

CONTESTED

How Data Is Defined, Gathered, and Owned

Daniel Keinan

Theories, Methods, and Experiments in Art and AI

Dr. Emily Spratt

August 13, 2026

In 1987–88, during the Chicago Bulls 82-game NBA season, their team stats for home and away games are as follows (per game): 85.2 to 85.9 field goal attempts home versus away, 44.2 to 44.3 rebounds home versus away, 29.1 to 23.3 assists home versus away, 9.7 to 7.7 steals home versus away, and 6.9 to 4.7 blocks home versus away. Notably, Michael Jordan, a member of that team who played fifty-three fewer total minutes at home games, was credited with 165 steals and 84 blocks at home versus 94 and 47 on the road.¹ Field goal attempts and rebounds stay almost exactly even, while assists, steals, and blocks move in a statistically significant manner. It is known why this discrepancy exists: the people responsible for recording statistics at the time were staff members from the home stadium, and these statistics, as defined by the NBA Glossary, are judgment calls, simply stating whether “a pass directly contributed to a basket”.² In the case of Michael Jordan, there was a real impact on his NBA career from this stat inflation and Tom Haberstroh calls into question whether Michael Jordan’s Defensive Player of the Year Award is even valid.³ This is a clear example of how statistics can be built on judgments, but sold as facts. An NBA statistic is crafted in the same way a work of art is: someone chooses the instant, the subject, and where the definitions are drawn, and the NBA publishes the resulting picture while withholding the choices, so nobody outside can check what its numbers mean.

This paper follows the choices in data tracking, subjectivity, and definitions. The claim is not that the record is arbitrary. The paper discusses the nature of what is public versus private data, and argues that the definitions and distinctions the NBA withholds or enforces are of the

¹ Basketball-Reference.com, “1987–88 Chicago Bulls Roster and Stats,” home/road splits

² Michael van Bommel and Luke Bornn, “Adjusting for Scorekeeper Bias in NBA Box Scores,” *Data Mining and Knowledge Discovery* 31 (2017)

³ Tom Haberstroh, “A Closer Look at Michael Jordan’s 1988 DPOY Award Raises Questions about Its Validity,” *Yahoo Sports*, June 20, 2024

same kind an artist makes. This paper is a companion piece to a data visualization / artwork by Daniel Keinan entitled Fadeaway that takes all publicly available data from the NBA and creates an artistic rendering of the data on a 2D Basketball court. Additionally, Fadeaway uses the NBA's definitions of the public data points to add layers, data inconsistencies (notably a 12 week period in 2015-16 where full 25 frame per second renderings of every player and ball position on the court are publicly available), artistic and term definition interpretation to the piece.⁴

In terms of the home team bias in statkeeping, it took until the 2017–18 season for the NBA to add an auditor as a second review layer. Since that moment, the home assist advantage has fallen from 10 percent to 2 percent. The judgement around statistics became a larger collective, and more uniform, but it does not change the fact it is still a judgment that is written as fact.⁵

Adorno and Horkheimer described a culture in which the work of sorting has already been done before anything reaches the person consuming it, so that nothing is left for them to classify. That is a fair description of an NBA box score. The categories arrive finished. A viewer sees twenty-nine assists and eleven blocks, not the room where a person decided what an assist was that night. What the home-scorer numbers show is that the sorting was never neutral and never automatic, and that the only reason we can see it now is that the bias happened to be uneven enough to leave a trace in the splits. Where the sorting is uniform, it leaves no trace at all, and it becomes indistinguishable from a fact.⁶

⁴ FADEAWAY, https://dkdan10.github.io/analytics_resolution/?talk.

⁵ Zach Kram, "The NBA's Home-Court Assist Advantage Is Disappearing," *The Ringer*, January 21, 2020

⁶Theodor W. Adorno and Max Horkheimer, *Dialectic of Enlightenment*, trans. John Cumming (New York: Herder and Herder, 1972), 120–67 ("The Culture Industry: Enlightenment as Mass Deception").

