

# Response Letter to Reviewers' Comments

## 1 Summary

I would like to thank Lucy Liu for her thoughtful, constructive comments. The manuscript has been revised accordingly with the following major changes:

1. Following the reviewer's comments on expanding the literature review, a new paragraph was added to the introduction that expanded on other works that have been done. This involved reviewing alternatives to the plus-minus and works that other people within the sports statistics world have done to address this. This also included addressing some downsides to these works and why this project is necessary.
2. In response to the reviewer's comment on clearly stating the hypothesis, the hypothesis was added to the last paragraph of the introduction that asked the over-arching question that is being addressed in the paper. This set up the work that is being done in the paper and what the readers can hope to take from this work.
3. The reasons that each of the models used were expanded. The need for the assumptions to be verified was added to the methods section. The reviewer did make the suggestion of adding the plots to verify that the assumptions were satisfied. While I did make plots to make sure all assumptions were verified, they were not included in the final paper due to space concerns. Also, I did not want to take attention away from the discussion at hand. There were additions made to the ridge regression section explaining why ridge was chosen over other regularization techniques.
4. An extra paragraph was added to the end of the discussion to explain future directions. The reason for this study was re-iterated as well as explaining how it can be used in the NHL. Additional comments were added to explain what can be done in the future based on this study and the work of other people within the field.

Point-by-point responses are as follows, with the reviewer/editor's comments in *italic*.

## 2 Response to Each Comment

*The literature review could be expanded to include additional studies that have examined the plus-minus statistic and its alternatives. This could provide a better foundation for the reasoning behind this study and highlight gaps that you hope to fill with your current research.*

This was a good note to improve the paper. While I initially mentioned Brian MacDonald's work and implied that other people had proposed alternatives to the plus-minus, I did not include enough detail. Including more literature helps the reader to have a better understanding of what work is already being done. It also allows me to explain why my study is important and what it contributed to this conversation. A paragraph better explaining the literature review was added as a fourth paragraph in the introduction.

*The paper evaluates the effectiveness of the plus-minus statistic compared to other metrics like Corsi and Fenwick. While the objectives are clear, the hypotheses are not explicitly stated. Clearly state the hypotheses at the end of the introduction.*

In the first draft, the overall goal of the project was stated as well as the questions that would be answered in the paper. At the request of the reviewer, the hypothesis of the project was stated in the second to last sentence of the introduction. Hopefully this helps the readers to understand the over-arching question that is being answered in this project.

*Although each method is described individually, the reason behind selecting these specific methods (Ex.why ridge regression and not another regularization technique) is not fully explained. Add a brief justification for each method and explain why alternatives were not selected.*

*Additionally, clearly outline the assumptions associated with each statistical method and discuss how these assumptions are checked and addressed within the analysis. Include diagnostic tests and results that assess whether the assumptions of each statistical method are satisfied. For example, provide residual plots or normality tests for mixed-effects models.*

While in the first draft, the reason that each method was being used was explained, the reviewer is correct that there is a need for additional explanation of why each model works in the given context. A few sentences were added to the beginning of the Ridge Regression section in Methods to explain how the models were used. Additionally, the assumptions of the models needed to be addressed. While I did test that the assumptions were not violated, images were not included. Due to the length of the paper, I did not want to include images to keep the paper from being incredibly long. Also, I felt that it would not benefit the discussion to include a longer section about verifying the models' assumptions. A few sentences were added to the end of each of the models' sections to verify that the assumptions were met.

*The discussion section is missing future directions. Discuss what comes next after this study, or some possible new ideas or improvements to explore. Further elaborate on the implications of these findings for the NHL.*

The reviewer is correct, the paper needs a better ending that encapsulates the work done. The initial last paragraph explained what was accomplished in this study and briefly mentioned the implications of this work but failed to remind the readers why it is important and what can be done moving forward. An extra paragraph was added to the end of the Discussion section to explain why this study was important, what can be done with the information in this paper, and what next steps can be taken.