Masters, Slaves, and Infant Mortality: Language Challenges for Technical Editing

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In this article we explore how some contemporary language usage presents challenges for technical editing. Drawing on scholarship in the rhetoric of science and in critical linguistics, we argue that language does affect our perception of reality. Consequently, the language used in some technical documents needs to be reconsidered or even challenged by technical editors. Present textbooks on technical editing do not directly confront this issue, though some scholars have begun to challenge the use of terms such as “studgun.” We conclude by demonstrating how a critical analysis of metaphors in everyday technical documents would help students question these language choices and draw attention to the consequences of using them.

Infant mortality includes two major elements, dead-on-arrivals (DOAs) and device operating failures (DOFs). DOAs are devices that fail when initially tested after shipment or incorporation in the next assembly level. For example, incoming inspection failures, first circuit pack failures, and equipment turn-on failures after installations are all DOAs. . . . The length of the infant-mortality period cannot be exactly defined, but generally it has its greatest impact in the first year of device use.

—C. M. Bailey, “Semiconductor Reliability,” Electronics Engineer’s Handbook, (28; emphasis in original)

A master-to-slave exchange . . . occurs only when requested by the master. The slave waits for the master to assert MASTER RDY before placing data on the bus and asserting SLAVE RDY. After the master reads the data, it drops MASTER RDY, confirming the receipt. The slave acknowledges by lowering SLAVE RDY. The master is then free to reassert MASTER RDY for the next
4-bit transfer. After transferring the specified number of bytes, the slave again looks for commands from the master.

In 1979 Carolyn Miller argued in “A Humanistic Rationale for Technical Writing” that those of us who teach technical writing should change the way we conceptualize it, that we should see it as “a persuasive version of experience” and not “the revelation of absolute reality” entailed in a positivist view of science. She suggested that viewing technical writing as “objective” was denying its context and “pass[ing] off a particular political ideology [associated with bureaucratic hierarchies, corporate capitalism, and so on] as privileged truth” (616). In the decades since Miller’s call for a rhetorical understanding of the demands of technical writing, the kind of shift that she suggested seems to have taken place to the extent that Patrick Moore has recently argued for the pendulum to swing the other way. In “Instrumental Discourse Is as Humanistic as Rhetoric,” Moore argues that “overemphasizing the rhetorical, literary, and creative aspects of technical communication”—as he believes a number of theorists have advocated in recent scholarly work—“ignores what is socially useful and humane about the instrumental aims of technical communication” (101), and he notes that this overemphasis ill-serves students who are left poorly equipped to fulfill the demands of the modern technical writing marketplace. He argues that language in technical communication “is denotative because it is standardized” not because it is objective:

>a group of people agree—sometimes in writing—to call a certain thing by one name, execute a procedure in one way . . . . This agreement does not confer objectivity on the language. . . . Rather, by virtue of an agreement about a standard, a certain thing is said to have one meaning unless the people agree later to change it. (108)

He argues that standardization has been a way for technical people to control the “subjectivity and slipperiness of language” in order to achieve something like “a rigid one-to-one correspondence . . . between the signifier and the signified or else someone could die” (110). In this quotation, Moore emphasizes that in many technical writing contexts the instrumental aspects of the discourse are critical: “readers must believe that the objects designated by the words exist, because if those objects do not exist or if [they] are ambiguously or erroneously specified by the words, then many kinds of undesired effects could occur” (111). In his commentary, Moore makes a strong case for contemporary technical writing classes to focus more on the instrumental aspects of technical discourse and less on its overlaps with literary and rhetorical theory.
This is not to say, however, that in focusing on using language that is standardized, clear, and unambiguous, the technical writer or editor should always acquiesce unquestioningly to the denotative terms assigned by the larger group through standardization. In fact, one goal of the application of rhetorical theory in the technical communication classroom is to assess the appropriateness of particular terms and to evaluate whether these terms will facilitate or hinder the readers’ understanding of the technical material. Technical documentation can, of course, have a range of audiences, but often it presents technical information for novice or non-specialist readers—their lack of knowledge of the subject matter leads them to consult the technical document. What they find there needs to be clear and unambiguous to assist them in completing correct procedures or making complex decisions.

However, not all standardized language is necessarily clear, unambiguous, and value-free (as Moore seems to imply). For example, the two passages that serve as epigraphs to this article are taken from standard engineering textbooks, and they both make use of striking metaphors or analogies to identify concepts in electronic technology.

The first passage describes standard terminology for electronic devices that do not work when initially installed. The genus term is infant mortality, while “dead-on-arrivals (DOAs)” and “device operating failures (DOFs)” are the species terms. Neither “infant mortality” nor “dead-on-arrivals” is an unambiguous term in this context. They are appropriated from medical terminology but used metaphorically (and perhaps with a touch of irony) to communicate to readers through drawing parallels with their human experience of death. In his interactional theory of metaphor, Max Black argues that any metaphor creates a new context or frame that extends the meaning of the primary system (in this case, infant mortality applied to human infants) to the secondary system (defective newly-assembled electronic devices). This comparison forces the reader to connect the death of human infants with the defective operation of electronics, highlighting certain characteristics (the early failure or death rate) of the electronics and de-emphasizing others (the sentient and animate versus the machine and inanimate). Black argued that the use of this (and any) metaphor changes our impression of both the primary system and the secondary system: through the interaction of this comparison, we are forced to consider, however fleetingly, human infants as inanimate, mechanical, assembled, and electronic devices as potentially living entities. While the pairing with human experience is perhaps intended to inject some black humor or wry irony into the discussion of defective electronic devices, Black’s theory on metaphor argues that the pairing also mechanizes (and, in subtle ways, devalues) human life.

In the second epigraph, master and slave have been used to replace main and subordinate in a description of how data transfers in
a microprocessor. In *The New Rhetoric*, Chaïm Perelman and Lucie Olbrechts-Tyteca note that a successful metaphor or analogy, especially in scientific or technical discourse, is one that readers or listeners no longer recognize as an analogy because they are so conditioned by use that they do not see the terms of the analogy as separate—they have entirely displaced the original term with the new term. The master/slave metaphor seems to be functioning at this level in this excerpt: it is intended to communicate vividly to the reader the nature of the relationship between the dominant and subordinate functions of the data transfer process. At the same time, however, the comparison evokes a connection between the task of data transfer and the institution of slavery in the human world. Given Black’s interactional theory of metaphor, the linking of the two systems implicitly legitimates and regularizes slavery, while it personifies the microprocessor mechanism and even transforms it into a racist/colonialist social structure.

