The Evolution of the Physicality in Football

Casey Tucker

Players (Defensive line)

Ernie Stautner (1950)- 6’1” 230lb

“Mean” Joe Greene (1970)- 6’4” 275 lb,

Haloti Ngata (Present)- 6’4” 340 lb

-Interior defensive line had the most exaggerated change over the past 60 years for various reasons due to bigger linemen and change in primary responsibility to stop the run.
-Arguably the best interior defensive linemen of their time.

The Simulation

- Each player will have a distance of10 yards to reach max speed.

-The player involved will sprint full speed towards a wall to simulate the amount of force created on impact.

-The impact will be measured by pounds of force.

Performance Comparison from Simulation

10 yard splits: Ngata- 1.73 sec.
Greene (estimated) -1.62.
Stautner (estimated) - 1.66 sec.

Momentum Generated: Ngata- 1,130 kg m/s
Greene- 970.72 kg m/s
Stautner- 794.9 kg m/s

Pounds of Force Applied on impact:
Ngata- 1,270 lbs of force (5,650 N)
Greene- 1,090 lbs of force (4850 N)
Stautner- 893.5 lbs of force (3974.5 N)

Player's Force Comparisons

-Ngata's impact of 1,270 lbs of force is equivalent to the weight of a baby whale.

-Greene's impact of 1090 lbs of force is equivalent to the weight of an adult bull shark.

-Stautner's impact of 893.5 lbs of force is equivalent to an average sized male polar bear.

Haloti Ngata in action…

https://www.youtube.com/watch?v=0rmGQN-DGyw

Ngata vs. Greene

——————> <——————

1130 kgm/s vs. 970.72kgm/s

-After collision Greene ends with a momentum of 71 kg m/s in the opposite direction.
Greene went back at a speed of 1.28 mph off of contact.

Greene vs. Stautner

——————-><————————-

970.72kgm/s vs. 749.9kgm/s

- Stautner is sent back with a momentum of 79.28 kg m/s. Stautner's initial speed was 1.7 mph off contact.

Ngata vs. Stautner

——-><——-

1130 kgm/s vs. 794.9 kgm/s

-Stautner gets launched back with a momentum of 135.6 kg m/s. (Nothing against Stautner, he was a beast.)
Initial speed off contact was 2.9 mph.

In perspective

In the 20 years difference between Stautner and Greene, the impact force changed by 19% while the impact force between Greene and Ngata changed 15%.

Will the trend continue, and for how long? Is there an asymptote that we hit when we reach our full potential?

Effective Equipment

-Pads today don't have any special ability to reduce the force a player feels on impact.

-Shoulder pads all have a different "K" constant because not all models are the same, and the resistance of the "K" constant decreases over time.

-New pads with a sturdy "K" constant can absorb up to 68 pounds of force from a direct collision.

-In 1950, shoulder pads did little to nothing during an impact. No strong constant of resistance.