Pace of Play and Load Management are two of the most utilized terms in the 21st century NBA. Over the last two decades, we've seen an influx of three-point shooting and innovative offenses like "7 seconds or less" lead to rapid increases in both possessions and scoring, challenging traditional notions of how the game can be approached. With the athletic and energy system demands of the game at an all-time high, high profiles stars often opt to sit out a leg of a back-to-back series and strategically plan respites during the season, hoping to remain as fresh as possible for the postseason.

With the past several seasons of NBA games monitored, including all those during the 2020 restart in the Orlando bubble, it's now possible to look closely at player movement patterns and quantify both the demands of the game and style of play from a physical perspective. Working with this data opens new possibilities to how player load can be monitored and how pace of play can be defined, potentially leading to insights concerning the only statistic that really matters: wins and losses.

**How Fast are Teams Really Playing?**

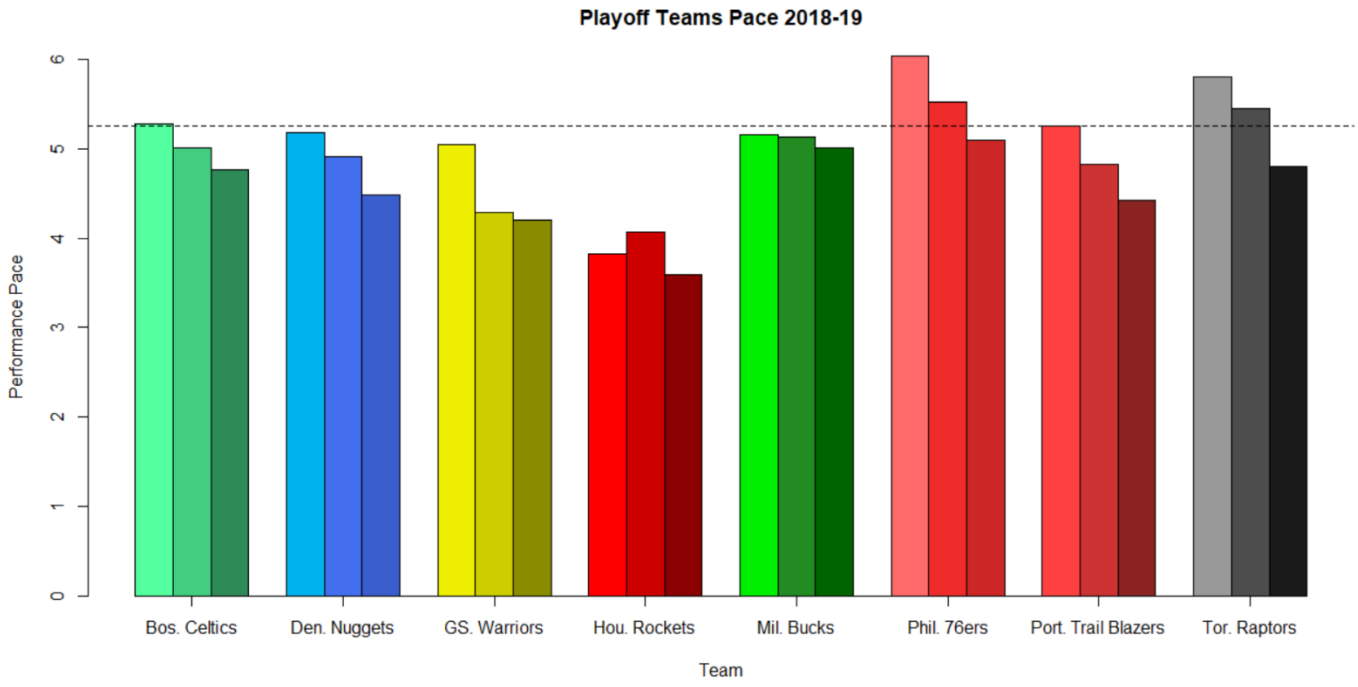
Pace of play in the NBA is defined by the number of possessions a team has on average in a game. It's no surprise that Mike D'Antoni's Houston Rockets, well known for their quick possessions and three-point prowess, land near the top of the pace rankings. The Rockets ranked second in NBA pace during the 2019-2020 NBA season, averaging 104.04 possession per game. But does this pace figure tell us anything about the physical performance of the Rockets players? Does it provide any insight to the amount of movement they produce in their offensive sets? About how far their players are running? Or the intensity of their acceleration and deceleration patterns?

