

Kaggle NFL Punt Safety

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Team Background

Todd Steussie

- COO PotentiaMetrics, a healthcare analytics firm
- 14-year NFL player (1994-2007)
- MBA Kellogg Business School, Northwestern University (2012)
- Master's of Data Science at Northwestern University (2018-current)

Kevin McGovern

- Data and Analytics Solution Architect at Slalom Consulting
- Master's of Data Science at Northwestern University (2018-current)

Problem Statement

- A disproportionate number of concussions come from punt returns (6% of plays but 12% of concussions)
- The NFL is exploring potential rule changes, based on data, that will make a positive impact on player safety

Kaggle Kernel with supporting data:

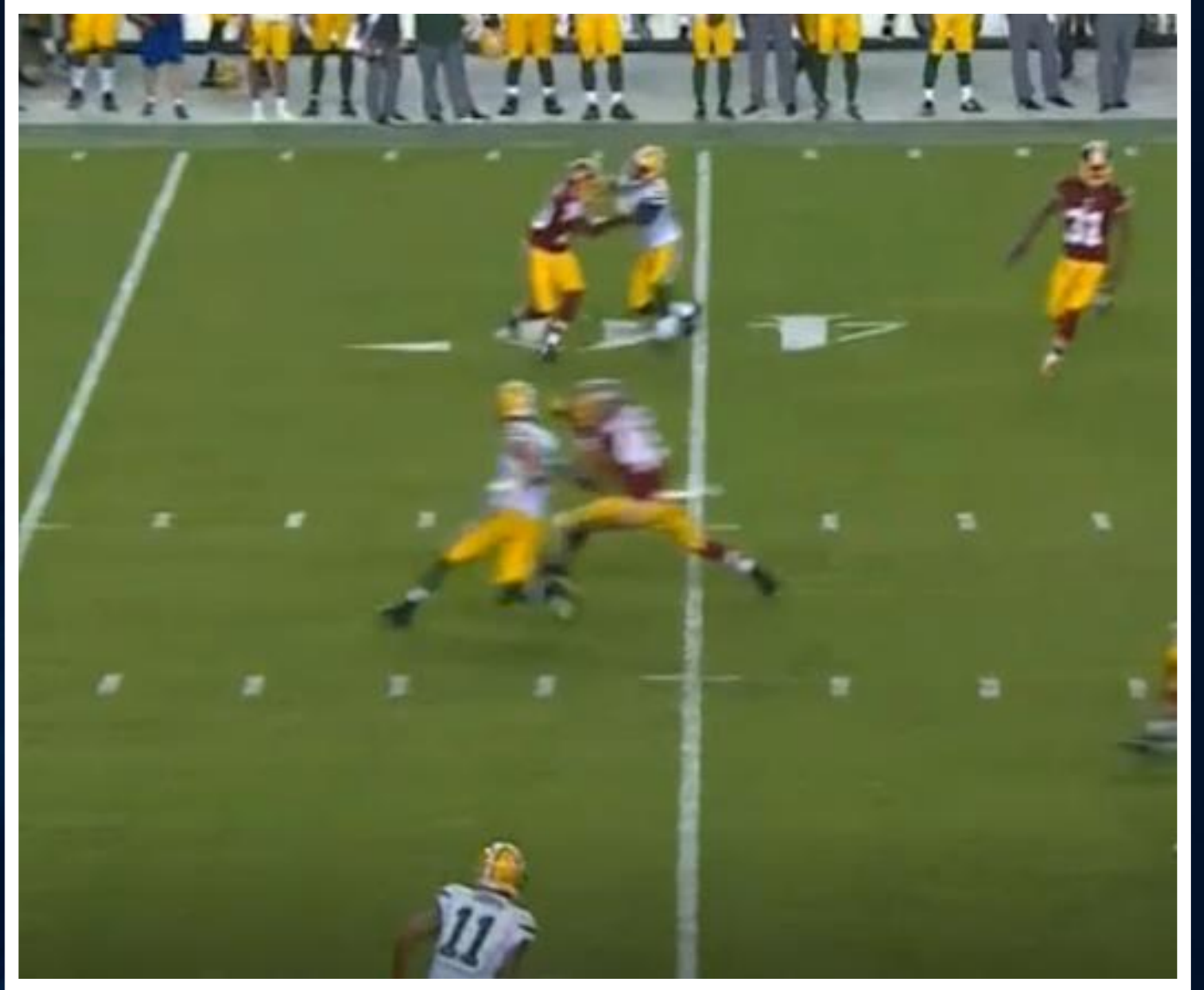
<https://www.kaggle.com/mcgovey/nfl-punt-safety-mcgovern-steussie>