Rather than claim that such metaphors should be ruthlessly hunted down and eradicated from all facets of language use, we would like to step back from these examples for a minute to explore the two larger issues: to what extent does technical language encode social meaning and what are the implications of such encoding for technical communicators? We explore these issues in this essay to examine the role that technical communicators and instructors of technical communication might play as gatekeepers and contributors to high quality technical documentation.

Traditionally, textbooks in technical editing introduce the nature of technical documents; they articulate the responsibilities of technical editors in the process of producing technical documents; and finally they focus on the skills of conciseness, clarity, and correctness required in successful editors of these documents. And while all of these topics need to be addressed, it is also important to provide opportunities for students to consider and discuss some of the larger issues having to do with language that the process of editing will inevitably entail. Some of these issues include the role of the technical editor, not only within the corporation or in the production of a document, but also as a leader in the social and cultural dimensions of language usage. While many people argue that editors (and especially technical editors) should play a neutral role in arbitrating language use, we argue that they have an ethical responsibility to ensure that language usage facilitates the understanding of readers and users of texts. If users are to decode and follow technical messages or instructions accurately, then this means that merely correcting mechanical and stylistic errors according to some pre-set style sheet leaves editors unable to respond adequately to usage that may be accurate on the technical level but sexist or racist or classist on a social level.

Students (and technical editors) can profit from discussing theories of language, from gaining knowledge of how we extract meaning from texts, and from gathering insight into how particular linguistic
constructions can embody the writer’s assumptions about the users of technical documents. With some theory of how language encodes social meaning, students can consider the more difficult issues generally avoided in handbooks, such as how complex and subtle configurations of sexist, racist, or ethnocentric language use in technical documents can derail or interfere with readers’ ability and desire to comprehend and follow important information.

In this essay, we explore how some awareness of language theory can help students expand their context for current editing textbook advice on language choice, how it can help them critically assess that advice, and what editors and teachers of editing can do to help produce technical documents that address all readers.

Language and Reality

Although in 1979 Miller argued that the assumptions about language inherent in a positivist view of science and technology no longer constituted a viable approach in the technical writing classroom, many of the handbooks and textbooks available for teaching technical editing now, nearly twenty years later, continue to base their materials on positivist assumptions. They continue to treat language as if there were an unproblematic relationship between language and reality—what Miller and others have called the “windowpane” theory of language (although the theory dates from the rise of the New Science in the seventeenth and eighteenth centuries). If we spell the words correctly, get them in the right order, and cut out excess verbiage, then the writing will become clear and comprehensible (Bush and Campbell; Mancuso; Brusaw, Alred, and Oliu; Pearsall). However, ongoing research in sociolinguistics, text linguistics, and language theory provides a number of new directions that instructors of technical and professional communication might profitably pursue.

For example, during most of the current century, linguists, sociologists, anthropologists, and philosophers have assembled evidence drawn from many spheres to argue that language does not reflect reality but instead helps to shape our perceptions of reality. (For a discussion of the “Sapir-Whorf hypothesis,” see Whorf’s Language, Thought, and Reality. For insight into how this hypothesis has shaped sociolinguistic theory, see Lakoff’s critique of objectivism in Women, Fire, and Dangerous Things, where he also demonstrates the role that language plays in creating reality.) George Lakoff and Mark Johnson (among others), in their extensive work on metaphor, argue that our use of language can shape the perceptions of reality about which we communicate. (We cite Lakoff and Johnson’s earlier work in Metaphors We Live By because the discussion dovetails well with the points we want to make in this article.) They argue that the particular metaphor a culture selects to conceptualize its problems can limit how members think about and react to events that they identify as prob-
lems. They contrast the North American tendency to view problems as puzzles to be solved with an alternative conception of problems as chemical mixtures:

To live by the chemical metaphor would mean that your problems have a different kind of reality for you [than conceptualizing them as puzzles]. A temporary solution would be an accomplishment rather than a failure. Problems would be part of the natural order of things rather than disorders to be cured . . . . We see this as a clear case of the power of metaphor to create a reality rather than simply to give us a way of conceptualizing a preexisting reality. (144; emphasis added)

This different metaphor would result in the speaker living differently and perceiving and responding to a different reality than those who see problems as puzzles, “for which, typically, there is a correct solution—and, once solved, they are solved forever” (144-45). The chemical metaphor would eliminate the frustration that many people experience when the same problem keeps coming to their attention after they thought they had solved it.

This view of language—that it can help “to create a reality rather than simply [giving] us a way of conceptualizing a preexisting reality”—has significant implications for all users of language, including technical and professional writers and editors. It suggests that technical documentation does not unproblematically reflect the reality embodied by a particular instrument. Instead, language choices participate in or contribute to the reality of the instrument; they shape and constrain how the user will perceive, respond to, and employ that instrument. In theoretical terms, this view supports the arguments that documentation is not, nor should it be, separate from the product or instrument that it explains; it is an integral part of the user’s experience of the technological device. This view suggests that conventional language choices that are otherwise correct, concise, and clear can become problems because they invoke a reality that is too limited or ethnocentric. Linguistic constructions can also embody social or cultural assumptions, stereotypes, or ideologies that perpetuate exclusionary categories and thereby reduce the effectiveness of the speaker’s or writer’s discourse. However, it is not solely a matter of functionality; it is also a question of ethics. If language does help to shape what we perceive as reality, then usage that objectifies or devalues or even sexualizes the asexual contributes to a reality that may undermine our society’s expressed goals for equal opportunity for all members.

We are aware that in emphasizing the social dimensions of technical discourse in the preceding discussion, we are also glossing over the fact that technical discourse is highly bound by context and the needs of the user or audience. Generally, users of technical documents come to them expecting the language contained within to be limited to the technical rather than the social realm. On these grounds, one might argue that the social realm does not and should not influence the
communication taking place. In “Coordinated Management of Meaning: A Critical Theory,” Vernon Cronen, Victoria Chen, and W. Barnett Pearce point out that context is always temporal in any kind of an utterance or communication and that humans are adept at recognizing and interpreting these shifting contexts: “Social actors are rarely in the predicament of finding that an almost infinite array of meanings can be assigned to what is happening. Even when they cannot decide which of certain competing interpretations should be acted upon, they usually think they know what the limited array of viable competing interpretations contains” (74). In other words, if we apply this perspective to the technical user, Cronen, Chen, and Pearce might suggest that because users approach the document in a technical context, they assign the appropriate and “correct” meaning to the terms used even if, in another context, the same terms might be viewed as racist or sexist.