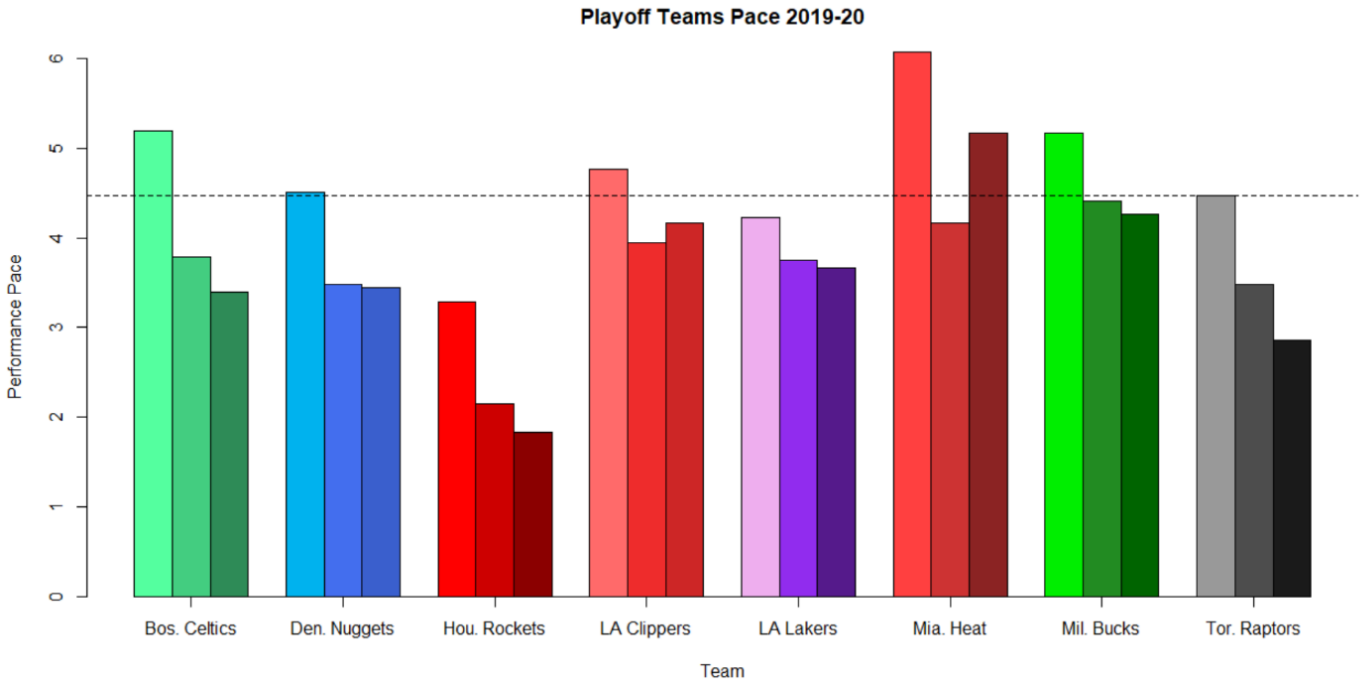
Using player tracking data, we can define pace not by number of possessions but instead with the distance covered, acceleration/deceleration pattern, and extreme exertions produced by a team on average per game. We combine these three measurements to create Performance Pace: a metric that quantifies not how fast a team is using the ball but how fast a team is actually *moving* on a per minute basis. In terms of Performance Pace, Houston ranks 30/30 – they are the slowest moving team in the league, painting a stark contrast to their second-place ranking in number of possessions. This example immediately shows us that defining pace in different terms can generate a very different understanding of the speed a team plays at. By focusing on player movement, Performance Pace provides a reliable barometer of the physical demands of the game for each player, allowing for training and recovery programs to be customized and tailored appropriately.