Proposed Rule Change

Penalize blocks where the opponent does not have an opportunity to anticipate the block prior to impact. This is often a result of the opponent being oriented in a different direction, and as a result, is not aware of the imminent collision. These blocks are often referred to as ear-hole or blindside blocks.

Justification

Both teams should both be prohibited from engaging in blocks where the opponent does not have an opportunity to that engages with a player who is not facing them leading up to the point of contact. Players running downfield that do not see an incoming player are particularly vulnerable to injury as a result of these types of blocks. Not only are these blocks dangerous to the vulnerable player, but they often lead to injuries for the player attempting to block as well.

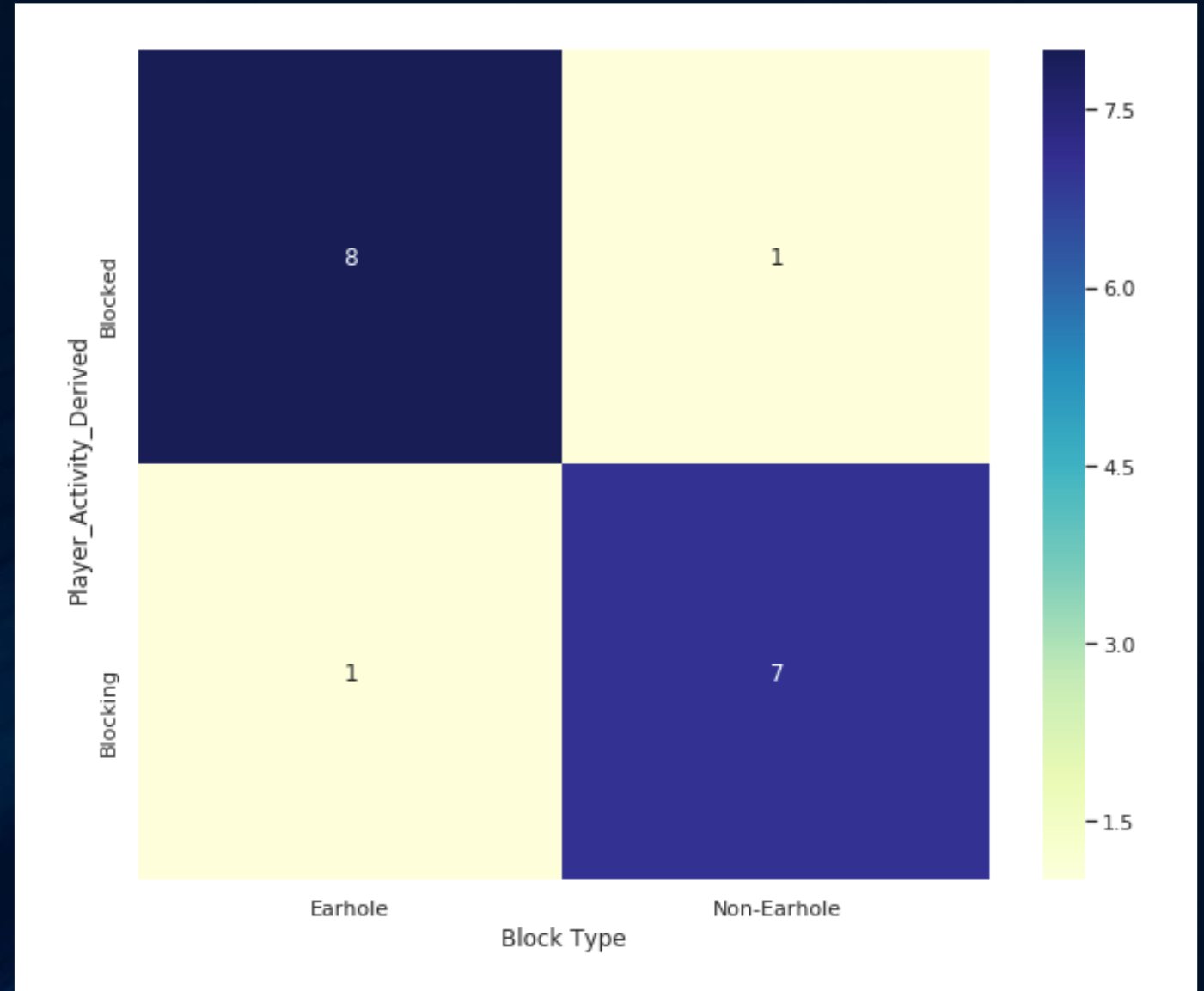


Supporting Evidence

Of the 37 plays that lead to a concussion in 2016 and 2017, 11 injuries were caused by a block occurring where the opponent does not have an opportunity to anticipate the impact. This is often a result of the opponent oriented in a different direction, and as a result was not aware of the imminent collision.

If adopted, this rule change would impact 65% of the injuries that were a result of blocking during punt plays (11 of 17).

This change can be viewed as an extension of the player safety rules the NFL already enforces regarding a defenseless receiver. As you can see from the play above, the player similarly has limited time to react to an incoming block putting both the blocking and the blocked player at risk.

