

# Enhancing Sport Movement Execution Accuracy Through Timely Feedback

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## INTRODUCTION

- Biomechanical feedback improves sports performance. Real time feedback enhances movement accuracy, reduces injury risk, and refines technique.
- Kicking accuracy is crucial in soccer. Precision and consistency are essential for player development and performance.
- This study evaluates feedback effectiveness. By analyzing impact location data, we assess how feedback improves kicking accuracy over multiple trials

## METHODS

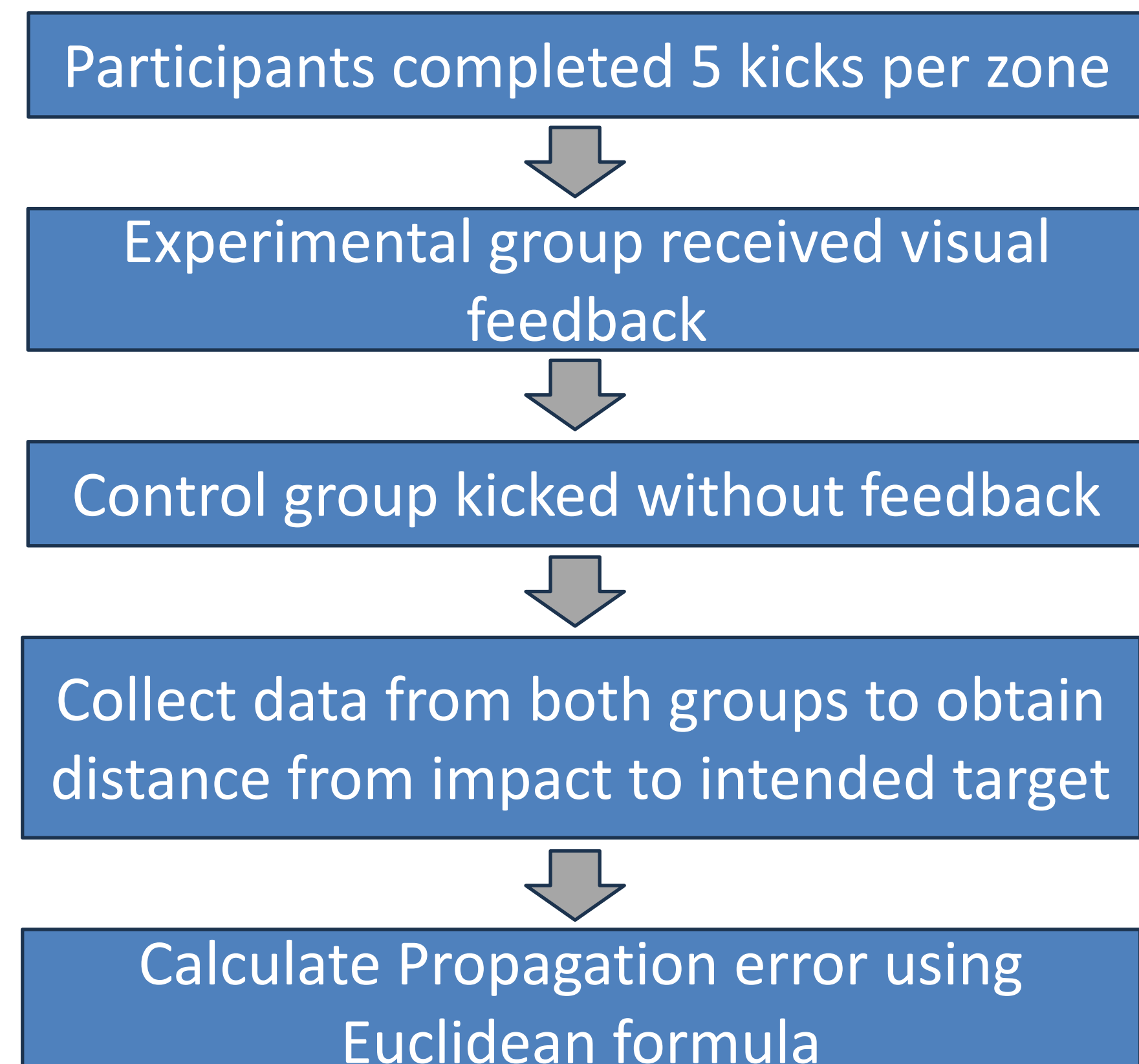


Figure 1: Ball impacting middle target

Experimental Design:

- 10 healthy participants (feedback vs no feedback)
- 5 kicks to 5 different areas
- Python script analyzed x/y impact coordinates.