However, Cronen, Chen, and Pearce also point out that while “enlightenment social theory [Cartesianism] has tended to separate facts and even theories from values” (which we are implicitly doing by bracketing off the technical context of a document and assigning it primacy) such a separation is not possible since “all communication systems are intrinsically moral orders” (76). In other words, the communication systems “entail ideas about what one must do, can do, may not do, and what is outside one’s responsibility” (76). The coordinated management of meaning theory examines discourse within the layers of context that make that discourse meaningful, and the authors argue that the moral or ethical dimension is always present in any discourse. In the multiple layers of context that constitute a meaningful communication, one layer will always be its fit with the culture or communication system’s values.

In discussing how to understand what a particular set of actions means in a given situation in a certain culture, Cronen, Chen, and Pearce argue that researchers must explore the “various levels of context” (83) surrounding that action and assess which levels have “prefigurative force” in determining the participant’s response. Certainly, when a user is reading a technical manual to determine how to operate a piece of machinery or how to perform a function in a computer program, the practical requirements generally minimize any social critique produced by the language contained in the manual instructions. However, Cronen, Chen, and Pearce point out that the user will not be unaware of the social influences because those contribute to the context of the communication, however peripherally.

In their articulation of the theory of coordinated management of meaning, Cronen and his co-authors sketch out the key elements of an epistemic theory of language when they argue that

the apparently stable social world . . . is created, maintained, and transformed in the process of communication. It sometimes seems that individuals communicate to express their emotions and to refer
to the world around them. But whence come these ‘individuals,’ ‘emotions,’ and ‘event/objects’? They are constructed in the process of communication. (71)

Cronen, Chen, and Pearce also note that “communication is part of the natural condition of mammals . . . our humanity does not exist outside of communication with other people” (72). In other words, we do not experience the world and then communicate about our experiences; our communication always mediates our perceptions and experience of the world.

Other scholars have written about the epistemic view of language (that language shapes the way we perceive reality). In his summary of linguistic scholarship for the field of rhetoric and composition in “The Linguistic Agent as Subject” in Fragments of Rationality, Lester Faigley points to the work of anthropologist Bronislaw Malinowski in elaborating an epistemic view of language: “Malinowski argued that language cannot be understood apart from the context of its use. Meaning, therefore, cannot be described adequately in terms of universal features but only in terms of specific functions in specific contexts” (87). Like Cronen and his co-authors, Malinowski also sees meaning deriving less from the individual features of specific words than from the whole construction and the rhetorical situation (context, for Cronen, Chen, and Pearce) in which it is used. Faigley goes on to argue that “the basis of language is meaning and that meaning is socially constructed” (87). Writer and reader (or speakers) negotiate the meaning of a given statement; they understand one another based on the events happening around the communication. As the same statement is uttered under different circumstances, listeners will understand it to mean entirely different things because they easily interpret changes in the social or cultural context.

As Faigley continues his discussion of the connections between meaning, context, and the social, he summarizes M. A. K. Halliday’s argument that “contexts precede texts, that words come to us embedded in the contexts where they are used, and that meaning is organized according to those contexts” (89). In this passage, Faigley emphasizes how the social conditions surrounding a statement will contribute towards how it is interpreted or understood, that is, the meaning that is attributed to it. However, he also notes that “language is not simply a reflection of social structure nor is it independent. Rather, the influence between language and society is bidirectional” (90). Consequently, our use of language is always embedded in, shaped by, and, in turn, shaping the social forces that provide the context that makes our linguistic constructions meaningful. Faigley and the critical linguists he cites emphasize the social contexts of any type of discourse, but in technical documents, generally the technical context (how to reload a nailgun or how to retrieve a passage of text inadvertently deleted from the screen) will prefigure the choice of action in a situation. This does not mean, however, that the social context is absent or even separate from the technical context; rather it is subordinate to the technical in
this instance. Do we, as readers, just turn off the subordinated contexts? Are all readers equally able to disregard the social influences of particular linguistic constructions even if those expressions are intended to be neutral in the technical context? Faigley (and we) would argue that it is precisely these kinds of situations that are fruitful for identifying the ideological assumptions underlying the "neutral" technical context.

Historically, technical and scientific language has been viewed as being outside the social context, as somehow being special and not accountable. However, neither Faigley nor the linguists whom he cites (Fowler and Kress) distinguish between ordinary language and technical language. Indeed, Charles Bazerman has shown in *Shaping Written Knowledge* that scientific and technical language is no less rhetorical and works no differently than non-scientific and non-technical language. This research suggests that technical language also shapes and is shaped by social and cultural forces. Embedded in these forces and in the language that it gives rise to are ideological assumptions that may be examined and explored as part of "a larger social critique of unjust social relations" (Faigley 31). One role of the editor concerned with the ethical use of language may be to analyze linguistic constructions in order to uncover and critique ideological assumptions embedded in them.

**Language and Reality in Technical Editing**

This kind of analysis has important applications in technical editing. Technical and scientific language often draws from metaphorical concepts commonly used in what Lakoff and Johnson call "everyday life" that then take on more specialized meanings. For example, in *How to Edit Technical Documents*, Donald Bush and Charles Campbell include a section, "Etymology," in which they discuss the Latin and Greek origins of many technical words to show that these words are not obscure but drawn from what were originally "ordinary" terms. They make the point that writers and editors draw on human experience for analogies and metaphors that will make an abstract or complex idea more comprehensible and concrete for audiences unfamiliar with that particular concept. In *The Concise Handbook for Technical Writing*, Charles Brusaw, Gerald Alred, and Walter Oliu offer the following advice regarding the technical writer’s use of rhetorical figures:

Technical people may find themselves using figures of speech to clarify the unfamiliar by relating a new and different concept to one with which the reader is familiar. In this respect, figures of speech help establish a common ground of understanding between the specialist and the nonspecialist. Technical people may also use figures of speech to help translate the abstract into the concrete. (252)
We argue that the figures of speech—metaphors, analogies, and so on—adopted in technical documents to make complex processes more familiar must import into the technical context some of the social meaning intrinsic to the primary system. If we could remove the social context, then the figure of speech would no longer work for the users—they draw on their experience of the social context to interpret the figure and understand the technical application.