The Fadeaway piece demonstrates how judgements affect the game in a very real way through its showcase of the decline of the midrange shot. Based on the distances the NBA defines the midrange, the number of attempts in that range fell from 39.9 percent in 1996–97 to 24.6 percent in 2015–16 and all the way to 10.0 percent 2025–26.

Fadeaway uses a fixed court and data from every shot attempt in a season laid on top of one another. Different display categories use colored regions or text names to give more information about what shot each was. This is an idea used to display stats in the NBA today, called a shot chart. Malraux wrote about the effect of photographic reproduction on art: it made incomparable things comparable by putting them all at one size or frame, with no need for their material or location. A shot chart does something similar for shot data. It allows for comparison by throwing unique attributes of a shot and putting them next to each other on a court. This isn't necessarily a negative for basketball, it allows for much innovation and understanding of the game at a large scale, but its price is specificity.⁷

⁷ André Malraux, *Museum Without Walls*, trans. Stuart Gilbert and Francis Price (London: Secker & Warburg, 1967).

One series, two starting points

Thirty NBA seasons; modern zone labels against the line in force in 1996–97

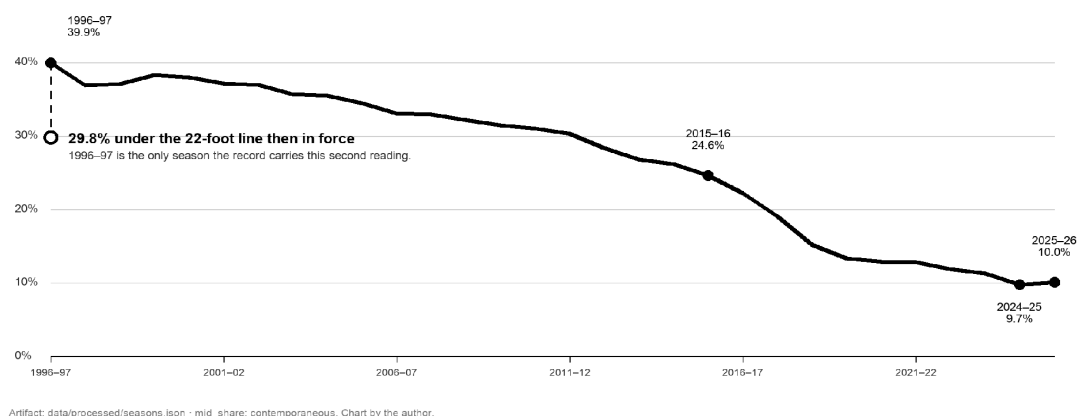


Figure 1. Graph of the midrange percentage over time. Percentages pulled from the same Corpus as Fadeaway.

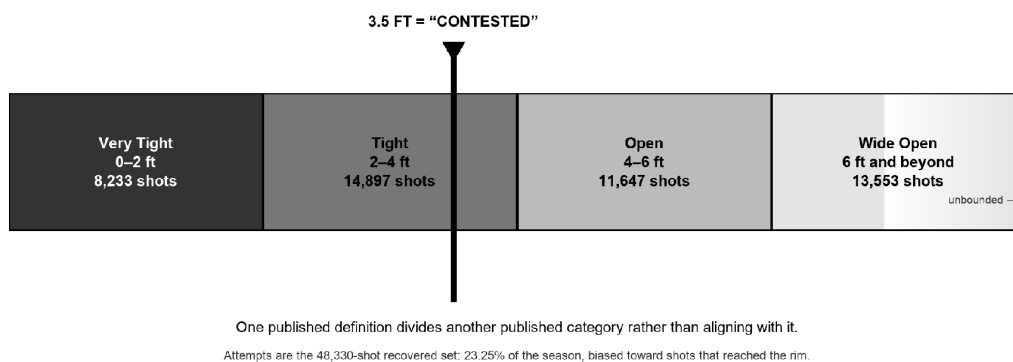
The Fadeaway project also finds interpretability in the term “Contested”. The term has three official meanings all on the NBA website. Tracking software defines the defender as the closest defender within 3.5 feet. Hustle statistics require a defender to both be running to the shooter and have a hand raised before the shot. The nested statistic of “Contested field-goal percentage” does not point back to how tightly the shooting player was being contested. None of the stats around the term “Contested” relate to each other. Data around the term “Hustle” begins outside the window of fully public games so it cannot be rederived. But its definition brings light to the idea that the creation of these statistics is becoming nested in these higher level tracking softwares that fit distance from players, body positions, and what contested means, all in one statistic that the public cannot rederive. The name of this paper originated from this “Contested” idea and its implications.⁸