### Procedure Overview



$$\Delta r = \sqrt{(\Delta x)^2 + (\Delta y)^2}$$

Error Propagation

## RESULTS

Pivot table was created to analyze raw data for an average of each kick in different areas and through time.

- Both groups improved over time.
- Feedback group 29.8% reduction in error
- Feedback group showed lower and more consistent error propagation across 25 kicks.

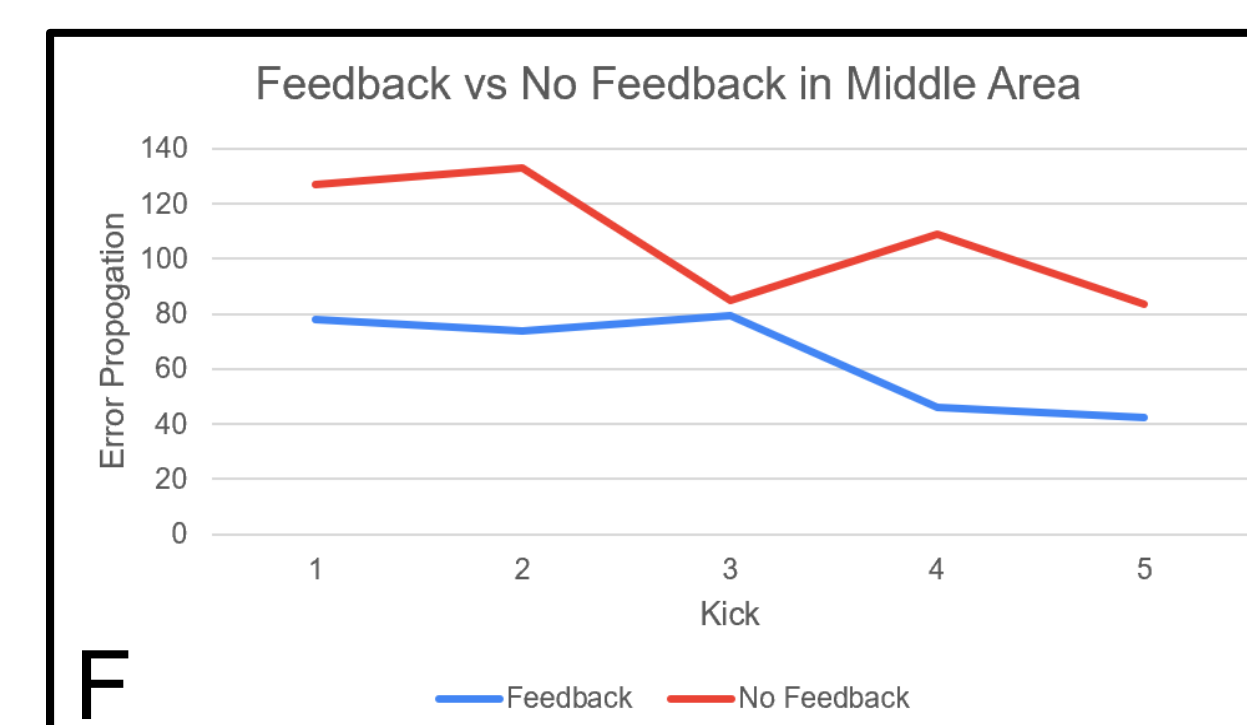
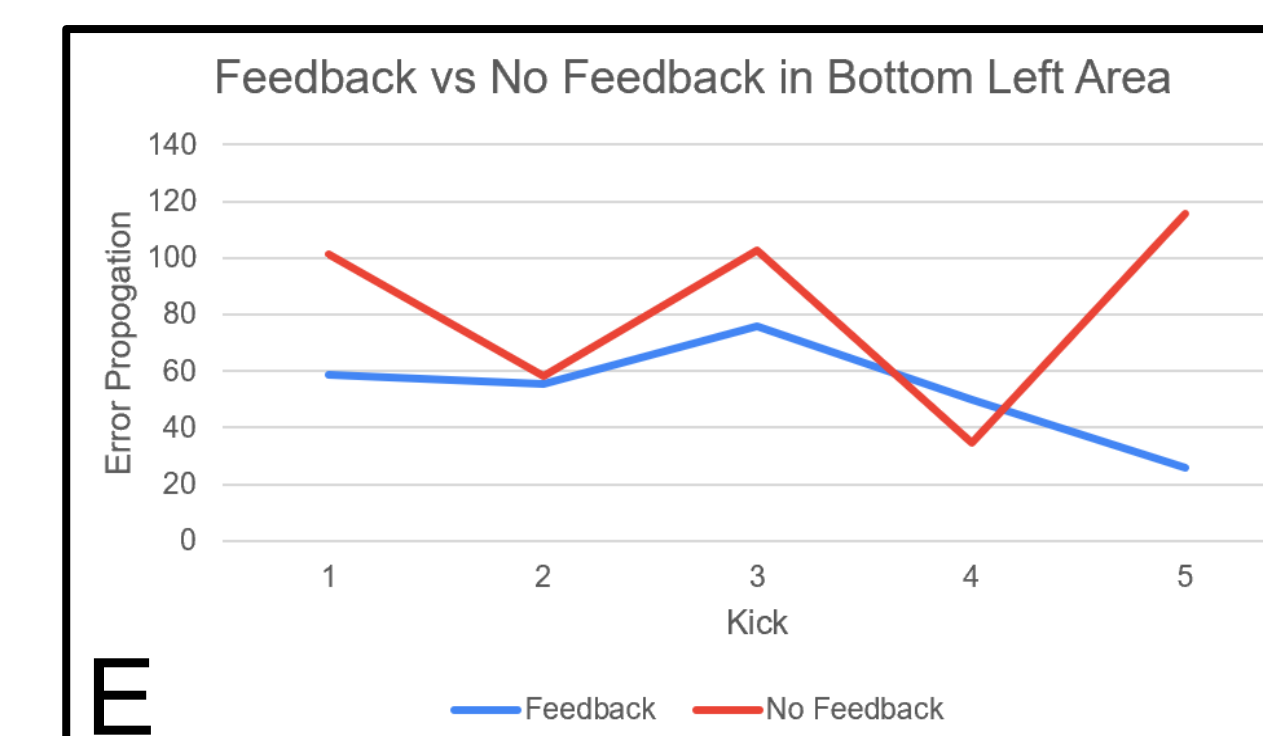
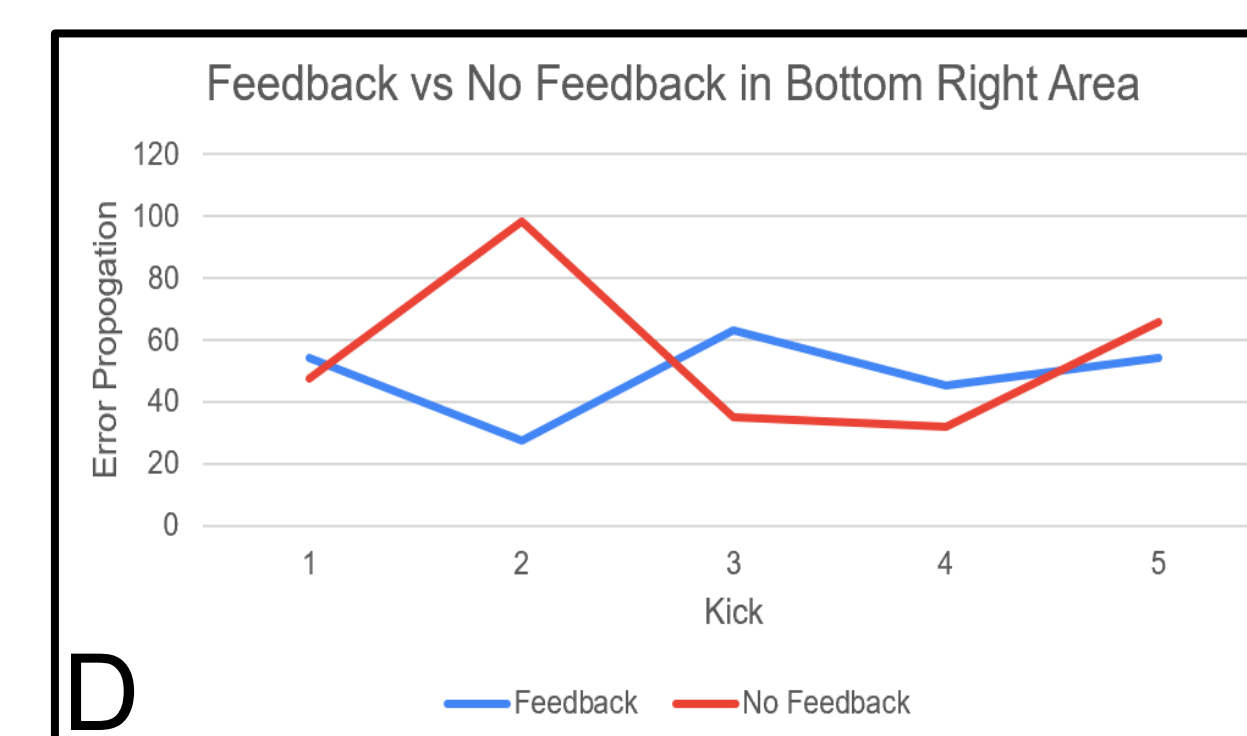
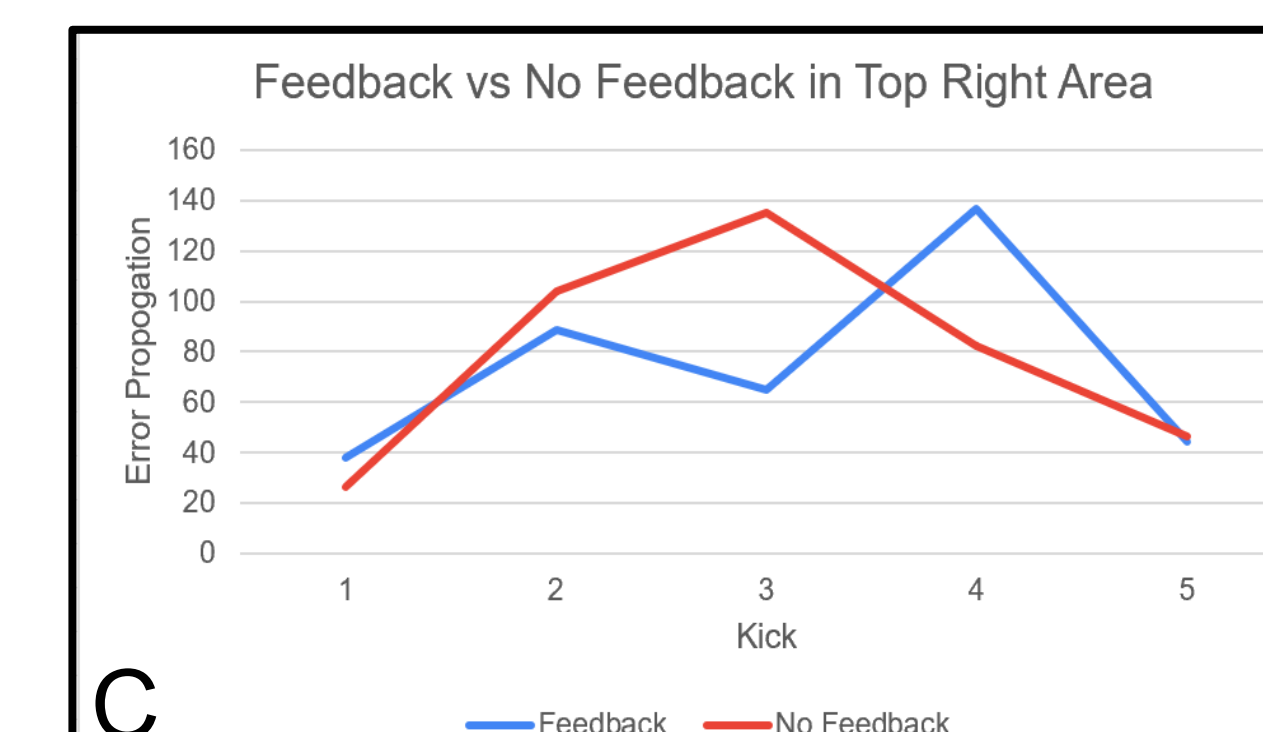
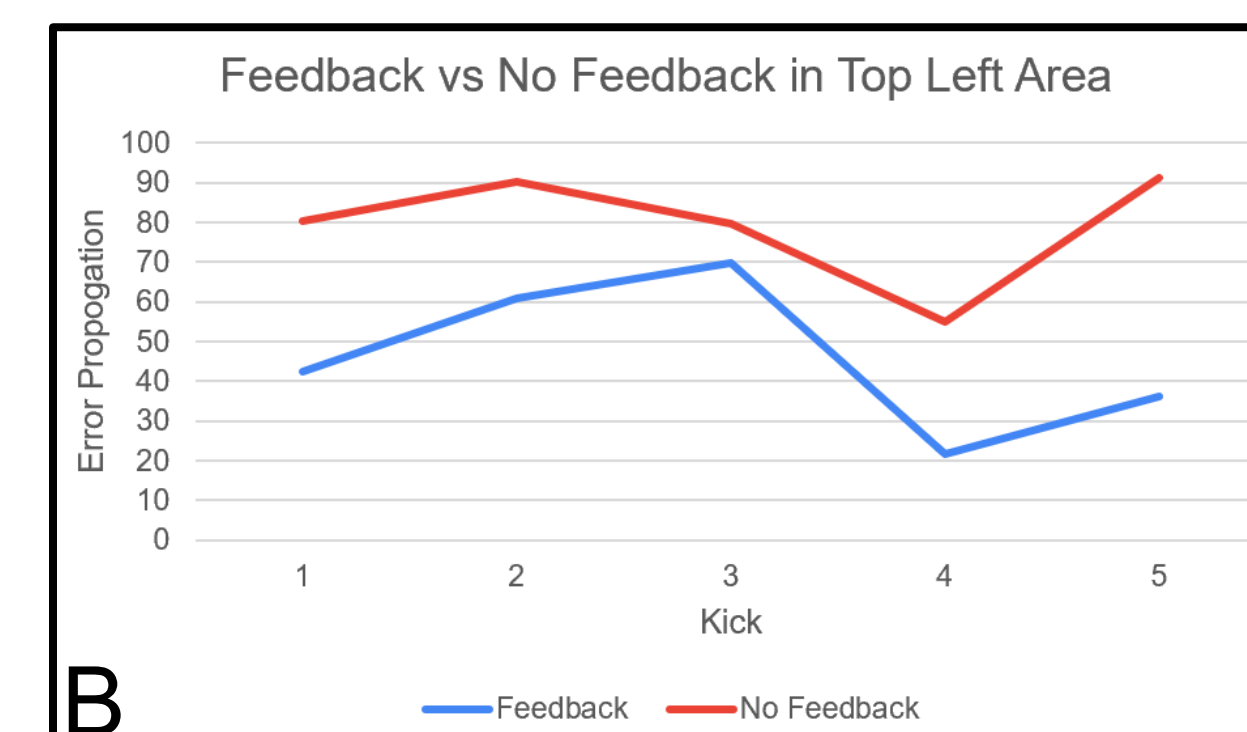
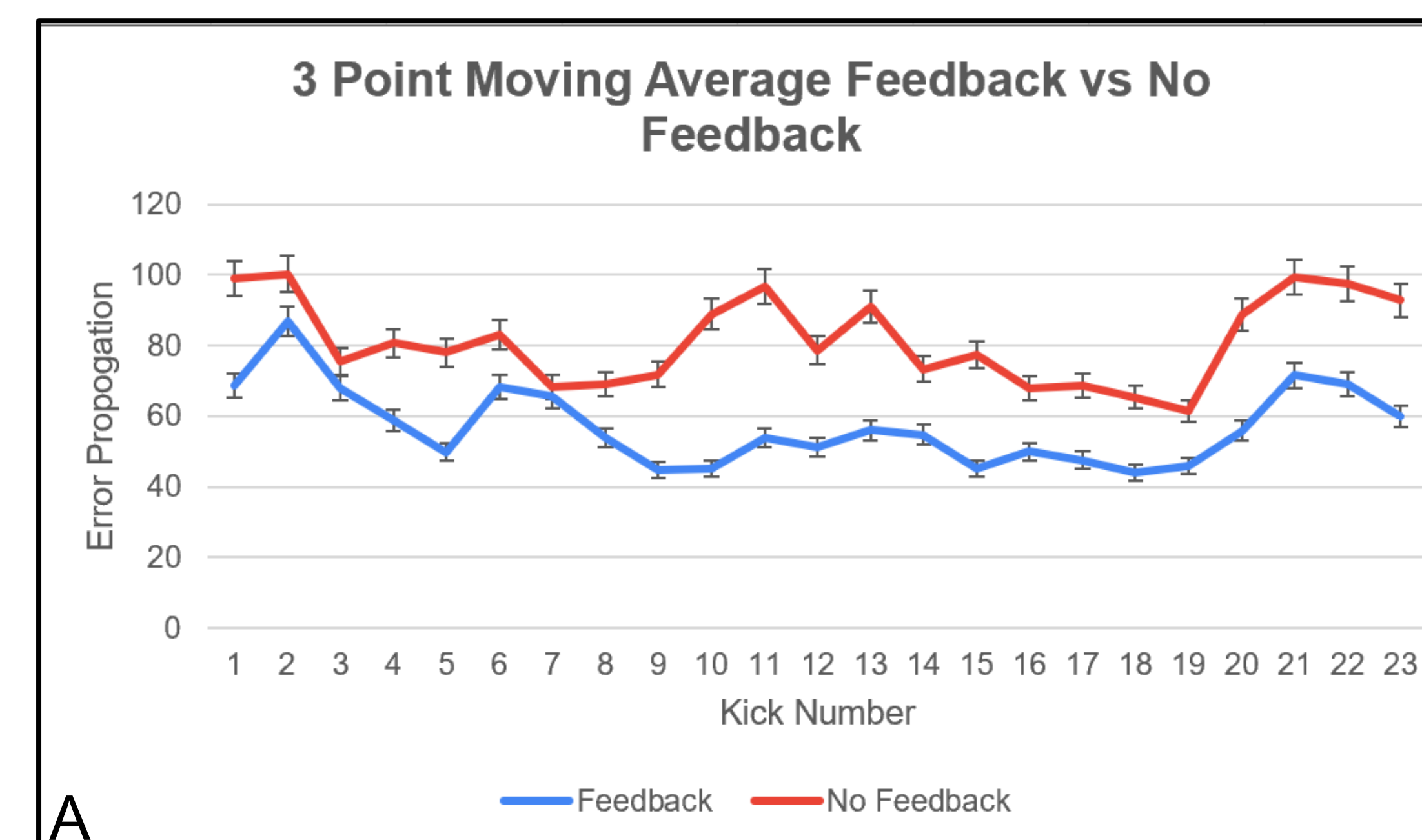


Figure 2A. Impact Error across 25 kicks comparing feedback and no feedback conditions. B. Comparing feedback and no feedback in top left. C. Comparing feedback and no feedback in top right. D. Comparing feedback and no feedback in bottom right. E. Comparing feedback and no feedback in bottom left. F. Comparing feedback and no feedback in middle.

## DISCUSSION

- Real-time biomechanical feedback significantly improved kicking accuracy and consistency.
- Participants who received feedback adapted their technique faster and demonstrated a stronger learning curve.
- Both groups showed improvement, confirming a general learning effect, but feedback accelerated performance refinement.

## SUMMARY, CONCLUSIONS AND FUTURE DIRECTIONS

- Biomechanical feedback is an effective tool for enhancing motor control and accuracy in sports performance.
- Participants receiving feedback demonstrated a ~30% greater improvement than those without feedback
- These findings support the integration of smart feedback systems into sports training programs.
- Develop into mobile app.

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