Consequently, an obvious place to explore the ideological assumptions embedded in linguistic constructions is in such figures of speech. For example, in “Sexual Dynamics of the Profession: Articulating the Écriture Masculine of Science and Technology,” Beverly Sauer analyzes the sexual metaphors inherent in James Paradis’ account of his experiences as an expert witness in a liability suit involving the power-actuated fastening tool (i.e., nailgun) or “studgun” recounted in “Text and Action: The Operator's Manual in Context and in Court.” Sauer identifies the term “studgun” as sexist based on the following argument. She notes that “The term ‘studgun’ does not appear in general dictionaries, contemporary dictionaries of slang, or dictionaries of science and technology available at the University of Maine Library” (312). Therefore, she investigates the term "stud," furnishing definitions from general and specialized dictionaries, ending with

*The Dictionary of Contemporary Slang* [that] defines ‘stud’ as ‘a sexually active, powerful, potent male,’ but notes that the term is ‘only slang when applied to men as opposed to (real) animals’ (Thorne 499). In British English, however, stud—derived from the stud stallion or ‘stallion at stud’—can also apply to a mistress—the ‘stud mare’—if she is available whenever required (Partridge 61). In the vernacular, the slang meaning of ‘stud’ predominates, even in academic circles. All students and faculty I asked to define the meaning of stud furnished the slang meaning first, frequently with great embarrassment. (312-13)

Sauer argues that the ubiquitous acknowledgment of the slang meaning for "stud" makes its usage in the term "studgun" both slang and sexist.

Next she cites a passage that Paradis quoted in his article from the operator’s manual, drawing the reader’s attention to the sexual references:

> Fasteners vary in materials, length, shaft diameter, tip design, and shaft design, each variation having a different effect on the net penetrating capability of the discharged fastener. In addition, there are ramrod devices for positioning fasteners at various depths in the gun barrel to achieve still different intensities of thrust, and doughnut-like metal disks are available for collaring fasteners, so that they are not driven too far into soft materials. (Paradis 261; qtd. in Sauer 314)
Then Sauer cites some of Paradis' text referring to the manual discourse. She argues that his description of how the tool is used “concede[s] the use of sexually loaded language” because when he cites a passage from the manual in his explanation, he places quotation marks around “desired”: “One rule, [Paradis] notes, 'directs the operator to begin with the weakest possible charge and to work upward in charge strength until the ‘desired’ penetration is achieved.'” She argues that Paradis’ discussion “winks at the sexual undertones of ‘desired’ through the use of quotation marks, without formally acknowledging the sexual nature of the metaphors in the description of the studgun mechanism” (314). Then she suggests that “the sexually loaded language of the operator’s manual allows [the male construction worker] to construct a working image of the studgun based on the sexual metaphors of penetration, power, and dominance” (315-16). Finally, Sauer argues that by not acknowledging the sexual connotations of the term studgun and the sexually-loaded language used to describe its function, Paradis contributes to “the écriture masculine of science and technology” (312). She concludes her article by urging instructors of technical writing and professional technical communicators to acknowledge and confront “the sexually loaded metaphors in the discourse of technology” if they are to remain “committed to the goals of non-sexist language and equal opportunity” (321). This commitment will require instructors and communicators to address the “serious theoretical and pragmatic questions about the codes and conventions that shape language use in the workplace” (321). The codes and conventions that shape language use in the workplace are the same kinds of codes and conventions that shape its use anywhere, and workplace usage equally shapes language use outside the workplace (Faigley).

Sauer’s analysis is part of a larger effort in language study to document and debate sexism in language generally. In “From Discourse to Dictionary: How Sexist Meanings Are Authorized,” Paula Treichler provides a brief but compelling history of how dictionary definitions have proven central in authorizing and perpetuating sexist usage. Treichler (and others—Frank; Wolfe; McConnell-Ginet) would join Sauer in arguing that many of the “conceptual system[s]” (Lakoff and Johnson 57) with which society thinks must be revised to eliminate the kind of “conflict between the rational, de-sexualized knowledge of the expert and the non-rational, sexualized knowledge of the user” that Sauer identifies in Paradis’ essay (Sauer 321).

The theory of the coordinated management of meaning would suggest that these conflicting realms of knowledge are also layers of context that influence the user’s comprehension of the manual instructions. Sauer would argue that while the producers of the operating manual might perceive their discourse as “rational, de-sexualized knowledge,” a male user of the manual may only partially share this context. For the male construction worker, an equally
influential and larger context for the operator's manual may be the "non-rational, sexualized knowledge" which the linguistic constructions in the manual draw on to describe the nailgun capabilities. Building on Sauer's argument, we suggest that the social and technical contexts in this example mingle through the implicit sexual metaphors. And if the reader of the nailgun operator's manual happens to be a female construction worker, then the sexual imagery may become implicitly threatening or violent. Can we still argue as vigorously that the technical context will override the social for the female reader of the nailgun operation manual?

The problem that Sauer identifies—that instructors of technical writing and professional technical communicators must address the "serious theoretical and pragmatic questions about the codes and conventions that shape language use in the workplace" (321)—is a daunting one that instructors cannot even begin to address on their own. Many of the linguistic constructions (for example, those colorful terms cited in the epigraphs to this essay—"infant mortality," "dead-on-arrival," and "master/slave") that are used in technical and professional writing have evolved from specialized and often closed communities of (middle-class, European, male) engineers, scientists, and technicians. Such terms have constituted accepted and unexamined ways of speaking and describing a concept for decades. The technical writer or editor is expected to adopt the language used by specialists or experts in the field, not raise objections about it. Change will require support across disciplinary boundaries and concerted effort to formulate new conceptual systems and new metaphorical structures upon which not only technical communicators but also engineers, scientists, and others may draw for effective communication. Feminist philosophers, historians, and sociologists of science have extensively documented sexist, androcentric, and masculinist bias in the discourses of science and technology, but these critiques, based as they are on gender, point out only one dimension of the problem. Recent work, including such volumes as Sandra Harding's The Racial Economy of Science: Toward a Democratic Future and Teun van Dijk's Elite Discourse and Racism, provide insight into another dimension of the problem.