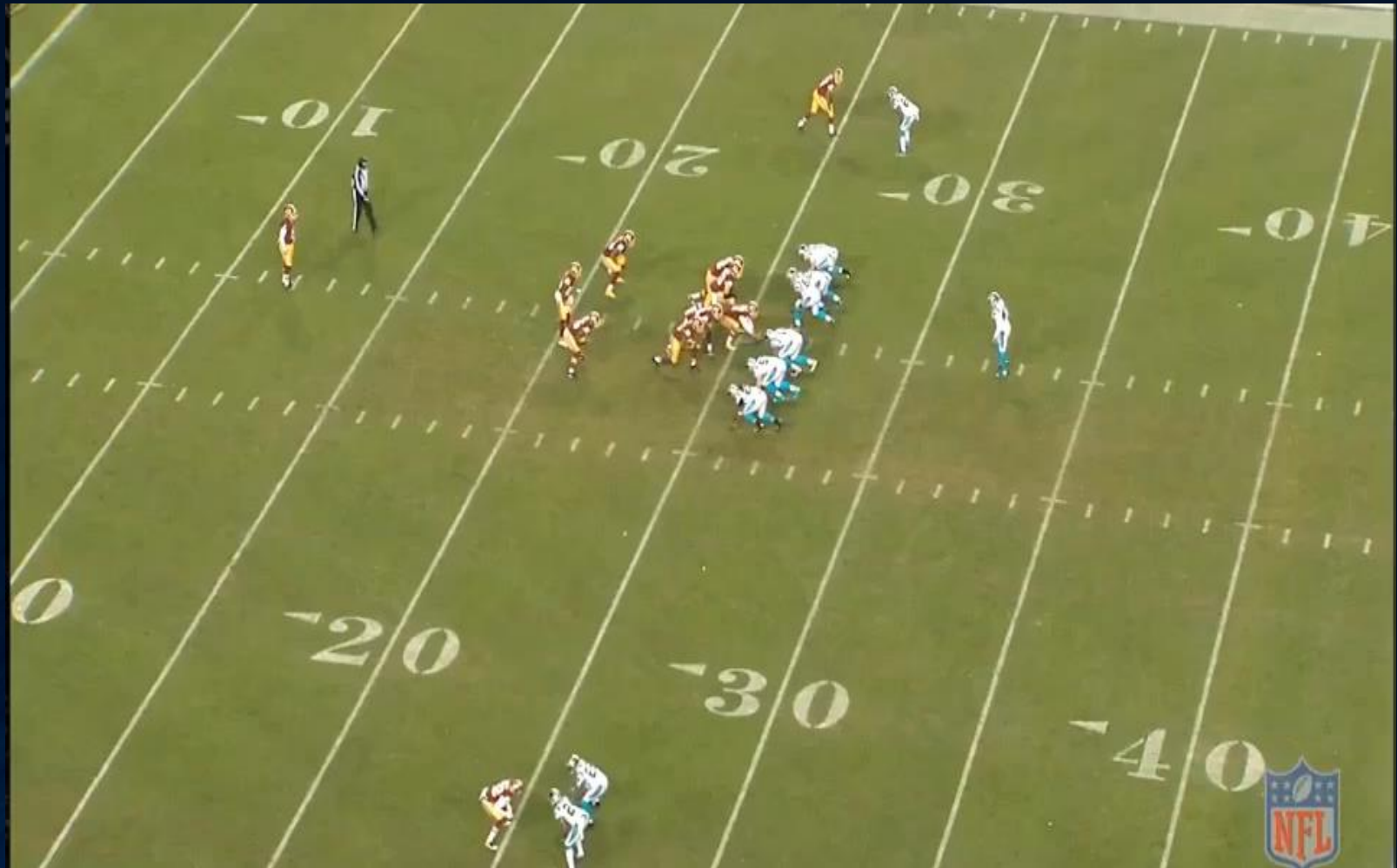


Play Example #1

2016 Week 15 Panthers @ Redskins

On this play, the Washington Redskins player on the kicking team runs down field in an attempt to make a tackle. Downfield he is hit by a Carolina Panthers player attempting to make a block. The Washington player is unable to anticipate the contact