⁸ NBA Stats Glossary, entries for Contested Shot, Contested Field Goal Percentage, and Hustle Contested Shots, The hustle definition begins with the 2016 playoffs, outside the recovered optical window.

The idea that these are clean statistics becomes even more contested when looking at how the term is defined as subjective measurement. On the NBA Stat page, closest-defender distance is sorted into clean buckets at zero to two, two to four, four to six, and six feet plus. It classifies these points as Very Tight, Tight, Open, and Wide Open respectively, but does not offer any information about specific shots within those ranges. Figure 2 below carries the number of attempts derived from the public open window of 12 weeks. Additionally it showcases the double definition the NBA has contested and its implication of defining shots differently, either more or less specific, around the same category of classification.⁹

The threshold cuts through the category

Published closest-defender bands against the NBA glossary's 3.5-foot contested-shot rule



Artifacts: data/processed/window.json · contest buckets: bias, NBA Stats Glossary, accessed Aug. 13, 2026. Chart by the author.

Figure 2. One published definition cuts another in half: the glossary's 3.5-foot contested-shot threshold falls inside the published two-to-four-foot Tight band. Attempts are the 48,330-shot recovered set, 23.25 percent of the season and biased toward shots that reached the rim.

An even deeper issue with the NBA glossary's classification of a 3.5-foot threshold for contested shots is that it does not state the defender distance relative to when a shot occurs.¹⁰

⁹ NBA Stats, "Shots Closest Defender."

¹⁰ NBA Stats Glossary, entry for Contested Shot, <https://www.nba.com/stats/help/glossary>. The glossary states the 3.5-foot threshold without specifying the instant at which the distance is measured.

Fadeaway can experiment with different definitions, tested on the public twelve week dataset. Based on whether the shot is defined as when the player starts shooting versus when the player releases the ball, the contested data changes drastically. In that four-tenths of a second earlier than the release, 18,664 of 48,326 shots moved between definitions of contested. The closest defender read changes by a mean value of 1.14 feet.

The same issue of masked fact appears everywhere a definition exists. How is a drive defined? How is a post touch defined? How are all these meta terms defined that get passed as true data? The bottom line is that no current NBA protocol has been made available for outside checking.

The amount of data the NBA collects is immense, even in the public version in 2016. The decision on how to define what the data means often comes after the data is already gathered. The cameras and sensors gather more than the record ever will or even can show. An example is when interpretation changes after data gets released. The amount of information hidden with data that we have not seen or what we can create that has no merit from data is enormous. Across the 632 NBA games from October 27, 2015, through January 23, 2016, optical tracking registered 50,821,648 moments and 507,966,345 body positions, while the shot record retained one position for each of 106,328 filed attempts—507,966,345 divided by 106,328, or 4,777 measured body positions for every position kept, a division performed here because no artifact carries the ratio.

