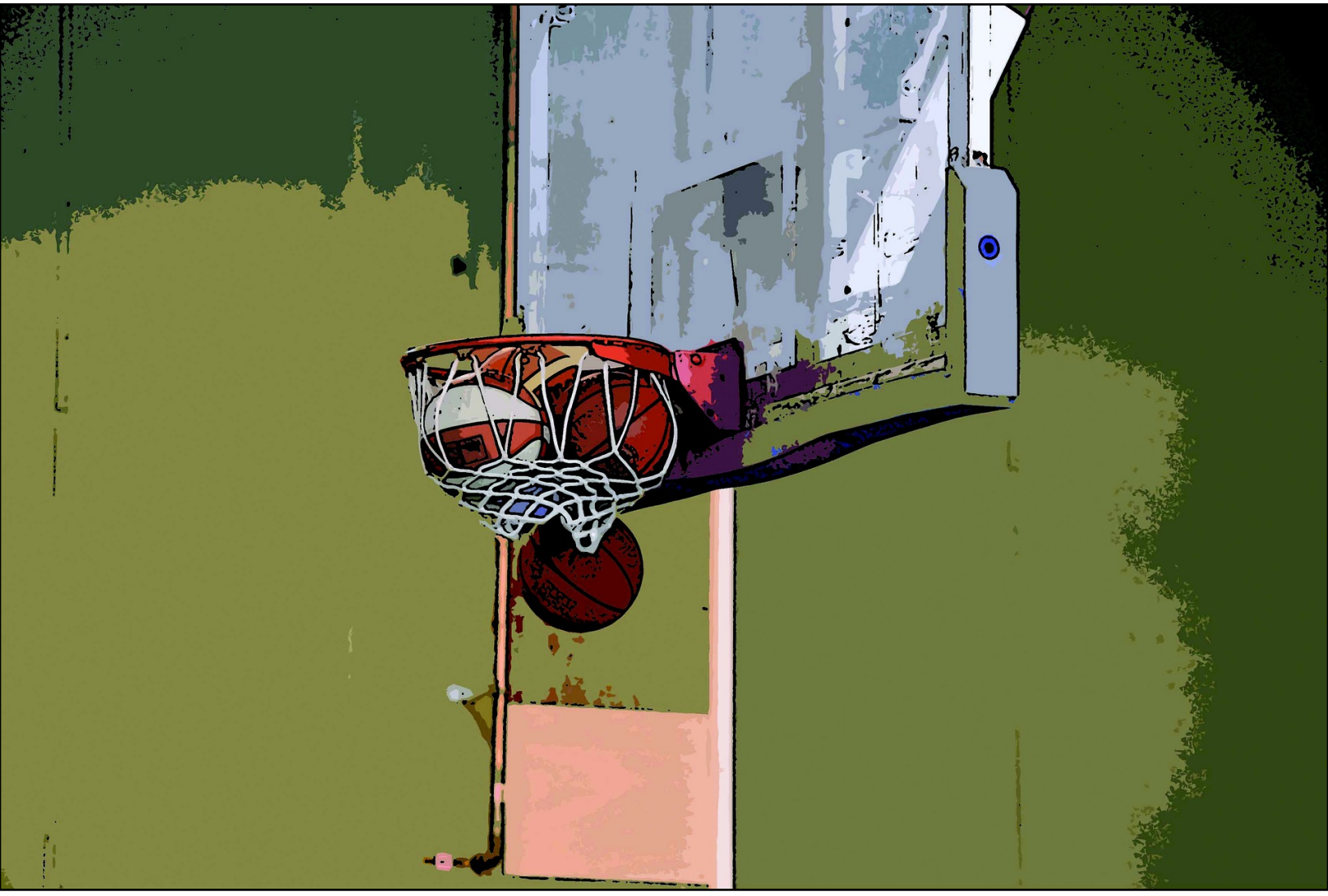
The 3-point Statistic to Rule Them All

Introducing 3NG

by Corey Wade



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Swoosh

“Boom baby!”

Every Indiana Pacer fan from the 90s knows that ring. Called by Slick Leonard, it meant that Reggie Miller had just made a 3-pointer. I felt a rush every time it happened.

Twenty years later, living in the Bay Area, I have been in awe of the rise of Steph Curry. His 3-point shot is so inspiring it’s revolutionized the game.

Three-point shooting is frequently analyzed by two statistics, 3-pointers Made, and 3-point Percentage. Most fans agree that the best 3-point shooters excel at both.