and is injured as a result of being hit at a high speed.

If implemented, the proposed rule change would penalize the Carolina Panthers player for hitting a defenseless player.



Video analysis available [here](#) or in Kaggle Kernel

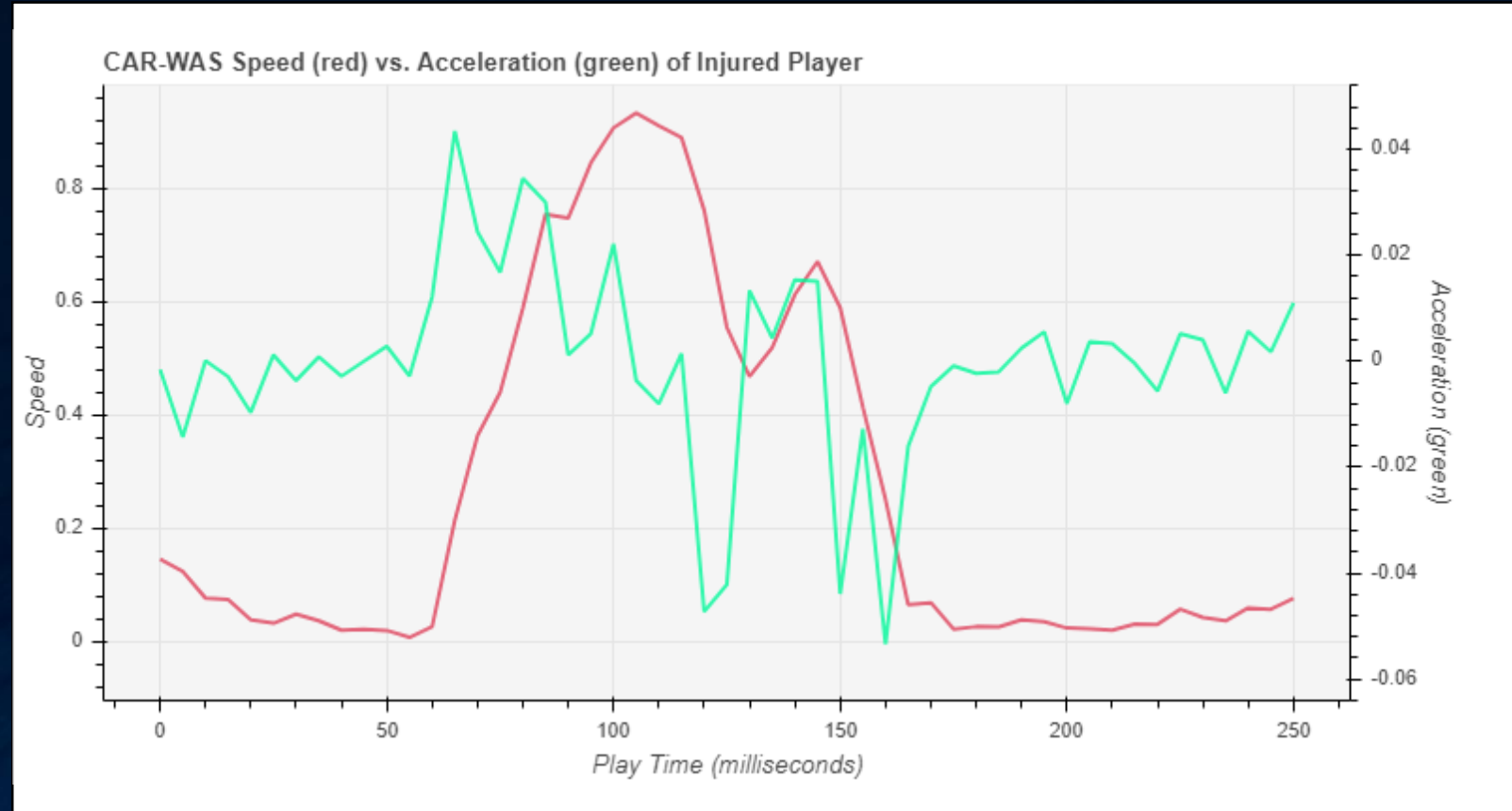
Additional supporting data provided in [Kaggle Kernel](#)