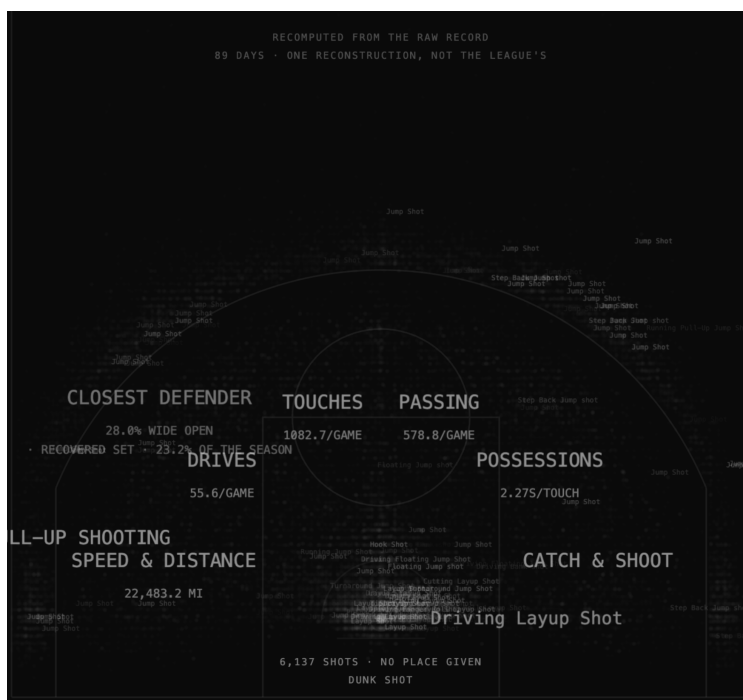


Figure 3. Figure of all the definitions and stats centered around the twelve week window.

Figure 3 depicts Fadeaway capturing all the text labels for data points and their aggregates overlaid with one another. It showcases the chaos and the art even in organizing the dataset.

The recovered optical archive ends on January 23, 2016. There is nothing left to derive. No fact checking or verifying the output of the NBA based on the data.

What remains public is the derivatives. SpeedDistance, Rebounding, Possessions, CatchShoot, PullUpShot, Defense, Drives, Passing, ElbowTouch, PostTouch, PaintTouch, and Efficiency, with a lack of information on the points behind them.¹¹

¹¹ NBA Stats, player tracking categories. The league publishes these aggregates; the frame-level positions they are derived from have not been public since January 23, 2016.

The NBA announced a Sportradar–Second Spectrum agreement eight months after the now deprecated SportVU public archive ended, with financial terms undisclosed. A 2021 successor agreement granted eight exclusive years and warrants over 3 percent of the vendor’s stock at a cent apiece, valued at \$87.3 million.¹²

Do the players have agency in their rights to the data? The 2023 NBA collective bargaining agreement, an agreement to protect players, split up how to define tracking material. The agreement concluded on a few measures regarding tracking software. Wearables (worn tracking software) are barred in games, requested practice use is voluntary (players cannot be forced to wear tracking software during practice), players receive full access (players see everything being recorded about them), contract use is prohibited, and a union grievance can produce a team fine up to \$250,000 (a fine of up to \$250,000 if a disagreement about a wearable results in contract termination or non-signing). Biomechanical screening instituted by the league (not team) is mandatory up to four times per season. The optical tier that SportVU (now the upgraded Hawkeye) used to produce 507,966,345 body positions in half a season was not mentioned.¹³

The NFL bargained the harder case because the tracking software device they rely on is worn. The 2020 agreement for the NFL gave access, purpose limits, a contract-negotiation bar, and player ownership of personal sensor data subject to the player contract’s publicity grant.

¹² NBA Communications, “NBA Announces Multiyear Partnership with Sportradar and Second Spectrum,” September 22, 2016; Sportradar Group AG

¹³ National Basketball Association and National Basketball Players Association, Collective Bargaining Agreement, effective July 1, 2023

Using the wearable in game is required, but because that is the standard method of tracking in the NFL, they have more agency in the recorded data than the camera recorded NBA.¹⁴