There has not been a single statistic, however, to rank the best 3-point shooters. 3-pointers Made rewards shooters like Antoine Walker who led the league in 2001 despite shooting 36.7%. According to 3-point Percentage, Steve Kerr is the best of all-time, but he didn’t shoot a high volume.

Is there an objective way to combine 3-pointers Made and 3-point Percentage into one overriding statistic? Will it reveal that Steph Curry is the greatest 3-point shooter of all-time? What about the best 3-point shooting team of all-time?

3NG

Each time down court, a team is expected to deliver a certain number of points. Since the 3-point shot was introduced in 1980, the NBA mean is approximately 1.06 points per possession.

Every time an NBA player makes a 3-point shot, his team earns 1.94 points beyond the expected value. Every time a player misses a 3-point shot, his team loses the expected value of 1.06 points.

3NG can be computed as follows:

Let 3P = 3-pointers made.

Let 3Mi = 3-pointers Missed.

Let EV = the Expected Value.

Then 3NG = 3P * (3 - EV) - 3Mi * EV.

Substituting 1.06 for EV (NBA only), we end up with:

3NG = 3P * 1.94 - 3Mi * 1.06.

In other words, 3NG is the difference between 3-pointers made times the net gain and 3-pointers missed times the expected value.

In effect, 3NG communicates the net gain in points beyond the league average that a player or team adds by shooting 3-pointers. Players are rewarded for making 3-pointers, and penalized for missing. 3NG can be computed by game, by season, or over an entire career.

Let's examine the data to see how 3NG meets expectations. My examples are based on data wrangled from basketballreference.com.

As a start, let's consider the league leaders from 2018.

3NG 2018 Top Ten

	Player	3NG	3P	3P%
1	Stephen Curry	2.03	212	42.3
2	Klay Thompson	1.84	229	44.0
3	Joe Ingles	1.45	204	44.0
4	J.J. Redick	1.29	193	42.0
5	Kyle Korver	1.27	164	43.6
6	Reggie Bullock	1.24	125	44.5
7	Buddy Hield	1.17	176	43.1
8	Kevin Durant	1.16	173	41.9
9	Anthony Tolliver	1.11	159	43.6
10	Kyrie Irving	1.09	166	40.8

According to 3NG, the 2018 Warriors gained 2.03 points per game beyond the league average with Steph Curry shooting 3's. They also gained an extra 1.84 points from Klay Thompson, and 1.16 points from Kevin Durant. Everyone in the top ten shot over forty percent.

The beauty of 3NG is that it can compare players across seasons and generations. Consider the top ten seasons of all-time.

3NG Best Seasons All-time

	Player	Year	3NG	3P	3P%
1	Stephen Curry	2016	3.33	402	45.4
2	Kyle Korver	2015	2.47	221	49.2
3	Stephen Curry	2013	2.28	272	45.3
4	Stephen Curry	2015	2.15	286	44.3
5	J.J. Redick	2016	2.04	200	47.5
6	Stephen Curry	2018	2.03	212	42.3
7	Kyle Korver	2014	1.95	185	47.2
8	Glen Rice	1997	1.93	207	47.0
9	Klay Thompson	2018	1.84	229	44.0
10	Ray Allen	2002	1.82	229	43.4

Steph Curry holds an astonishing four of the top six spots. Steph's unanimous 2016 MVP season crushes even his previous bests. Kyle Korver's 2015 shooting 3's at a ridiculous 49.2% is a solid number two.

Glen Rice from 1997 is a bit of an outlier. Who were the best 3-point shooters of the 90s?

3NG 90s Top Ten

	Player	Year	3NG	3P	3P%
1	Glen Rice	1997	1.93	207	47.0
2	Dana Barros	1995	1.69	197	46.4
3	Dennis Scott	1996	1.63	267	42.5
4	Tim Legler	1996	1.59	128	52.2
5	Mitch Richmond*	1996	1.57	225	43.7
6	Reggie Miller*	1997	1.44	229	42.7
7	Steve Kerr	1996	1.39	122	51.5
8	Hubert Davis	1996	1.32	127	47.6
9	Mitch Richmond*	1997	1.29	204	42.8
10	Dell Curry	1999	1.25	69	47.6

All players were in the second half of the 90s. Compare Reggie Miller and Steve Kerr, six and seven on the list. Reggie made more 3-pointers, but Steve Kerr shot a higher percentage. Who was the better 3-point shooter? 3NG provides a statistically meaningful answer.