Hover over image to show video controls for playback

Play Example #1

2016 Week 15 Panthers @ Redskins

In the chart to the right we compare the speed of the injured player against the acceleration of the injured player. The injured player actually briefly decelerates, we assume when he first sees the incoming player, immediately prior to the moment of impact but not with nearly enough time to make a difference in his overall speed. Because he makes contact at such a high speed, damage is maximized and he is immediately immobilized.



Additional supporting data provided in [Kaggle Kernel](#)

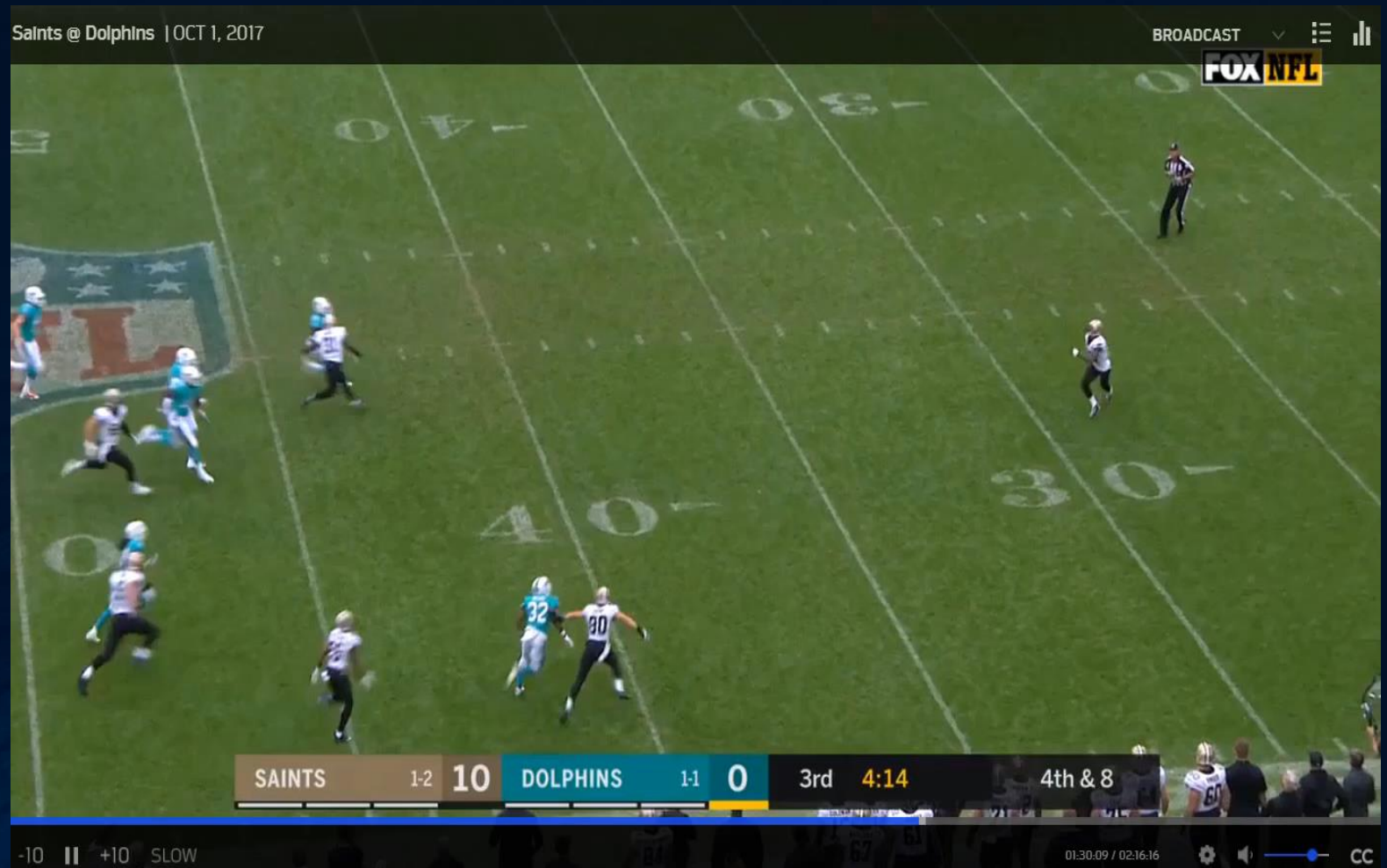
Play Example #2

2017 Week 4 Saints @ Dolphins

On this play a Saints player runs up the sideline to make a block on a Dolphins player. However, because the Dolphins player is unable to anticipate the block, the two players make contact at a high speed.

The injured player actually is the blocking player. This example shows how high speed defenseless blocks are not only dangerous for the players being blocked.

Adopting the proposed rule would impose a significant penalty at the spot of the foul, and would likely promote safer punt schemes and in-game decisions by players.