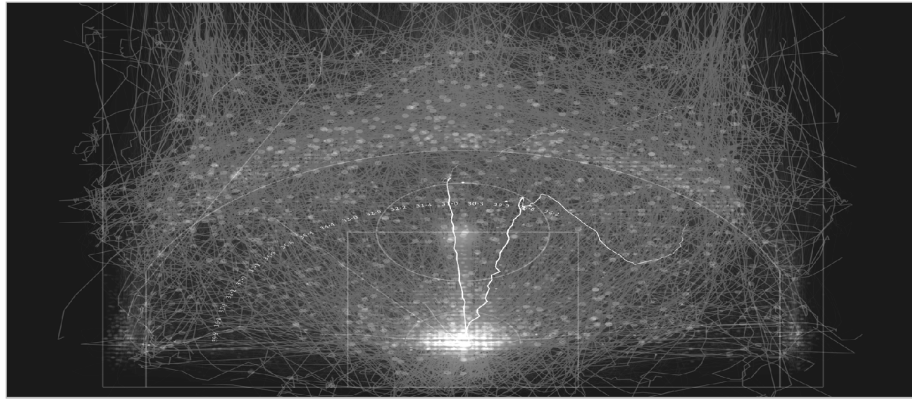
An interesting case study around the NBA control over players body and image is LaMelo Ball in November 2023. He was forced to cover up his tattoos because they had the letters “LF” as a reference to LaMelo’s brand which was not sanctioned by the NBA. After discussions among the league, union, player, and representatives, Ball returned uncovered on January 12, 2024. This is a rare example of a ruling about a player’s body or clothes being overturned. Rival and non-compliant logos are banned from being seen on the court/broadcast. The NBA does not need to give reasons for these decisions. The irony is the NBA’s say in what players can and cannot wear without the reverse of players dictating what can or cannot be done with their statistics.¹⁵

¹⁴ National Football League and National Football League Players Association, Collective Bargaining Agreement, March 15, 2020.

¹⁵ Adrian Wojnarowski, “NBA to Allow LaMelo Ball to Expose Once-Banned Tattoo,” ESPN, January 12, 2024

FADEAWAY, THE PLATE, inside the eighty-nine days

Tracked bodies and the ball at their measured weights — the material the record reduces to one coordinate



One monumental halfcourt that never moves, at $t = 300$ s of a 500-second loop.

Capture: dkdan10 github.io/analytics_resolution/?mode=plate&t=300, reproduced at increased exposure for print. Artifact: data/processed/game.json. Image by the author.

Figure 4. FADEAWAY, THE PLATE, inside the eighty-nine days: tracked bodies and the ball at their measured weights, on one halfcourt that never moves.

Anadol's *Living Memory: Messi* combines the discussion of custody of one's image with the generation of a work of art. *Living Memory* was produced with Messi's collaboration and sold with a certificate signed by athlete and artist. It reconstructed motion of one moment through seventeen mapped body points. It uses biometric data of Messi's heartbeat and breathing from an interview of Messi recounting the event years later.¹⁶ Fadeaway similarly uses data to recreate moments in time, but it does not land specific to any one player and is purely divided by seasons and data available within each season. It desires to capture the attempt at organizing data while still showcasing the magnitude of its unstructured chaos.

¹⁶ "Living Memory: Messi—A Goal in Life," 2025.