We can also use 3NG to compare teams, like the 2018 Rockets and Warriors. The 2018 Rockets broke the NBA record for most 3-pointers in a season. They took the Warriors, a legendary 3-point shooting team, to seven games in the Western Conference Finals. Who shot 3's better in the regular season?

3NG Warriors v Rockets 2018, Qualified Players Only

	Player	Tm	3NG	3P	3P%
1	Stephen Curry	GSW	2.03	212	42.3
2	Klay Thompson	GSW	1.84	229	44.0
8	Kevin Durant	GSW	1.16	173	41.9
49	Chris Paul	HOU	0.49	144	38.0
53	Ryan Anderson	HOU	0.47	131	38.6
69	James Harden	HOU	0.36	265	36.7
79	Trevor Ariza	HOU	0.28	170	36.8
81	Nick Young	GSW	0.28	123	37.7
103	P.J. Tucker	HOU	0.18	115	37.1
123	Eric Gordon	HOU	0.10	218	35.9
131	Luc Mbah a Moute	HOU	0.07	63	36.4
239	Andre Iguodala	GSW	-0.39	33	28.2
250	Draymond Green	GSW	-0.60	77	30.1

The Warriors dominate the top, but the Rockets own the middle. The MVP, James Harden, is behind 66 players, while Andre Iguodala and Draymond Green had negative contributions.

Summing 3NG from the table above reveals who gained more net points shooting 3's at full strength.

GSW: 4.32

HOU: 1.95

Another option is to compute 3NG by summing 3-pointers over the entire season. This takes trades, injuries, and unqualified players into account. The summative results are as follows.

GSW: 3.12

HOU: 0.91

The 2018 Warriors are the superior 3-point shooting team, more than doubling the Rockets on both counts. How do they rank historically?

3NG Top Teams All-time

Tm	Year	3NG
GSW	**2016**	5.74
PHO	**2010**	3.72
CHH	**1997**	3.69
GSW	**2015**	3.53
PHO	**2006**	3.41
PHO	**2007**	3.20
GSW	**2018**	3.12
CLE	**2017**	2.95
GSW	**2013**	2.88
PHO	**2005**	2.83

The Warriors and the 7-seconds-or-less Suns dominate the list with eight spots. The 1997 Charlotte Hornets are a surprise until one realizes that they had Glen Rice and Del Curry. The top ten includes two NBA Champions, and seven conference finalists. The Warriors record-breaking 73–win season is an impressive outlier.

To determine to the best 3-point shooter, we can sum 3NG and divide by the number of seasons.

3NG Career Averages

	Player	3NG/y
1	Stephen Curry	1.94
2	Klay Thompson	1.38
3	Kyle Korver	1.08
4	J.J. Redick	0.91
5	Hubert Davis	0.78
6	Ray Allen	0.76
7	Steve Novak	0.76
8	Steve Nash	0.71
9	Peja Stojakovic	0.69
10	Dennis Scott	0.68

Steph Curry doubles everyone on the list except teammate Klay Thompson and Kyle Korver. This list answers a question that we have not even posed. What makes the Warriors so dominant? They have the two best 3-point shooters of all-time.

Where is Reggie Miller, the most electrifying 3-point shooter of his generation? He played 18 seasons and made more 3-pointers than anyone in NBA history besides Ray Allen. We can find Reggie, along with other great historical shooters, in 3NG Career Totals.

3NG Career Totals

	Player	3NG/c
1	Stephen Curry	1192.30
2	Kyle Korver	1178.17
3	Ray Allen	1010.91
4	Steve Nash	861.98
5	Reggie Miller*	775.75
6	Klay Thompson	741.98
7	J.J. Redick	640.78
8	Dale Ellis	615.90
9	Mike Miller	607.86
10	Peja Stojakovic	604.77

Now that is a beautiful list.

Game Over

3-point Net Gain, or 3NG, has exceeded my expectations. It stacks up well historically, and ranks contemporary shooters and teams accurately. 3NG is a meaningful, verifiable statistic that communicates valuable information

3NG can be applied to any league, WNBA, college, high school, etc. with an appropriate expected value used as a baseline of comparison. It can be used by coaches, scouts and players to inform critical decisions. Fans can leverage 3NG to put questions to rest of who the best 3-point shooters really are.

See https://github.com/coreyjwade/New_NBA_3-point_Stats for data analysis in pandas and additional 3-point Statistics.