Implications of an Epistemic View of Language for Technical Editing

The primary question for instructors of technical writing and editing, as well as professional technical communicators, is how do we follow through on the insights gained from this research? How might we educate student writers and editors to be sensitive to linguistic constructions that invoke stereotypes or perpetuate the kinds of underlying messages of power, penetration, and authority in the language of technology (313) that Sauer identifies in her article? How
do we begin to implement change on language issues that are often beyond the control of individual communicators?

The first step in implementing change lies in raising more widespread awareness that something is a problem. Unless we point out to one another and to engineers and scientists that various linguistic constructions are exclusionary or ethnocentric or divisive, then conventional and traditional constructions will continue to be used without having their limitations acknowledged. Discussion will move speakers and writers from the position of unconsciously and unwittingly using an offensive construction and perpetuating its place in the status quo to becoming self-conscious about the assumptions, beliefs, or values embedded in the construction. At this point, instructors of technical writing and technical communicators can probably do little more than point out problems with specific phrasing or technical vocabulary and provoke discussion about linguistic constructions that are sexist, racist, classist, or ethnocentric. Raising the issue promotes awareness that may lead to eventual widespread change.

Of course, many people adamantly resist suggestions that they should alter their word choice or avoid certain linguistic constructions because of a particular embedded ideology. Deborah Cameron explores social responses to contemporary calls for linguistic change in *Verbal Hygiene*. She argues that many people object to critiques of their language usage because they see such critiques as “the politicizing of their words against their will. By calling traditional usage into question, reformers have in effect forced everyone who uses English to declare a position in respect of gender, race or whatever” (119). She argues that such objections are based in two fundamental (but illusory) assumptions about the nature of language: first, that one can use language in a way that is objective or “politically neutral,” and second, that “speakers have total control over the meaning of their own discourse” (119). As we noted earlier, the cultural or social context around a statement constrains how an utterance may be understood in spite of what the speaker may have intended to say.

However, for technical communicators, professional or student, to raise such issues with engineers or programmers, the communicator must be able to discuss issues of language as more than just their “opinion” or language “preference.” Critiques of particular constructions must be firmly based in the relevant contemporary language theory and research. For example, in chapter one, “On Verbal Hygiene,” of *Verbal Hygiene*, Cameron offers a cogent overview of competing theories of language; her insightful analysis of what motivates participants on both sides of the political correctness debate also lays out a readable theory of how users decode language to make meaning from discourse. In the introduction to *Elite Discourse and Racism*, van Dijk explains how public discourse can be racist; in exploring how the discourse of professionals contributes to maintaining institutionally-structured inequality, van Dijk also gives a fascinating account of how we make meaning from language. The linguistic theory provided in
books such as Cameron's and van Dijk's should allow classes to consider how we make meaning from language and what the relationship between language and reality might be. Instructors also need to help students equip themselves to argue convincingly for change; they need to be informed of the relevant research in linguistics and writing theory that helps them argue persuasively that it does matter what words we use to describe things. In the introduction to this essay, we briefly summarized Max Black's interactive theory of metaphor. Another interesting source on metaphor is W. H. Leatherdale's book, *The Role of Analogy, Model, and Metaphor in Science* (especially chapter 3 on metaphor). Both of these theorists examine metaphor in the context of scientific or technical use, a focus of particular interest to technical communicators because it articulates how users decode metaphors in a technical or scientific context.

**Editing for Metaphoric Language**

How might we, as instructors and technical communicators, equip ourselves and our students to engage in these discussions? One dimension—language theory—may be new to instructors and communicators. But other dimensions may be addressed by extending the discussion of concepts we are already familiar with and that we already teach: diction, sentence structure, active/passive constructions, nominalization, and agency. Having students read an excerpt from the work of Lakoff and Johnson will help them begin to recognize the central role that metaphor plays in our ability to communicate at the most mundane levels. We have found *Metaphors We Live By* to provide the level of discussion accessible to the widest range of graduate students (while *Women, Fire, and Dangerous Things* may be accessible to doctoral students, we find that Lakoff's disciplinary agenda obscures the focus we wish to bring to the material). If students attempt to write a paragraph that uses no metaphorical language at all, they will soon recognize the limitations of literal language to communicate what they want to say. Having them analyze the use of metaphor in another text (technical or otherwise) will also provide them with an opportunity to explore the implications attached to many of the metaphorical expressions we use as if they were literal language.

How could this work in the classroom? Consider the following sentences in an article in *Fine Woodworking* in which Niall Barrett embeds several metaphors: “Polyurethane likes a slightly roughened surface, a little tooth. This is quite different from using yellow glue, where two mating surfaces are, ideally, clean and smooth” (47). First, Barrett personifies the compound polyurethane in suggesting that it has preferences or can feel the emotion of liking. It also has teeth, like a human or animal. This comparison humanizes, even individualizes, polyurethane glue and gives it a character or personality that is distinct from other kinds of glue. Second, Barrett uses a sexual meta-
phor, mating, to describe the conditions under which yellow glue works most efficiently to join two pieces of wood: “two mating surfaces are . . . clean and smooth.” This choice of metaphor may alter how we conceptualize a joint in our table top. At the same time, these metaphorical constructions recreate for the reader the activity of gluing wood in terms that reflect direct (and intimate) human experience. Gluing two pieces of wood is transformed through the metaphors into a kind of relationship between living creatures. Here Barrett’s conceptualization is an instance of the metaphor that Lakoff and Johnson identify as “an instrument is a companion” (134). The glue that the woodworker uses is depicted as a companion, invoking a fundamental conceptual system that makes Barrett’s construction in this example unremarkable on casual examination. In other words, it is not a construction that will stand out as needing revision, and we are not proposing this example as needing revision. However, it is an example of how commonplace metaphor is in routine expression by technical communicators. Once students become sensitive to the presence of these embedded metaphors, they can begin to assess the implications of a particular construction to decide whether or not they want to invoke that comparison. In the example above, we might as editors consider what the sexual metaphor contributes to the information that Barrett wants to convey and decide to remove it as gratuitous, or we might revise the passage to remove the personification altogether. On the other hand, we might decide that the sexual metaphor is innocuous enough and let it go.