In addition, defining pace in terms of movement rather than possessions allows for greater individuality in defining a team's style. In a given contest, the two competing teams will always have an equal or one different number of possessions; as a result, the NBA pace for both teams in a game is inseparable. Team can focus on taking quick shots to generate a high number of possessions or holding the ball until late in the shot clock to drive possessions down, but regardless this action will define the game for the opponent in the same way. When considering Performance Pace, it becomes apparent that a team can focus on playing their game at a certain speed *and* forcing their opponent to play at a speed they find uncomfortable, resulting in a potential deviation in playing styles within the same game. The possibility of this decoupling in Performance Pace that does not exist with NBA pace results in there being a much greater range of team averages in terms of movement compared to possessions.

Looking at Performance Pace for teams at different intervals provides unique insights as to how an NBA season functions. Below, we can see the average Performance Pace for the eight playoff teams who

made the second round during three different time periods in the season: the first 20 games, the rest of the regular season, and the playoffs. Results for both the 2018-19 season and 2019-20 season are shown:



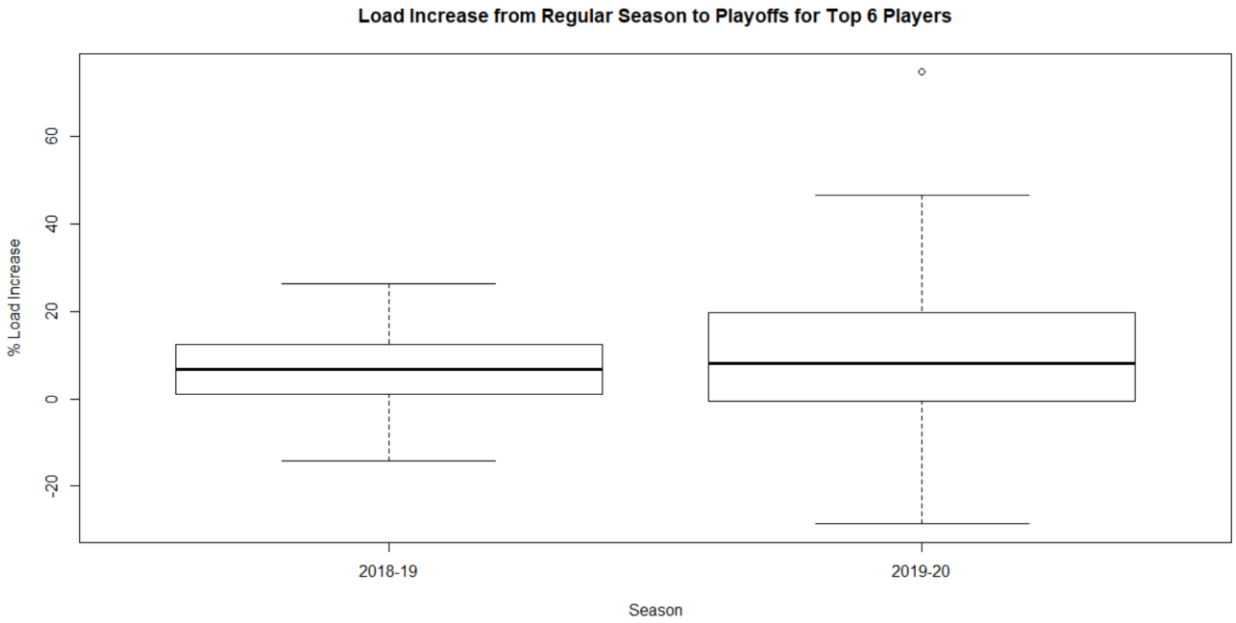



***Performance Pace for playoff teams in the 2018-19 and 2019-2020 season. For each team, the left most bar is the team's average pace during their first 20 games of the season. The middle bar is their pace for the last 62 games of the regular season. The right most bar is their pace in the playoffs.***