Video analysis available [here](#) or in Kaggle Kernel

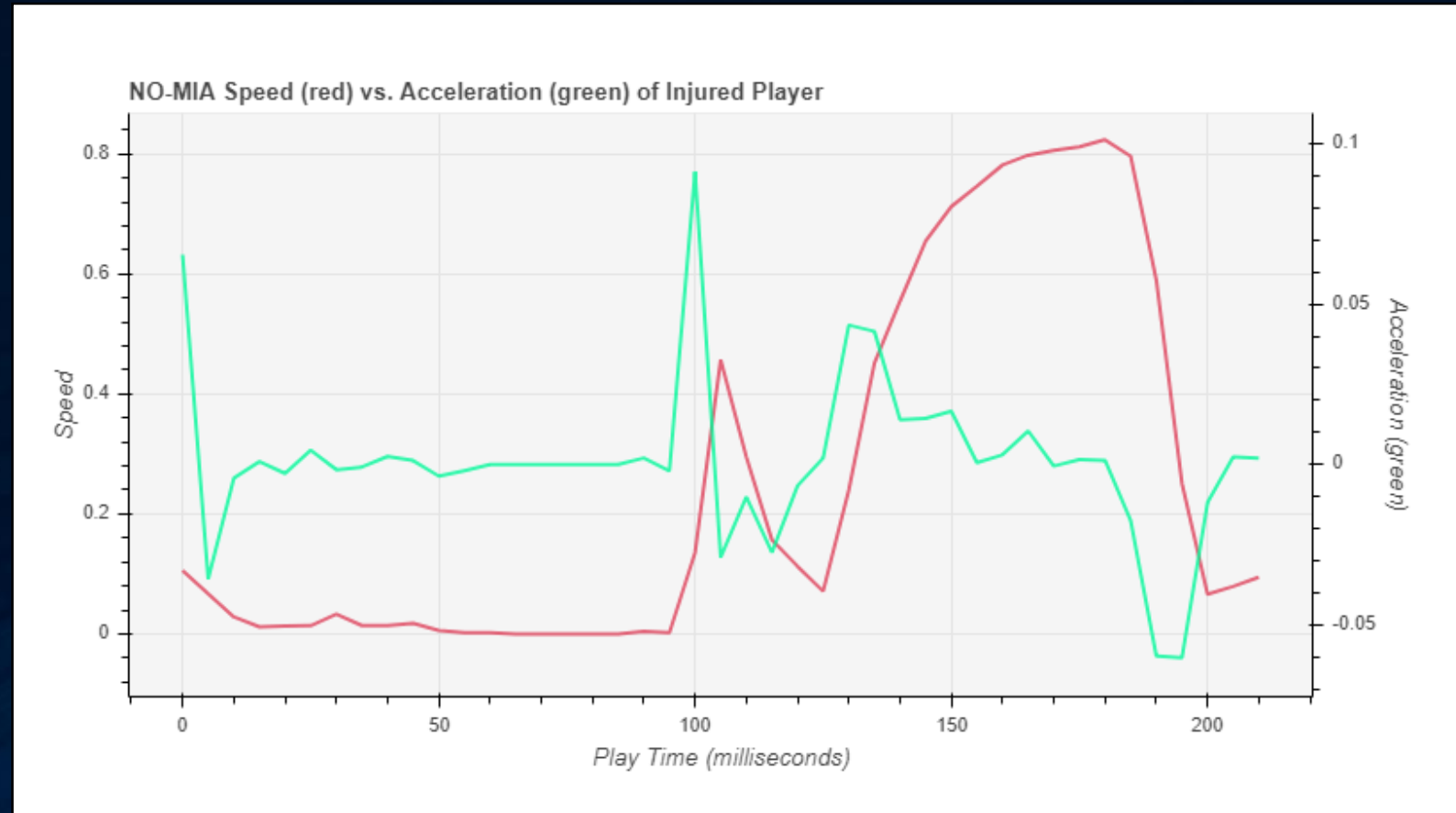
Additional supporting data provided in [Kaggle Kernel](#)

Hover over image to show video controls for playback

Play Example #2

2017 Week 4 Saints @ Dolphins

The chart to the right shows speed and acceleration compared for the injured player. Acceleration increases rapidly when the ball is kicked as the player initially backpedals to block. As the ball goes down field, the player accelerates again and maintains that speed until the point of contact near the sideline down field. At the moment of impact (190-200) the player quickly decelerates as he quickly comes to a stop after making contact with the player running downfield.



Additional supporting data provided in [Kaggle Kernel](#)

Protections for Defenseless Players – 2018 NFL Rulebook

Under current NFL rules, it is illegal to initiate unnecessary contact against a player who is in a defenseless posture. As our analysis has shown, a significant portion of injuries on punt plays have resulted from blocks against defenseless players. Although applied to a different situational context, Article 7 of the NFL Rulebook establishes criteria for defenseless player status, stating that a player is to be considered defenseless until "the player is capable of avoiding or warding off the impending contact of an opponent". Additional precedent applying to defenseless players in Article 9, prohibiting "intimidating and punishing acts" and Article 6 that establishes continuous defenseless player status on specific plays.

It is our contention that by broad defenseless player protection on punt plays would significantly reduce injuries. We believe that this rule change is a logical extension of the protections already enacted to protect defenseless players. Adopting this rule change is likely to have the same positive impact on player safety as previous rules promoting players safety, with minimal risk of negative externalities associated with changes to strategy or player behavior.