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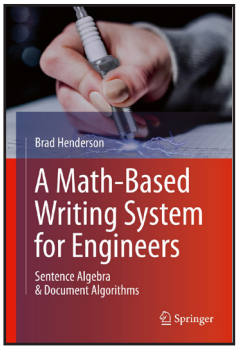

A Math-Based Writing System for Engineers: Sentence Algebra and Document Algorithms

Brad Henderson

Cham, Switzerland

Springer Nature Switzerland AG
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Reviewed by Megan Boeshart Burelle

Old Dominion University

Grammar instruction and how it should be handled is an ongoing and contentious topic in composition and technical communication. Michael Knievel, April Heaney, and Meg Van Baalen-Wood (2010) trace the historical tension between writing instructor pedagogies that emphasize "rhetorical concerns like audience and purpose" (p. 58) and the skills-based pedagogies that have strong roots in the engineering discipline. Despite varied opinions, many technical communication instructors for engineers may find themselves in a position of needing to address grammar because of the company and client expectations that students will encounter in future. While there are a multitude of approaches, Brad Henderson's *A Math-Based Writing System for Engineers* (2020) provides one method that focuses on how the English language works at a sentence level. Knievel et al (2010) ultimately invite technical communication instructors "to reevaluate the role of grammar instruction in their own classrooms" specifically emphasizing that many students, "especially adult students continue

Contact author: mboeshar@odu.edu

to identify grammar and mechanics as the very crux of what matters in writing" and that grammar instruction can ultimately be a way to open up more conversations within technical communication classes on what makes good writing (p. 67). Henderson's book could provide technical communication instructors with an approach to grammar instruction that also resonates with math-based thinkers and engineering students who may desire explicit English grammar and/or language instruction. I wouldn't consider the volume a substitute for a more general technical communication textbook as the book lacks discussion of technical communication theory or rhetorical concerns. However, it could function as a helpful supplemental text for helping students, including multilingual students, who may find the explicit grammar-focused instruction helpful as they continue to develop as writers.

A Math-Based Writing System for Engineers provides a unique framework for how to think about language learning for math-based thinkers, particularly engineers. Henderson makes it clear from the beginning that the book's primary audience is meant to be engineering professionals rather than typical students in technical communication courses. It draws on mathematical language and framing to better reach the primary audience and help them understand "the structure and operation of the English language–its building blocks (words and sentences) and buildings (documents)" (p. 1). It is also important to note that Henderson does not recommend the text for teaching general technical communication to "aspiring professional technical writers" (p. 3). The clarification of the audience Henderson provides is essential because it assumes that the audience is interested and invested in learning more about the English language, particularly at the sentence level. It also means that the text cannot replace a typical technical communication/technical writing textbook for a course but may provide a helpful supplement for English language sentence-level instruction.

Henderson acknowledges that readers may choose to skip certain parts based on their experience and needs. The volume is divided into three sections. Part I (Chapters 2-8) is focused on what Henderson calls "sentence algebra" or defining the parts of speech using variables to create sentence equations and explain basic sentence structure. Part II (Chapters 9-13) discusses "sentence optimization" or how to simplify and clarify sentences and eliminate common errors. Part III (Chapters 14-21) defines what Henderson names "document algorithms," or five common genres of documents he believes engineers should know how to write. What makes Henderson's approach to language

instruction in the book unique is that it is math-based. In other words, Henderson frames the parts of speech and their functions by using algebraic equations and providing a function and variable for each part of speech.

In Part I, Henderson lays out the phenomenon described in the text as "spark." To create "spark," sentences are required to have a subject noun, using the variable (N), which must be joined together with a verb or the variable (V) to create meaning. This base equation is worth pointing out as it becomes the building block equation that the rest of Parts I and II are built upon. Over the course of several chapters, Henderson covers the purpose of each part of speech and how each one plays a role in various types of sentences. In many ways, if a reader is familiar with sentence diagramming, the coding system that Henderson lays out may feel very familiar. The difference is that Henderson frames the sentence diagramming as coding and decoding equations. For example, the sentence, "Sheila improved it." would be written in equation form as Ns + V + XO (Subject Noun + Verb + Object Pronoun). In addition to the equations and defining the various parts of speech as variables, Henderson uses matrices and flowcharts to demonstrate common sentence structures. This framework for thinking about how language functions within sentences is a different way of framing the material that may feel more comfortable for an audience accustomed to using equations and math-based vocabulary to talk about language.

Part II continues to build on the sentence algebra from Part I with a focus on making optimal sentences. The chapters address several topics that a reader may find in other technical communication texts such as clarity, passive vs. active voice, and parallelism. Although the approach is relatively prescriptive, it does likely align with the audience's expectations that Henderson outlines at the beginning of the text. Skill and drill "action items" are present at the end of all sections. Action items are meant to help the reader engage with the material they have just learned and include "thought tasks to further understanding of concepts and mini 'do' tasks to test drive application techniques" (p.3). At times, these exercises and examples seem disconnected from contextual writing the reader may be doing. However, other action items do engage readers in looking at their own personal writing in very specific ways to help them decode their own writing habits and determine if there are more effective ways they could be writing. The action items where writers are asked to engage with their own recent writing seem to be the most useful exercises throughout the text since the focus remains relevant and on an

authentic text rather than just individual sentences without context.

Part III of *A Math-Based Writing System for Engineers* is dedicated to what Henderson calls "document algorithms," or what technical communication instructors would consider common document genres or elements (such as tables and figures) that engineers are likely to use regularly in industry. Henderson focuses on five genres: project proposals, status reports, project reports, tech-to-non tech briefs, and instructional job aids. Henderson frames these genres in terms of "document algorithms," a move that "defines how the operative flow of a human language message develops and how and when the message's language stream articulates descriptions, claims, and evidence; and how these elements aggregate and synthesize into a coherent, cohesive, and convincing message output" (p. 211). Ultimately, Henderson hopes that the document algorithms take the "guesswork (and consequent anxiety)" out of creating these common workplace documents (p. 211). While there are excellent technical and professional communication textbooks that address these workplace documents, technical communication instructors will likely notice that while rhetorical concerns are briefly mentioned, the text spends little time on the topic. Again, this may have to do with Henderson's intended audience wanting the text to feel more practical and less theoretical.

Overall, the text takes a very practical approach to English grammar and language learning although it is one with which many technical communication instructors may feel ambivalent or uncomfortable. However, Parts I and II are still worth considering as supplemental material since some engineering students may find the text a useful way for understanding grammar concepts and sentence structure using a framework that they are more comfortable with. While Part III may provide some strong examples of common engineering documents, the lack of theory or rhetorical concerns in this section makes it less useful for discussions about genre in the technical communication classroom.

References

Knievel, Michael; Heaney, April; & Van Baalen-Wood, Meg (2010). Breaking the Rules: Teaching Grammar "Wrong" for the Right Results in Technical Communication Consulting for Engineers. *IEEE Transactions on Professional Communication*, 53(1), 58-68. https://doi.org/10.1109/TPC.2009.2038738

Author Information

Megan Boeshart Burelle is a Senior Lecturer and the Writing Center Director at Old Dominion University. Her research focuses on online tutoring, tutor and instructor response to student writing, and how writing tutoring influences student revision decisions.