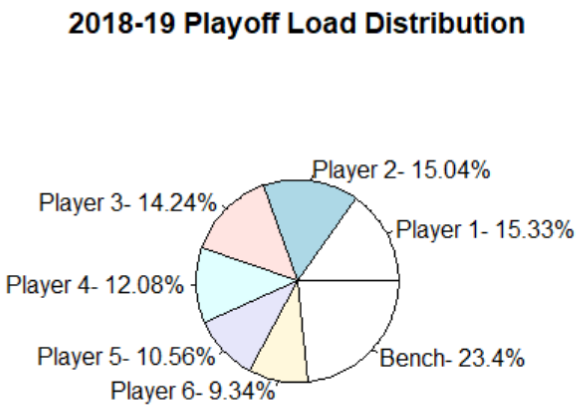
***Team averages for NBA pace, based on possessions, ranges from -0.88 to 0.98 standard deviations away from the mean. Team averages for Performance Pace, based on movement, ranges from -2.02 to 1.8 standard deviations away from the mean.***

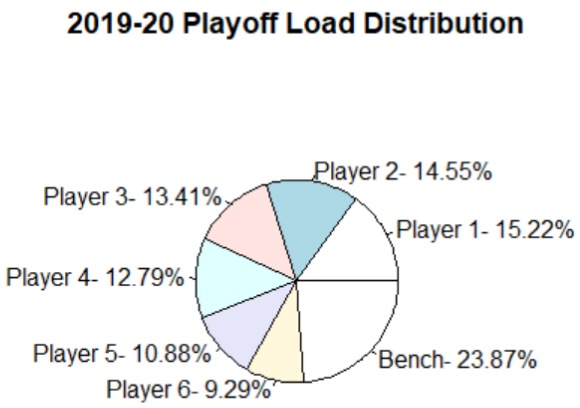
**Playoff Intensity – An Old Phrase with a New Meaning**

Almost all teams seem to follow the same pattern of starting the regular season at one pace, dropping down after the 20-game mark, and then decreasing again in the postseason (the one significant exception to this rule in the postseason seems to be the Miami Heat this year – we'll explore them and their unique style in greater detail below). Observing this picture, we might be able to hypothesize why this pattern exists: teams start the season with high levels of energy and adrenaline, level off when excitement dissipates and the "grind" of the regular season sets in, and become even more meticulous and deliberate when the stakes become higher and every possession increases in importance. While this is likely in some part true, we can also use tracking data to quantify why the intensities of playoff games are reduced: because overall volume of work is higher. In other words, in the playoffs top players log more minutes, cover more distance, and perform more accelerations and decelerations (increase in loads), causing their average speed and rate of acceleration, metrics that define Performance Pace, to drop off due to fatigue (decrease in intensity).




***Mechanical load increase from regular season to playoffs during the last two years. Both samples contain 48 players: the top 6 players from each of the eight teams that qualified for the second round. Both inside and outside the bubble, loads for top players typically increased in the postseason. Interestingly, there is greater variation in the load differences for players this postseason in the bubble: this is possibly a reflection of an increased likelihood for strategic changes following a 4 month pause.***




***Load distribution for each of the top 6 players and the bench in the playoffs. In each of the last two seasons, the top 6 players handle approximately 76% of the total load in the playoffs. In certain series where benches are shortened, this total can become as high as 85%.***

Mechanical load is a measure of a player's acceleration and deceleration activity; due to the start/stop nature of basketball and the confined area of the court, this metric is a good barometer of overall workload. The first plot above shows the percentage increase in mechanical load from the regular season to the playoffs for the top six players on the eight second round playoff teams – we can see that load typically increases with median values of 6.81% and 8.56% in the two seasons. Below this, the pie charts represent the distribution of load in the playoffs amongst the top six players and the rest of the bench during the last two seasons. In combination with the Performance Pace figures visualized above, these graphics show us not only that load increases and is heavily weighted towards the top 6 players in the postseason, but also that this effect has been fairly consistent across the past two seasons despite their vastly different natures. It appears that with continuous play or a four-month layoff, in home arenas or a bubble in Orlando, the nature of the game does not change: the playoffs are still the playoffs.