Another kind of metaphor that warrants attention is what critical linguists call a grammatical metaphor, which arises out of considerations of agency. Basing his discussion largely on the work of Halliday, Faigley describes “how ordinary language codes some extraordinarily sophisticated interpretations of experience” in the concept of agency, or “the match between the language of the text and the actions being described by the text . . . the fit of a text to the reality it depicts” (94). The fit between a linguistic construction and reality can be congruent or incongruent. Congruent clauses “code agents as subjects and processes as verbs in sentences such as Prisoners of war build the railroad to Burma” (94; emphasis in original). Incongruent clauses are cross-coded, “something other than an agent functions as the subject or something other than the underlying process functions as the verb . . . The railroad pushed through to Burma or 1943 saw the railroad reach the Burmese border” (94; emphasis in original). It is the cross-coded examples, where the railroad becomes the agent of the action, that create what Faigley calls “a metaphorical displacement that changes the meaning of the entire clause” (95). The cross-coded sentences use personification of the railroad to obscure the fact of who provided the labor for this industrial expansion (prisoners of war) and to present the building project in a neutral or even positive light. Faigley argues that this type of grammatical construction can be an important site for analyzing or revealing cultural assumptions or
ideologies that we should pay attention to, even when they are embedded in technical or scientific documents.

Technical editors, in their concern with language usage at the structural level, are well situated to identify and reflect on the ideology embedded in these cross-coded instances of agency and perhaps to revise such constructions. The following example from the instruction booklet accompanying an automatic steam vaporizer has users as its primary audience, and the booklet is intended to educate them on the proper use and maintenance of the electrical appliance. In the passage below, the real agent of the action is never identified:

SPITTING, LOUD BOILING NOISES, STRONG NOISY JETS OF STEAM, BLOWN FUSES, HOT POWER CORD, AND FLICKERING LIGHTS: These are some of the symptoms of hard (excessive mineral content) water. The vaporizer must not be operated with any of these conditions. Besides the above problems, excessive mineral content water will severely shorten the product life due to increased corrosion of the electrodes. (3; caps and bold in original, italics added)

In this step of the instructions, the water and the vaporizer are personified, while the real agent of the action, the user, is absent from the scene. In fact, the user will perform the activities that prompt any of the list of symptoms, but the writer of this paragraph has displaced this point by making the vaporizer and the water inside the focus of the grammatical action. An alternative format for this passage (and the one recommended in technical writing textbooks and handbooks) would be to write the instructions in the imperative mood, as presented in this revision:

WARNING: Spitting, loud boiling noises, strong noisy jets of steam, blown fuses, hot power cord, and flickering lights. All of these are symptoms caused if you use hard water (water with excessive mineral content) in the vaporizer. Do not operate your vaporizer if any of these symptoms occur. If you do use hard water, in addition to the problems mentioned above, you will increase the corrosion of the electrodes in your vaporizer and severely shorten its product life.

In this revision, the user takes center stage in the action; he or she will decide whether or not to risk the problems described in the passage through the choice of water used. In the original version, the grammatical metaphor transforms the active relationship between user and appliance to an active one between water and appliance that only indirectly involves the user. By constructing the “excessive mineral content water” as the criminal or disease that will “shorten” the vaporizer’s life, the writer displaces “blame” for misusing the appliance from the user to the device itself. The phrase “shorten the product life” personifies the vaporizer and the water, but it also adds a moral dimension to the action so that the water “murders” or makes a victim of the vaporizer. In this grammatical construction, the writer chooses to de-emphasize the reader’s role rather than explicitly address him or
her and assign responsibility for using overly hard water and ruining
the vaporizer.

The linguistic construction selected seems to emphasize the
financial consequences of using excessively hard water (“severely
shorten[ing] the product life”) rather than the potentially dangerous
consequences of a hot power cord or strong noisy jets of steam pouring
out of the appliance. Perhaps the writer thought that users would find
the threat of having to buy a new vaporizer more persuasive than the
possibility of personal injury. Or perhaps embedded in this grammati-
cal construction is an implied disclaimer of manufacturer’s responsibil-
ity if the user does operate the vaporizer with excessively hard water.
Whichever it may be, this grammatical metaphor results in an indirect
warning to the reader, it describes a passive relationship between the
user and vaporizer, and it imbues this step in the instructions with
distinct moral overtones that seem illogical, at least at first reading.

Of course, a sophisticated speaker of English will easily be able to
infer the warnings embedded in these instructions (although not all
users will necessarily be sophisticated speakers), but the writer’s use of
grammatical metaphor makes the instructions ambiguous and less clear
than they should be. The instructions are unclear about the user’s
responsibility within the context of operating the vaporizer because
linguistically they render the user a passive spectator in a mock-heroic
drama unfolding between the appliance and hard water. While this
phrasing might add dramatic interest to the instructions, we wonder
whether it may result from either poorly-written instructions or from
issues of manufacturer liability obscured in the grammatical cross-
coding. The latter point, of course, raises ethical issues that technical
editors should question.

### Passive Voice and Objectivity in Technical Editing

Another aspect of agency can be explored through discussion of
active and passive voice constructions. Many of us rely on the kind of
advice offered by Thomas Pearsall in *The Elements of Technical Writing*:

*Active-voice sentences clearly state who or what the actor is and
what the actor is doing. For that reason, most readers find sentences
written in the active voice easier to follow and understand than
those written in the passive voice. In addition, sentences written in
the active voice seem more direct and interesting. You should use
the active voice for the bulk of your writing . . . . Passive voice does
have a place. When the identity of the actor is obvious or irrelevant
(as is often the case in the Materials and Methods section of a
research report), use the passive voice. (22-23)*

While such advice has resulted in the production of many technical
manuals that use the active voice and the imperative mood and that
address the reader directly as “you,” Pearsall’s comments here regard-
ing the passive voice invite discussion. He validates the use of the passive voice in the methods section of a research report by asserting that “the identity of the actor is . . . irrelevant,” suggesting that further discussion of the issue is unnecessary. However, in “The Mechanical Self and the Rhetoric of Objectivity,” Kenneth Gergen argues that such use of the passive voice constitutes part of the “rhetoric of objectivity,” a linguistic construct. He suggests that the concept of objectivity, as it is used in fields such as science or engineering, “is primarily a matter of rhetorical practice” (265), and he describes how “objectivity is most typically achieved in one’s written and spoken communications to others; in effect, it is a textual achievement” (271; emphasis in original). Gergen’s use of the verb “to achieve” in this passage emphasizes that objectivity arises out of specific effort by the writer; it is not a “natural” occurrence. According to Gergen, the relationship between the objective observer and the external world is conceptualized in the rhetoric of objectivity as being “mechanical”:

