

Then ... and Now

By Bob Irving

They're getting bigger and bigger all the time – America's professional football players, that is. It's no longer uncommon to find several players of 300 pounds or more on a team. A couple of decades ago that would have been virtually unheard of; newsworthy on sports pages all by itself! Since this trend seems to have crept up on us almost without our being aware, is it unrealistic to expect it to continue – perhaps to become even greater?

Can we expect to see either more and more 300 pounders on each team or, more of the present 300 pounders to begin to nudge 350 pounds or 375 pounds, or more? Or perhaps to see both these things occur in the future? Will it end? Will it turn around so that fewer of these 'giants' will appear on our gridirons some day? Team injury statistics are increasing every year – are these two phenomena, increased body weight and injuries per team, as related as they appear to be?

While the foregoing is not an exhaustive search, it does suggest some 'food for thought.' Being a Green Bay Packer fan I have several of the books their "Lombardi era" spawned, during the decade of the '60s. "Instant Replay" was perhaps the best known of all; it contains the names of all team members of the 1967 season with heights and weights, plus position played.

The present-day '*Packer Report*' always contains the same information for today's team. An eyeball comparison of the two teams, separated by 35 years, was a natural for comparison. The '67 team had no 300 pound players. In fact, three men at 260 lbs were their heaviest. To make a comparison, I chose the heights and weights of today's Packers as of their first game of the 2002 season. Twelve of them reached or exceeded 300 pounds; their heaviest at 339 pounds! It's too bad that individual times for the 40-yard dash aren't published for each team by player. If they were available it would probably show that today's players are also faster than their earlier counterparts.

The point, of course, for this brief mention of individual speed, is that hitting power is a function of momentum which in turn, depends upon velocity or speed as well as on weight or body mass. From physics, mass times velocity equals momentum. Today's 'giants', possessing much greater mass, can hit with enormous momentum.

Let's take a look. To begin with, I compared the full team of 43 men of 1967 to the full team of 53 men of 2002, to get a rough idea of the disparity between teams in both height and weight. My first hypothesis was that although differences would exist in height, they would surely fall within the realm of chance variation – either team might show an advantage in height but it would be very slight and of no consequence either on the field of play or as a team statistic. By contrast, the second hypothesis was that differences would exist in body weight which would, by all means, be noted both on the field and on paper, and furthermore, would be statistically significant – that is, well beyond simple chance variation. My third hypothesis was that running backs and wide receivers would not vary except by chance from one era to the other, in body weight.

Full teams

	1967	2002	diff	% diff
Average height	<u>74.6 in.</u>	74.2 in.	0.4 in	0.269
Average weight	225.2 lb	<u>251.4lb</u>	26.2 lb	5.49

By changing absolute differences in inches and pounds into percent differences for each, they're directly comparable and so, better understood. The two teams vary by just a tad over ¼ percent in height but by 5½ percent in weight; the influence of weight is more than 20 times greater than that of height. Moreover, statistically there is less than one chance in a thousand that the body weights of the two teams were from the same population of body weights; it's way beyond the realm of simple chance variation.

Backs and Wide Receivers

	1967	2002	diff%	diff
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THE COFFIN CORNER: Vol. 27, No. 1 (2005)

Average height	<u>74.2 in</u>	73.1 in	1.1 in	0.75
Average weight	208.9 lb	<u>220.5 lb</u>	11.6 lb	2.71

This shows pretty much the same picture as for the full teams, but with much less than half the advantage of body weight as before; in fact, in this comparison, weight is just over three and a half times as important as height. In this pair of comparisons the team with the advantage (underlined) has a statistically significant advantage (.05), albeit not a great on-field advantage (2.71 percent) in weight – just over 10 pounds on average.

Tight Ends and Offensive Linemen

	1967	2002	diff	% diff
Average height	75.4 in	<u>76.1 in</u>	0.7 in	0.47
Average weight	243 lb	<u>299.7 lb</u>	56.7 lb	10.45

These guys are the blockers for the teams' offensive efforts plus the ends as pass receivers. Size and speed are needed here, in particular, and are applied on the field primarily against the defensive linemen and linebackers. As we'll see next, the latter are also much bigger than before (in an effort to match up with their opponents – it's a tit-for-tat world!). In 1967 the average tight end / offensive lineman outweighed the average back / wide receiver by 34 lbs but in 2002 that disparity was 79 lbs! In 2002 the body weight disparity was more than 22 times as prominent as the height disparity. Furthermore, there were less than 5 chances in a thousand that the body weights of the two groups were from the same body weight population.

