The Physics of Football

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Five Vignettes

- The Fullback Scrambles Just Out of Reach
- The Offensive Lineman Blocks the Rusher
- The Defensive Back Tackles the Ball Carrier
- The Quarterback Passes to the Receiver
- The Kicker Boots the Ball

The Fullback Scrambles Just Out of Reach

- Why is it easiest for the fullback to
  - stay motionless?
  - run steadily in a straight line?
- Why does dodging take so much leg strength?
- Why does the fullback lean as he dodges?

The Offensive Lineman Blocks the Rusher

- Why is a huge lineman so hard to move?
  - Is the lineman's *weight* the issue?
  - If he wore roller skates, would he be easier to move?
- Why does a running start help either player?
- Why is padding so important to avoiding injury?

The Defensive Back Tackles the Ball Carrier

- Why does the ball carrier
  - stay upright when hit at chest/stomach height?
  - flip backward when hit at shoulder height?
  - flip forward when hit around the legs?

The Quarterback Passes to the Receiver

- What distinguishes different types of passes?
  - Why does a screen pass stay low but travel fast?
  - Why does a long bomb arc high but travel slowly?
- Why can't a mere mortal be quarterback?
- Why does a good receiver need soft hands?
- Why is a smooth spiral so helpful?

The Kicker Boots the Ball

- Why do different plays require different kicks?
  - How does a field goal kicker maximize distance?
  - How does a punter maximize time in the air?