In particular, environmental events [the external world] are often imbued with an active power, while observers [the scientist or engineer] are treated as passive victims. If individual perception operates in a machinelike fashion, responding to antecedent conditions in the external world, it follows that internal knowledge of events should largely be the result of the external forcing its effects into the realm of the internal. Such assumptions lend themselves to the pervasive use of the passive voice in research reporting. “Aggression was observed,” and not “I observed aggression;” “the results were obtained,” and not “I obtained the results.” If the researcher strove to see a certain pattern, the result may not be due to the “thing in itself” so much as the striving of the mind. (278; emphasis in original)

Here Gergen offers a different perspective on the use of the passive voice in a “methods” section: the passive voice supports the rhetoric of objectivity by emphasizing or supporting the assumption that the external world forces knowledge of itself onto the observer. An active voice construction, in this case, would highlight the experimenter’s role as an active agent in the creation of the information being reported. Consequently, it would destroy the illusion of objectivity that is so carefully constructed through the linguistic choices made by the writer.

This argument advanced by Gergen adds another dimension to the discussion of active versus passive voice construction. It helps to expose some of the assumptions or belief systems that give rise to standard stylistic advice about the passive voice. The agent of the action in such constructions becomes “irrelevant” when the writer wants to emphasize the activity and in so doing validate the agent’s activities as objective and scientific. An interesting classroom exercise that dramatizes for students how the agentless passive can objectify the ideas being presented involves asking students to rewrite a
paragraph from an essay of literary criticism using the agentless passive wherever possible. The agentless passive will enable them to present the interpretation as external to the critic, based on the data provided in the text. The following example is drawn from Nina Baym’s “Melodramas of Beset Manhood: How Theories of American Fiction Exclude Women Authors”:

Let me use my own practice as a case in point. In 1977 there was published a collection of essays on images of women in major British and American literature, to which I contributed. The American field was divided chronologically among six critics, with four essays covering literature written prior to World War II. Taking seriously the charge that we were to focus only on the major figures, the four of us—working quite independently of each another—selected altogether only four women writers. Three of these were from the earliest period, a period which predates the novel: the poet Anne Bradstreet and the two diarists Mary Rowlandson and Sarah Kemble Knight. The fourth was Emily Dickinson. For the period between 1865 and 1940 no women were cited at all. The message that we—who were taking women as our subject—conveyed was clear: there have been almost no major women writers in America: the major novelists have all been men. (63)

This passage works well because Baym uses first-person narration. After students have rewritten this passage using a scientific style, then they should revise a paragraph from a technical or scientific document identifying the agents of the action and adopting other stylistic features employed in the humanities-based essay. Experimenting with the styles helps them to identify how linguistic constructions such as active and passive voice can shape the reader’s perception of the information: literary criticism becomes fact-based, while scientific discoveries arise out of the scientist’s interpretive powers and not necessarily out of reality reflecting transparently through the data. This exercise helps students begin to understand how the style and genre of a particular type of document sets up certain expectations and assumptions in the reader (and in the writer). In fact, many members of technical and scientific fields have internalized these assumptions so that they understand the technical style not as a “style” per se but as a transparent reflection of reality—the agent of the action really is irrelevant because they believe that every agent would have observed exactly the same thing. This perspective ignores developments in physics in the twentieth century that demonstrate that the fact of the observer’s presence alters (however minutely) the scene being observed; the corollary then is that a second observer will not necessarily affect the observation in a way identical to the first observer. In other words, there must be variation in perceptions among observers. Therefore, the supposedly irrelevant agent of the action mentioned in the example above may observe something different under exactly the same circumstances.
Nominalizations, Passivizations, and Agency in Linguistic Constructions

Recent work on technical and scientific style also explores how these assumptions about objectivity may be grounded in the general usage of nominalizations and noun phrases in scientific and technical discourse. For example, in “Noun Phrases and the Style of Scientific Discourse,” William J. Vande Kopple argues that the scientist’s extensive use of noun phrases to achieve clarity and precision promotes a tendency to conflate the description with the thing being described:

As the researchers provide a complete and precise specification [of the framework for their experiment] with noun phrases, they make scientific reports remarkably thing-oriented. One potential drawback associated with such complete and precise specification, of course, is the temptation for writers and readers alike to assume that anything that is referred to repeatedly in such detail must exist, must exist in the specified form, and must relate to other things exactly as described. (335)

He suggests that the degree of specificity or detail produced through the use of noun phrases and nominalization supports a representational theory of language underlying this discourse—that the description corresponds exactly to the phenomenon being reported. Vande Kopple also argues that “whenever writers use a nominalization to pack into a noun phrase the information that would otherwise be expressed in a clause, their readers must supply the information about processes that nominalizations convey only indirectly” (337). He suggests that nominalizations are used to compact complex information (whole theories, references to other related experiments, complicated methodology, and so on) into short phrases that convey description and interpretation briefly and concisely. However, such compaction also relies on the reader having the background and the ability to decode and understand the embedded references, claims, and arguments. In this case, such nominalizations draw on the layers of context that have built up around the term over time of which the reader is assumed to have knowledge. Generally, however, the primary context for these terms remains largely technical (although their original coinage—and, therefore, secondary contexts—may have drawn on the social, as did now-scientific terms like “quark,” “gluon,” “doppler,” or “Fermi level”). The interactive process of reading created by such technical and scientific texts also encourages readers and writers of scientific and technical documents (at least technical documents prepared for expert audiences) to view objectivity as an unproblematic reflection of the real world.

Faigley argues that nominalizations and what he calls passivizations provide an additional source for the kind of linguistic transformation present in grammatical metaphors. While he acknowledges
that nominalizations are essential in science and technology, Faigley also notes that ideology is always present in nominalizations. For example, the following sentences introduce a section on increasing the energy-efficiency of an old house in The Old House Journal: Guide to Restoration: “Anti-infiltration work is the heart and soul of weatherization. It’s very time-consuming, picky work, and it requires a thorough knowledge of how your house is put together” (193). In this example, both anti-infiltration and weatherization are what Faigley would call “passivizations.” The agents of the action—as well as the activities involved in the action—are buried in nominalizations that obscure the political implications or the ideological beliefs that underlie these activities. Of course, at first glance, neither “infiltration” nor “weatherization” would appear to harbor sexist or classist implications; they are clearly technical terms, compacting processes into a noun phrase using the kind of shorthand noted by Vande Kopple, and they equally clearly draw upon a technical context for their primary source of meaning. However, Faigley argues that such terms are never neutral; they always imply a set of beliefs and perspectives.