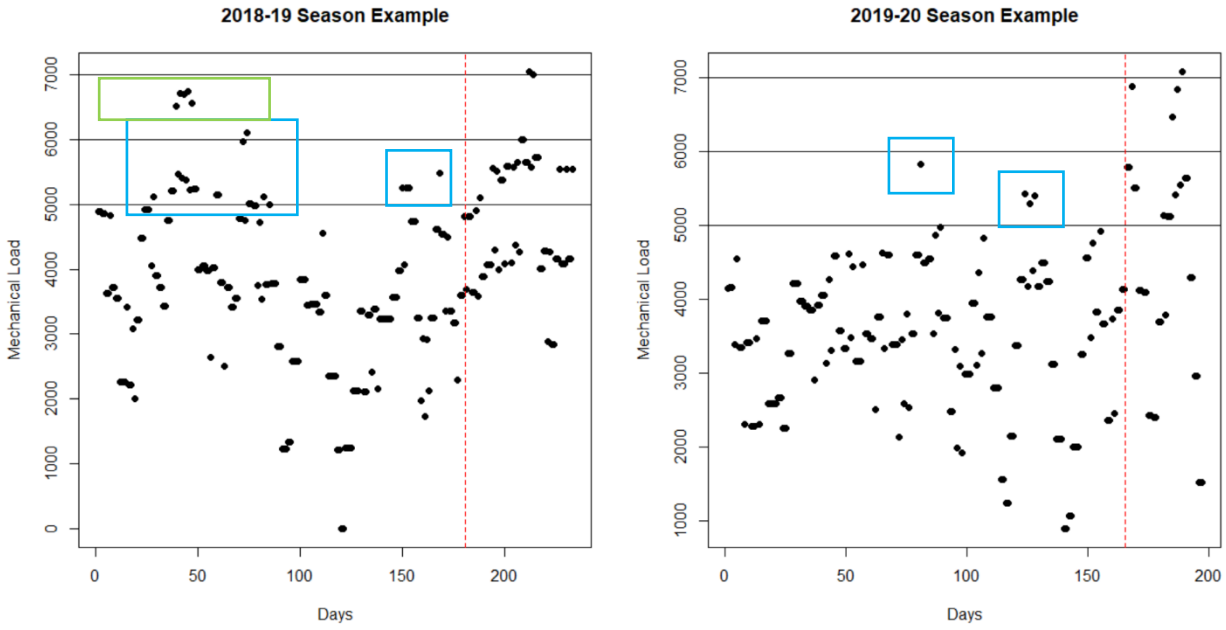
**Load Management: Preparation and Recovery**

Long before the concept of player tracking existed, an enthusiast of any sport would guess that greater demands are asked of star players as the games increase in significance. Everything we've seen so far suggests that high loads are a staple of the postseason; if this is the case, it's essential that players are prepared to handle these loads and perform to the best of their ability when it matters most.

The challenge of the NBA postseason for athletes is the accumulation of high loads over several games during a relatively short period of time. In short series, players are asked to repeatedly perform at maximum effort for lengthened durations under stressful conditions. While this is not problematic for a

single game, it's understandable how fatigue could accumulate and being to hamper performance as a playoff run is extended.