Defensive Linemen and Linebackers

	1967	2002	diff	% diff
Average height	<u>75.9 in</u>	74.9 in	1.0 in	0.67
Average weight	247.5 lb	272.4 lb	24.9 lb	4.79

In 1967 the average Packer defensive lineman / linebacker outweighed his offensive counterpart by 4½ lbs but by 2002 the offensive linemen / tight ends predominated by about 27 lbs, a swing of just over 31 lbs! The prominence of weight in this comparison predominated over that of height by a factor of more than seven fold and there were only two chances in a hundred that the 1967 and 2002 body weights were from the same body weight population.

Cornerbacks and Safeties

	1967	2002	diff	% diff
Average height	72.1 in	<u>72.2 in</u>	0.1 in	0.07
Average weight	194.5 lb	<u>204 in</u>	9.5 lb	2.39

Although the influence of body weight here was more than 34 times as great as the influence of height, neither of the differences between teams was statistically significant. These men were within about 3½ inches of the height of the tallest men, on average, on the field. They were a great deal lighter in weight, however; as much as 95 lbs lighter!!

The job performed by these men requires them to be extremely agile, to change direction of pursuit quickly, and to jump well. Those attributes are not found in the enormously heavy men up front. Cornerbacks / safeties will tackle men in the running back / wide receiver category whose average weights are not overwhelmingly different from their own (204 versus 220.5).

It's probably reasonable to assume that linebackers / defensive linemen can pursue at a rate of about 24 feet per second, all out, which would translate to about 5 seconds to run the 40-yard dash, the NFL's premier test of straight-line speed. We have to use the 24 feet-per-second speed for both '67 and '02 since we have no data for either team, player by player. We're left with the differences, by position, in body weight alone.

The most disturbing disparity between opposing body weights exists between linebackers/defensive linemen versus backs / wide receivers (272.4 versus 220.5), about 52 lbs on average for 2002. Multiplying 52 by 24 = 1248 foot-pounds of force. In 1967 the average difference was 38.6 lbs, creating 926 foot pounds of force for a difference between their offense and defense of 322 foot pounds.

THE COFFIN CORNER: Vol. 27, No. 1 (2005)

1967's defensive linemen / linebackers would hit with an average force of $247.5 \times 24 = 5940$ foot pounds. By contrast, those of 2002 would exert a momentum force of $272.4 \times 24 = 6537$ foot pounds, a difference of 597 foot pounds. Considering that very often two, three or even four men will converge on the tackle of a ball carrier, the 597 can quickly become anywhere from 1194 to 2388 foot pounds!!

These figures, of course, assume direct on-target hits. Lighter bodies, with smaller bones and less protective muscle and smaller ligaments and tendons suffer, especially from repeated impact. Add to this the change from 12- to 14- to 16-game seasons over time and the fact that 12 of today's teams extend their season by play-off opportunity. Add again the probably reasonable assumption that today's linebackers / defensive linemen pursue even faster despite their added body weight than those of 1967. If anything, it's reasonable to assume that the disparity in hitting power between the 1967 and 2002 teams is even greater than described. It's easy to see that, given the disparities described above, coaching has become as much a problem of managing 'healthy bodies' in and out of the lineup week by week, as it is the teaching of techniques of attack and defend.

I compared the body weights of a sample of today's Packers (2002 season, games 6 and 10, chosen randomly) to a similarly-chosen sample of those of each of their 16 regular season opponents, by one way analysis of variance. As expected, there was no significant difference, since the F-ratio was 0.285.

Since there was no significant difference this suggests that the comparisons made previously here between today's Packers and those of 1967 would hold true for today's entire NFL. Thus, we have the probability of a league-wide trend in body weight disparity along with whatever that disparity suggests – backs and wide receivers of about the same body weights as they were 40 years ago, being tackled with much greater force today because of the increased size of their pursuers.

Perhaps the foregoing brings up some sobering philosophical questions. As previously suggested, will these trends continue? Is it proper to examine the body mass and momentum differences between players of various positions or should they be left alone to evolve as they may?

The same examination could be made in basketball but with one very important difference. In that game height differences may be as much as 15 inches which obviously gives the taller man a great advantage. However, in basketball the advantage probably translates mostly to more points whereas in football the advantage in points may be disguised but it certainly exists in hitting power where the disadvantaged smaller player may sustain a season or career-ending injury which he carries to his grave.

We're reminded of Johnny Unitas and Earl Campbell whose respective injuries have been well-documented in the sports world. They are but two among the many retired players of the past whose injuries will plague them for their lifetimes. Will there be any interest in making changes to protect players whose body weights are so disparate? Care to place a bet?