Let us unpack some of the assumptions and beliefs that inhabit these passivizations. In The Old House Journal, weatherization refers to the activities of weather-proofing a house such as caulking around windows, insulating walls and attics, and tuckpointing foundations, while anti-infiltration work is more specific, describing the efforts of the home owner to prevent heat loss by air movement through the cracks and joints of a house. In other words, caulking around windows and doors and installing weatherstripping will reduce the amount of cold air that infiltrates the house in winter. While the agent of this activity is not identified, The Old House Journal: Guide to Restoration assumes that the reader/home-owner is doing it him or herself. We should note here that this volume is a 400-page hardcover book that retails for $45.00 U.S. It is a how-to book rather than a coffee-table book; the black and white photographs and line drawings seem designed to assist the reader in correctly identifying the parts of a window frame to aid in dismantling and repairing rather than providing aesthetic enjoyment. While the occasional reader of this book might pour over it to fantasize about distinguishing the termite from the carpenter ant, the target audience seems to be owners, contractors, and architects working with old houses who need background information and step-by-step instructions.

Given this primary audience, The Old House Journal also makes a number of assumptions about the location and motivation of its readers. For example, while homeowners in southern climates might work to counteract the effects of excessive heat on their homes, The Old House Journal: Guide to Restoration assumes that weatherization and anti-infiltration have to do with minimizing the effects of cold weather. Embedded in these terms are a number of assumptions:
1. about climate—that home-owners live in northern climates where cold weather is the problem;
2. about values (that a draft-free home is worth the time and effort involved to achieve it), especially middle-class values—that home-owners want to save money on heating by eliminating drafts;
3. about class—that home-owners have the leisure time to do the work themselves or the money to pay someone else to do it; and
4. even about able-bodiedness—that home-owners have the strength and health to fix drafts in their homes.

These assumptions constitute some of the ideology embedded in the nominalizations.

At the same time, the omission of any agent in the activity of weatherization—the person standing on the ladder squeezing the caulking gun—creates a passivization or linguistic transformation that depicts the activity as doing itself. These kinds of transformations can obscure the danger inherent in a particular activity, the amount of labor required, or the financial or environmental cost (a case of nearly-empty caulking tubes goes into the local landfill where it may eventually pollute groundwater reserves). These issues are not generally seen as part of the technical discussion or even as relevant to it, but raising them allows us to perceive some of the values, assumptions, and beliefs that constitute the ideological context for the renovation instructions.

**Implications of Challenges to Usage**

Traditionally, research in technical editing and communication has not conducted the kind of linguistic analysis proposed here, but careful attention to these issues will be required if we, as editors, instructors, and students of technical and scientific communication, are to construct a theoretical framework for successfully challenging accepted and unexamined usage in the discourse. While much analysis has been conducted by researchers using examples of unsuccessful technical communication, relatively little attention has been paid to the linguistic constructions used in ordinary and successful technical documentation. Linguistic analysis can help us to uncover assumptions embedded in a document that we, as a society, might want to reconsider and change. For example, examine the agents of the action in the following paragraph which introduces Ulrich Sigwart's article "Endovascular Stents" on the latest developments in treating damaged arteries in the September/October 1997 issue of *Science and Medicine*:

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*Endovascular Stents*...
Medicine has a long record of attempts to repair blood vessels. Leaking arteries have been ligated for centuries. During the Middle Ages, heroic measures were taken to stop the bleeding from amputated limbs by placing the stumps in hot oil or tar. More refined methods were developed thereafter, but repair of the individual vessels, mostly after trauma, has been undertaken only within the past 100 years or so. Surgical repair of degenerated arterial conduits that obstruct blood flow and replacement of failing blood vessels by prosthetic materials are even more recent. (16)

Of the six verbs in five sentences, four are in the passive voice, while the other two can hardly be called “active” verbs (“has” and “are”). The agents of the action in these sentences are never identified, largely because they are considered irrelevant and self-evident. This passage is a good example of what Gergen calls “the rhetoric of objectivity.” The agents of the action are, of course, physicians; however, in the first sentence, rather than the individual humans who were the actors throughout history, the profession, “medicine,” is designated as the subject. This construction personifies the profession while it also diverts our attention, as readers, from both the individuals who treated the amputated limbs by placing them in hot oil or tar, and the individuals whose limbs were burned. In fact, in this paragraph, the patients are present only through synecdoche—“amputated limbs,” “stumps,” “individual vessels,” and “degenerated arterial conduits” (16). At the same time, the subject of the third sentence, “heroic measures,” communicates the attitude that we, as readers, should assume towards the pioneering physicians of the past. We are expected to admire and identify with the doctors or surgeons, the agents of the action, and not with the “stumps” being placed in hot oil and tar or even the degenerated arterial conduits needing “repair,” the objects of the action. Yet the likelihood is much greater (given the prevalence of heart disease and other circulatory ailments in contemporary society) that the reader of Science and Medicine will be the object of the “arterial repair” rather than the agent. Scientific discourse such as that used in this article reduces patients to their ailments—“degenerated arterial conduits”—and locates them as passive objects to be acted upon by an heroic other. Is it in the patients’ best interests to be passive consumers of medical technology? Is it in the doctors’ best interests to see themselves as treating “conduits” rather than other human beings? Do we, as readers/consumers, want to acquiesce to the kind of positioning implied for us, not only in Sigwart’s “Endovascular Stents,” but in much technical and scientific discourse? Objective language can objectify, in the worst sense.

In raising this issue we are not proposing that doctors should inquire after our family’s health, letting us bleed to death while amputating our “stumps,” but contemporary language theory would suggest that doctors who refer to their patients as body parts or medical procedures are more likely to think of them in those terms and
ignore the active role that those patients, as human beings (and not
degenerated arterial conduits), should be playing in their own health care. Editors, writers, and researchers of technical communication are in a unique position to use their expertise not only to produce top quality documents, but also to examine and raise for discussion those linguistic constructions and conventions that portray reality in questionable ways. In our research and writing we can apply concepts drawn from language theory and from grammar to get at assumptions and ideology embedded in linguistic choices. By raising these issues in the technical editing profession as well as the technical and professional communication classrooms, we can initiate discussion that can lead to widespread change. But we need to start by raising these issues.

Works Cited


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