understanding of such typical composition practices as peer review. Because peer review is so widely used, it is essential that we continue to consider its impact on our students and their writing development. That means reconsidering its theoretical foundations and goals, as well as its structure and organization, in practice.

AUTHORS’ NOTE
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NOTES
1. The “all caps” version of “love” is technically not an error; however, so many participants labeled it as an error that we decided to include it with the other, more traditional errors in the essay.
2. A pseudonym.

REFERENCES
decisions of three college freshman. Paper presented at the Annual Meeting of the Canadian Council of Teachers of English, Montreal, Canada. (ERIC Document No. ED236618)


FISHER, D. F., & SHEHLISKE, W. L. (1985). There is more that meets the eye than the eye mind assumption. In R. Groner, G. W. McConkie, & C. Menz (Eds.), *Eye movements and human information processing* (pp. 149-157). Amsterdam: Elsevier.


JOHNSON, R. (2001). The next frontier of the student-centered classroom: Teaching students to recognize quality writing through the use of peer evaluation. (ERIC Document No. ED463813)


RUBIN, L. (2002). “I just think maybe you could . . .”: Peer critiquing through online


Heinemann.


APPENDIX

The student essay text that student participants in our study peer reviewed follows:

Write a narrative essay about a single experience or event that has had a significant impact on you. Be sure to focus on just one moment or occasion; don’t try to recall a series of events in an essay of this length.
The Quarry
Memories of my life flood my mind, all the days my friends and I spent together growing up and learning about life. We were never apart and spent our summer days outside in nature. Mother Nature surrounded us; we could see trees and rolling farmland for miles. We grew up outside play sports, games, swimming, and just sitting outside and talking. Of all the great places we loved the one spot that stands out to me most is the Quarry, and all of my summer memories there could fill up the enormous hole. My days and nights at the Quarry are some of the best memories, and it is the place were we all watched each other grow up and this summer we watched everyone move away from the small town. At the Quarry we remembered our pasts, lived for the moment, and developed a hunger from the future.

The Quarry to some may be just an old hole in the Earth now filled with water due to the carelessness of the workers who hit a water vein and filled the hole with water. To the workers it was a big mistake but to us it was the best accident because the Quarry is a special place to my friends and I. It sits off the road surrounded by a small forest and its large rocky walls rise from the surface of the still water. An old dock and diving board are close to shore, right in front of the shabby beach house. the sand pit is close to the house and is soft beneath our feet when we play late night games of vollyball; only the moon shines down on our figures as we laughed and play in the soft light. The shore is full of small pebbles and yellow sand; it is also very small and is near the only shallow water. The old basketball hoop lies just beyond the shore. The net is now gone and all the remains is the rusty poll and wooden backboard, but it is the perfect place to compete in half court games. I LOVE and miss the Quarry as I think of this wonderful place.

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