By observing cumulative loads over a multiday period consisting of several games, we can gain insights into the load demands of a playoff stretch and how these demands might shift over the duration of the "second season". Below, we can see the cumulative loads over every possible 9-day period from the start of the regular season to the end of the playoffs for this particular player. The 9-day window is intriguing because it often captures load demands over a four game stretch while occasionally including a period of five games played every other day, representing the peak demand required over this length of time. Results for both last season and this season are included:




***Cumulative load in 9-day rolling windows from the beginning of the regular season through the final game of the postseason for Player A. The 5,000, 6,000, and 7,000 zones are identified and the dotted red line separates the playoffs from the regular season. In this example, Player A had a ratio of 0.84 playoff to regular season exposures above 5,000 in the 2018-19 season but a ratio of 2.17 in the 2019-2020 season. The vastly different nature of these two regular season, highlighted in green and blue, may have contributed to differences in postseason performance.***

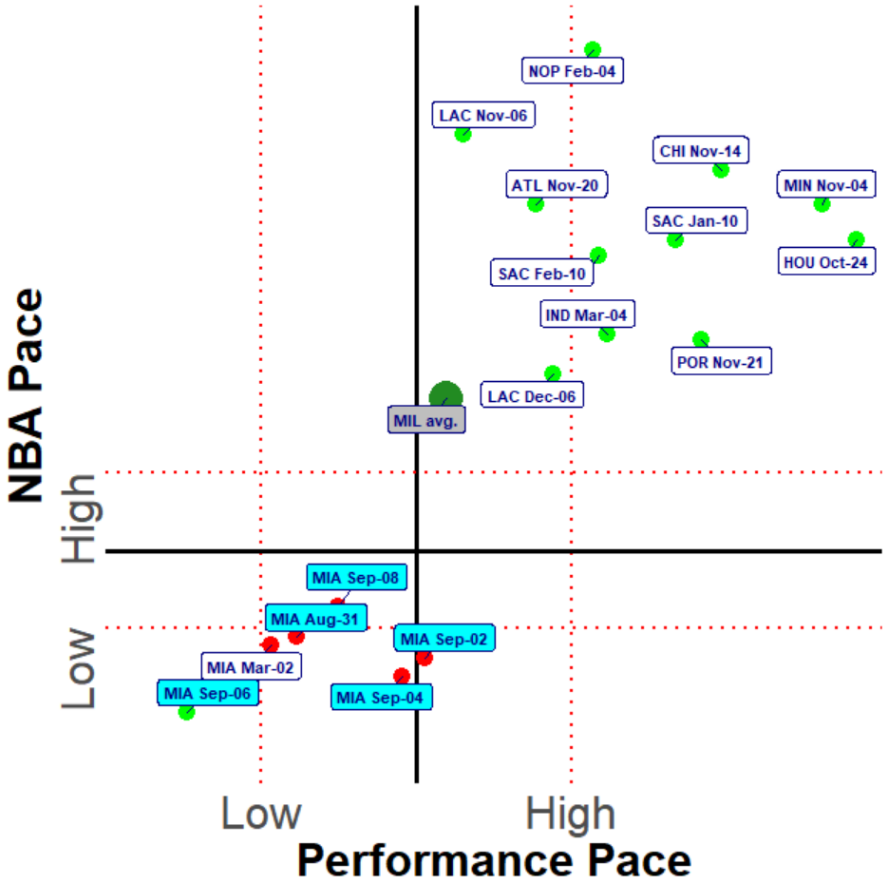
Continuing with the earlier theme, there seems to be similarities in the playoff demands for this player in both the normal 2018-19 season and the interrupted 2019-20 season. In both playoffs, the player is required to spend significant time in the 5,000-6,000 load range, representative of four strenuous games in a 9-day period. Furthermore, the peak demand in both playoff campaigns is approximately 7,000, showing that a five game in nine day playoff stretch is not necessarily unique to the bubble format and should be within the athlete's performance capabilities.

Although the playoff demands were similar, there is a stark contrast in how this player used the regular season to prepare for the high load requirements that lay ahead. Two seasons ago, the player is frequently exposed to 9-day periods with load above 5,000 units and even experiences stretches above 6,000 units, preparing him well to return to these levels when the postseason begins. This past season, the player only surpasses the 5,000 benchmark on rare occasions and does not cross the 6,000 level; this lack of preparation results in standard four-game playoff loads representing some of the hardest work the athlete has performed all season while extreme five-game playoff loads are completely unprecedented. As a takeaway, we can expect that any year to year differences in postseason readiness and fatigue effects for this individual are due not to the extreme demands of a particular postseason but instead how those demands were prepared for.

