From: **Kimberly Nunlist** kimberlynunlist@gmail.com
Subject: **Scientist as detective**
Date: **May 6, 2016 at 5:59 PM**
To: cgwohl@lbl.gov

Dear Dr. Wohl,

Regarding your paper on Luis Alvarez as a detective, I thoroughly enjoyed not only the original subject matter, but also the welcome respite from the grammatically challenged writing that I read for work. You mentioned that you would like to be able to say you learned something from my comments; if I am able to fulfill this request, it will not be on the topic of grammar, which is perfect throughout the paper. You told me you like editors who really shred the work, but to be perfectly honest, I have to stretch to find anything to critique in your writing, as you will see from the following comments.

In fact, the only changes I would suggest stem from the consideration that the paper's readership may not have the same sophisticated understanding of the English language as its author. Non-native English speaking readers may find your paper particularly difficult because of the highly varied sentence constructions you employ. For readers with excellent English language skills, this variety holds the reader's interest and is also well-matched with the paper's content, encouraging readers to take different approaches to a given problem. However, readers who are less familiar with the English language can have a hard time translating uncommon grammatical constructions, and therefore a recent trend toward making English sentence structure more explicit has been gaining traction.

The trend does not require that all sentences sound the same, and most of the sentence structures you use are sufficiently explicit. The following two examples are rare moments in your paper when the reader has to work to identify the sentence's subject, in the first case, and predicate, in the second.

First, in the first paragraph of Section I: "Near Cairo, they are 4,500 years old." Non-native English speakers may have trouble with the translation because the sentence begins with a modifier, and the subject of the sentence is not identified explicitly. To improve clarity for these readers, the sentence would probably be added to the preceding sentence as follows: "Figure 1 shows the two largest pyramids every built, which are near Cairo and are 4,500 years old." This sentence is not as grammatically interesting, but it can be more easily understood by a broader readership.

Second, in Section III, second paragraph, first sentence: "Drop a heavy rock in a pond and watch the splash—a crown-like curtain of water, and perhaps a secondary splash as the water overshoots in refilling the hole." In this sentence, the lack of an explicit predicate after the dash could make it difficult for a reader to understand the relationship between the two clauses. In addition, the command form of the verb can be misinterpreted by readers in whose native languages the command form is reserved for directives to subordinates. To eliminate the possibility of misinterpretation, the sentence could be revised as: "Dropping a heavy rock in a pond and watching the splash, one sees a crown-like curtain of water, and perhaps a secondary splash as the water overshoots in refilling the hole."

In case this is sounding a little too much like a Berkeley diversity training, there is reason to believe that making sentences more explicit helps native English speakers, too. My final comments on the overall structure of the piece are in consideration of your scientific readership, without regard to nationality. In my work with scientists, I have found that many of them are so focused on the details of their work that they sometimes neglect the bigger picture, to the point that they can become focused on a problem that may in itself have merit but is nonetheless outside the scope of the original research question. Because these readers may focus on Luie's mathematics and procedures, I would suggest that your paper could be lightly restructured to emphasize the over-arching theme, which I believe is that Luie's diverse

accomplishments can be attributed to his being simultaneously open-minded, creative, and mathematically rigorous.

What I have called a light restructuring would involve revising the Introduction and Epilogue, with additional adjustments to the transitions between sections; here, I will try to demonstrate to you that I can indeed be ruthless as an editor. In the Introduction, I would eliminate the Nobel Prize quote because it references a particular discovery of Luie's that is not one of the topics of this paper. Instead, I would suggest simply identifying Luie as a Nobel laureate with the following adjustment to the first sentence: "Luis Alvarez (1911–1988), winner of the 1968 Nobel Prize in Physics, was one of the most brilliant …" I would then suggest adding one or two sentences to that first paragraph that would more fully introduce the mysteries, what piqued Luie's interest in them, and why his approach to these particular problems should be of interest to the greater physics community. My last suggestion for the Introduction would be to relocate the Feynman quote to the Epilogue, where it would encourage readers to take a bold approach only after the gains that can be made from such a bold approach have already been demonstrated.

In the three main sections, I would suggest getting to Luie's perspective on each mystery as soon as possible. In Section I, the descriptions of the pyramids in the first three paragraphs could be shortened to one paragraph that presents only the most relevant characteristics: their size and layout. The restructuring of Section II would be a little more involved: I would suggest relocating the paragraph on page 972 that begins "Luie's scientific interest …" so that it becomes the first paragraph of the section. The reference to the Zapruder film would have to be removed, and then the mystery and conspiracy theories would have to be presented as a flashback before you detail Luie's approach. Likewise, in Section III, the paragraph beginning "Luie's son Walter Alvarez …" could become the first paragraph of that section. In this section, I would recommend elaborating on " the challenge the impact theory made to uniformitarian dogma" at the appropriate moment in the narration (whenever the naysayers began to vocalize their objections). The description of the catastrophe, currently used to open the section, could be presented alongside the naysayers' objections to emphasize the significance of Luie's suggestion.

Closing the third section with that debate would provide an excellent transition into the posthumous confirmation of Luie's ideas that begins the Epilogue. In this last section of the paper, I would recommend emphasizing the hallmarks of Luie's genius by relocating the references to further reading to appear near the relevant statements in the main text, and starting the second paragraph with the sentence that begins "Most remarkable in Luie's investigations …," deleting the preceding sentences in that paragraph because they repeat points that were already made in the main text. To end the Epilogue with the Feynman quote, you could transition from the current last paragraph by adding a sentence after "… incline …" that identifies what you would like your students to gain from the stories you tell in that lecture.

Again, I am really splitting hairs here to try to find ways to improve an already superb paper. I hope I have not totally made a fool of myself with these comments, and I will look forward to your feedback whenever it is convenient for you to provide it. In the meantime, I hope your current students will not be too unmanageable, and that you will be able to enjoy some fine spring weather, and that spring has finally reached your daughter in New England, too.

Warm regards,
Kimberly