

MEMORANDUM**FROM: Kyle Jerreld****TO: Dr. Markwardt****SUBJECT: Rhetorical Analysis of Medical Research****Date: 2-Feb-2022**

Biomedical research is an interesting rhetorical situation. It is the duty of the researcher to collect, present, and draw conclusions from the data that they have collected in a manner that is objective. However, one would be naïve to believe that the authors of biomedical research were not trying to use rhetorical techniques to convince the reader that their conclusions are correct and about the significance of their findings. In some cases, this is more obvious than others and for good reason. The piece I chose to write about was a piece of medical research related to neurological disorders because of SARS-CoV-2 (COVID-19) vaccinations entitled, *“Neurological complications after first dose of COVID-19 vaccines and SARS-CoV-2 infection”*.

There are many factors that determine how reputable and influential a piece of biomedical research is, two of the prominent factors are the authors and the journal in which the research is published. In the case of this paper, it was written by a cohort of scientists from the University of Oxford and the University of Glasgow. As most people know, any research that carries the Oxford name with it holds a certain level of prestige and reliability. Secondly, the journal in which the research gets published is a big factor in the rhetorical strength of scientific research. The more prestigious the journal, the more people will read it, the more people will cite it and, in the end, the larger sway the research will have. The National Library of Medicine currently ranks Nature Medicine, the journal which this paper was published in, third in terms of its popularity and reputability as indicated by its high impact factor (a metric determined by the frequency with which a journal is cited in other papers).

The above factors only have an impact on certain readers. Most biomedical research is read only by physicians and other researchers who often are very aware of what authors, universities, and journals are the most reputable. They can also parse good research from the bad even without those indicators as reputable research does not only come from prestigious universities. However, due to the subject of this research paper there was undoubtedly less trained individuals who also read this paper and used its results as a means for making healthcare decisions for themselves as well as justifications as to why those around them should or should not seek out the COVID-19 vaccination. Since the mass rollout of the COVID-19 vaccines there has been much information and misinformation that has circulated about the efficacy and safety of those vaccines. One of the more troubling findings that was substantiated was the development of rare neurological disorders in the wake or receiving the first dose of one of the vaccines. The two vaccines that this study focused on is the Pfizer/BioNTech (BNT162b2) mRNA vaccine and the Oxford/AstraZeneca (ChAdOx1nCoV-19) non replicating viral vector vaccine.

This peer-reviewed research article followed most of the conventions that one would come to expect of biomedical research, containing an abstract, introduction, methods, results, and discussion/conclusion. It did seem as if there was some level of expectation that there would be individuals who were not of the normal audience for scientific research. There is no real way to compare this objectively, however, the paper seemed to read a little easier than scientific research tends to. The mechanisms by which the vaccines and the disorders work was minimally mentioned in the paper, and it primarily focused on the results of the statistical study. The mechanisms may have just been out of scope for this research, which does seem somewhat likely as it was mostly a statistical study. However, it is somewhat standard to propose causes with scientific basis for why the observed phenomena are occurring in either the discussion or the introduction. The second rhetorical decision that was made by the author which likely relates to the anticipated audience was the order in which the paper was presented. Generally, the order in which the sections of a paper are organized are as listed above. In this paper, the methods section was included not just last, but after the cited sources, acknowledgements, etc. It was treated almost more as supplementary information rather than one of the foundational parts of scientific research papers. Admittedly, a reorganization that includes the methods after the results or discussion/conclusions is not completely foreign as there are many other papers that do this to put the results—often what readers care about the most—at the forefront of paper for the convenience of the reader. It is likely that the authors realized that in this case it was the results and discussion that the audience really cared about and thus prioritized them over the methods.

Arguably the most important part of any research paper is how you present your data in a digestible and accessible mode for the audience. In this research paper there were three tables presented and two figures. There are more figures and tables added at the end as supporting material that are not necessarily essential for understanding the main points and conclusions of the paper. Tables tend to present data in a purely numerical form and can be quite convoluted with large amounts of numerical data. Additionally, making direct comparisons between traits can be more difficult and take more time for the reader to interpret the data. Generally, numerical data when being compared across multiple traits and controls is shown as some sort of plot, whether it be a bar graph, scatter plot, etc. Anecdotally, most of the papers that I have read from any of Nature's journals, have contained well-made figures that summarize all the data in a simple and sensible manner. One of the figures in this paper does a very good job of showing the incidence rate ratio (IRR) averages for all the conditions with the respective 95% confidence intervals on a plot with a line at 1 (the normal IRR). The tables presented in this paper generally contain huge amounts of data and frankly, were cumbersome to interpret. A lot of the data presented in the tables was discussed in the results section and was redundant or supplemental to the main figure that contained the most useful information. Using some sort of simple visual representation likely would have made this information easier to digest for the figures that contained counts of the numbers of people who developed the disorders.

The authors utilize an appeal to logic, especially in the discussion portion of the paper. They presented that the IRR for all the neurological disorders associated with the vaccines are higher in the four weeks following a positive COVID-19 test than in the four-week span following

vaccination. Understandably, it would be ideal that the IRR of these rare neurological disorders following vaccination be at the baseline for what they would be under normal conditions. Thus, the argument presented is that, despite the slightly increased IRRs for the neurological disorders the risk of developing them following a COVID-19 infection was higher and that widespread vaccination programs was still the best way to move forward in the interest of public health.

It is worth a mention that some of the authors from the cohort that wrote this paper are from the University of Oxford which is the same university where the vaccine that bears its name, the Oxford/Astra Zeneca vaccine was developed. This obviously could cast a shadow of doubts on the results due to the potential conflict of interest amongst other ethical concerns. However, it is unlikely that this is the case as the data presented and discussed showed higher IRRs post Oxford/Astra Zeneca vaccine than with the Pfizer/BioNTech vaccine. Essentially, the results and discussion presented imply that the Pfizer/BioNTech vaccine was safer in terms of neurological disorders than the Oxford produced vaccine. For these reasons, and the acknowledgement of the potential conflict of interest in the supplementary information of the paper it is unlikely that this should take away from the trust the audience has in the authors.

The authors of this paper did a relatively good job of leveraging the rhetorical situation to help get their point across. Their ordering of the paper, use of simpler language for the sake of the audience, and the prestige of the journal and the authors also increased the rhetorical strength of this paper. However, slightly more clear data presentation would have helped aid in the understanding and ultimately the influence the paper could have had. Additionally, I think that if there was an anticipation of a less highly trained audience that does not read biomedical research regularly it may have been a good idea to present these findings out in a more accessible way to both audiences.