**A Shift in Playing Style**

In all sports, teams have different styles of playing; the same is certainly true when it comes to Performance Pace. Much like NBA pace, where teams can be successful both taking quick shots or slowing the game down in the half court, a fast or slow Performance Pace is not inherently good or bad but rather a definition of how a particular teams likes to play and under what conditions they enjoy the most success.

When we consider NBA pace and Performance pace together, it quickly becomes apparent that the Milwaukee Bucks had a very specific formula that helped them post a league best 56-17 record in the regular season. Averaging 105.51 possessions per game, good enough to top NBA ranks with a full 1.5 possessions greater than second place Houston, the Bucks have often been labelled with the moniker of the fastest team in the league. While this may be true in terms of possessions, Milwaukee ranks only slightly above average in terms of Performance Pace. Looking at some of their results below, we can see that when the Bucks played particularly fast in terms of possessions *and* movement this season they were close to unbeatable.




***NBA pace and Performance Pace for the Milwaukee Bucks in select games from the regular season and their playoff series against the Miami Heat. Milwaukee thrived when playing a fast moving game with a high number of possession but struggled in the bubble when both phases of the game slowed down.***

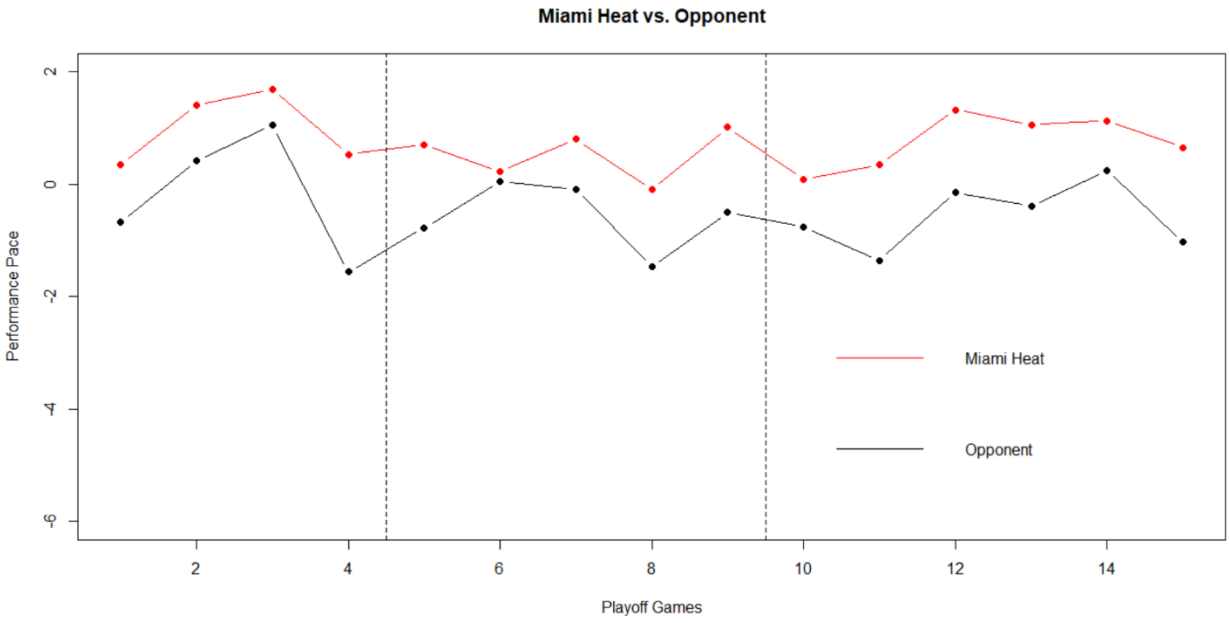
Let's consider the Milwaukee victories in the upper right quadrant of the graph. We can see that, in terms of both paces, these games are all faster in terms of the Milwaukee average, which is already well above the league average represented by the origin (intersection of black axis lines) on the graph. If these games were fast for Milwaukee, a team used to playing at breakneck pace, imagine how they must of felt for their opponents. With the opposition so far from their comfort zone and playing at a speed they were unaccustomed to, it's easy to see how the Bucks were able to create an advantage.

Heading into their second round series against the Miami Heat, betting odds projected that Milwaukee had approximately an 80% chance of advancing to the Conference Finals. But would Vegas have thought differently if they knew the Bucks would be playing not at their typical pace levels but at one much lower ones, representative of a team far different than the one that dominated the regular season? Playing a slower moving game with fewer possessions throughout the entire series, the Bucks were eliminated in five games. While this change in style could be attributed to a long layoff and the Orlando restart functioning like a "new" season, it's interesting to note that Miami also forced Milwaukee into

playing one of their slowest games of the season on March 2nd, ten days before the postponement of the NBA season – the result was a sixteen point loss for the number one seed.

**Controlling the Game**

While the Bucks went home early, the Miami Heat were able to capitalize on their momentum and make an unexpected run to this year's NBA Finals. Let's look at Miami's Performance Pace compared to their opponent's in all of their playoff games leading up to the finals.




***Performance Pace for the Miami Heat and their opponents in playoff games during the first three rounds. Series are separated by dashed vertical lines. Miami played faster than their opponent in every playoff matchup – during the regular season, the Heat ranked 6th with a .614 winning percentage when out pacing their opponent. They were one of 11 teams to play faster than their opponent at least 40 times and they had the best winning percentage amongst that group.***

It's easy to see that the consistency for Miami is not necessarily the level of pace they play at but playing faster than their opponent. In other words, for some teams an advantage is created not based on the absolute pace but rather the relative pace of the game.

Unlike Milwaukee, who deviated from their regular season style in the postseason, playing faster than their opponent is something Miami was accustomed to. The Heat had a higher Performance Pace than their opponent in 44 of their 64 pre-bubble matchups, posting the following records:

Miami Slower: 14-6, .700 w%

Miami Faster: 27-17, .614 w%

While it's clear Miami like to play faster, it may seem like it's not particular advantageous until we consider the above records in the context with those across the entire league. Because teams who fall behind in a game will attempt to increase the pace in an effort to mount a comeback, losing teams often end up with the faster pace and winning percentage for teams who play faster is biased downward:

League Faster: 369-570, .393w%

Of course, playing repeatedly at a faster pace comes with the cost of sustaining greater loads and requires adequate preparation. Miami's fast-paced success comes as no surprise considering that the organization cultivates an enviroment that emphasizes fitness and readiness to perform. Renowned for their training camp conditioning test program[1], the Heat ensure that players are exposed to both the loads and intensities that might be required during a championship run: load management at its finest. Seeing that they could win playing faster, Miami continued to press this advantage throughout the postseason – the result was a trip to the NBA finals.

**Our Goal: Preparing Players**

Both the recent 2019-2020 and upcoming 2020-2021 NBA season are unprecedented. Between navigating through a 4-month hiatus and adjusting to a forthcoming condensed schedule with unique travel requirements and logistical protocols, coaching and performance staff may be facing their greatest challenge in terms of preparing players to be able to perform at optimal levels. With a very different structure in place, we plan to segment the season into four different phases: the preseason, the first twenty games, the remaining regular season, and the playoffs. After this truncated preseason phase, we will be carefully monitoring player activity in the second phase, particularly in terms of high-end exertions. Previous years of tracking data have demonstrated that the first 20 games of an NBA season are typically played at higher intensities and we expect this year to be no different, a reality that will have to be managed for following a shortened training camp. Once we enter the third phase and pace has settled down, we can reflect on exertion levels to this point and prepare players for the final and most important phase, the playoffs, when we know the greatest load demands will occur. We will continue to monitor loads, intensities, and pace of play as the season unfolds, always keeping in mind the ultimate goal: ensuring players are in the best condition possible to perform at their highest level when it matters most.

[1] https://www.insider.com/miami-heat-conditioning-test-program-legendary-nba-2020-9