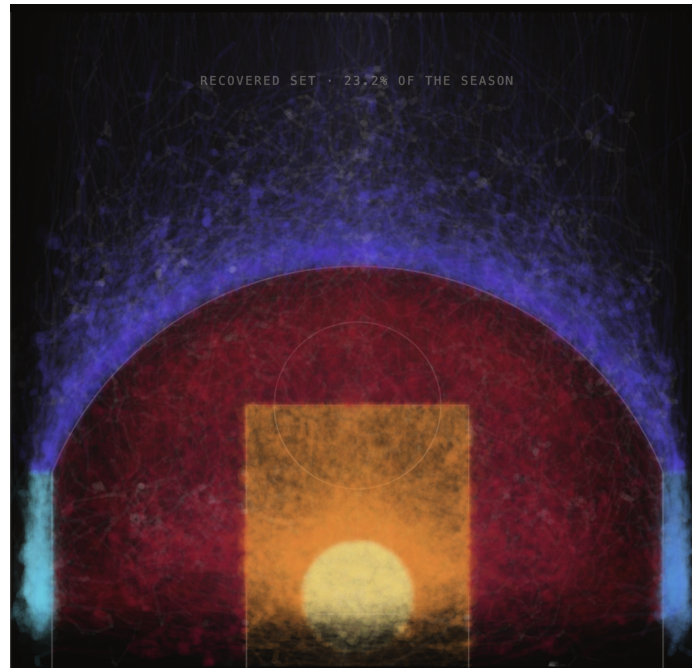


Figure 5. FADEAWAY, THE HAND, this segment of the FADEAWAY Project aims to capture the chaos of the data in its rawest form. It uses the same 89 day open window of the NBA player tracking to create a piece inspired by Jackson Pollock. Each player movement is represented by a new paint splatter. Truly encapsulating the Art of Data Science.

Figure 5 introduces the idea of "the art of data science". Every display of a dataset involves the same decisions creating a work of art involves: what the mark is, how big it is, what gets left out, what is allowed to overlap. Fadeaway's "The Hand" makes those decisions and intersections clear. Each stroke of "paint" is a recorded player's movement, brushed across the court until other movements stroke over it. The Pollock inspiration for the display is a statement about the raw data and its chaos before it becomes interpreted into easy to process categories.

The point is that the NBA makes these micro and macro decisions but presents them as definitions and facts. When an artist creates an art and is making similar micro and macro decisions to channel a vision, they are doing something very similar. Both are renderings of an idea or moment. The difference is that one announces itself as an interpretation and the other does not.

In 2024 and 2025, optical tracking from Madison Square Garden drove a feature called *Dunk the Halls*, a live ESPN telecast in which the ten players on the floor in New York appeared, in real time, as Disney characters. This rendering highlights both the abundance of private data the NBA has and a line between data and art. The 2024 production relied entirely on the newest vision system, Hawk-Eye, and its twenty nine point limb tracking. Sony stated the latency from a moment on the court to a rendering of the Disney game was below one second. It created an interpretive spectacle and art piece from massive amounts of private data, in real time. Within the public sources, not one body position has been publicly served since January 23, 2016. Every number in this paper was made the same way the league's are: someone or something chose an instant, a subject, and a boundary. The derivations that lead to each output have become more protected as the value and amount of data increases. As data becomes more layered, the raw recording becomes lost and we enter a world of rendered interpretations.¹⁷

Figure 6. Dunk the Halls telecast (ESPN, December 2024); see the ESPN Press Room release in the bibliography.

¹⁷ ESPN Press Room, "Transcript: NBA on ESPN 'Dunk the Halls' Media Conference Call," December 2024; ESPN Press Room, "Second Dunk the Halls," November 2025

Bibliography

- Adorno, Theodor W., and Max Horkheimer. *Dialectic of Enlightenment*. Translated by John Cumming. New York: Herder and Herder, 1972.
- Anadol, Refik. "Living Memory: Messi—A Goal in Life." 2025. <https://refikanadol.com/works/living-memory-messi-a-goal-in-life/>.
- Basketball-Reference.com. "1987–88 Chicago Bulls Roster and Stats." <https://www.basketball-reference.com/teams/CHI/1988.html>.
- ESPN Press Room. "Transcript: NBA on ESPN 'Dunk the Halls' Media Conference Call." December 2024. <https://espnpressroom.com/us/press-releases/2024/12/transcript-nba-on-espn-dunk-the-halls-media-conference-call/>.
- ESPN Press Room. "Second Dunk the Halls." November 2025.
- Haberstroh, Tom. "A Closer Look at Michael Jordan's 1988 DPOY Award Raises Questions about Its Validity." *Yahoo Sports*, June 20, 2024. <https://sports.yahoo.com/a-closer-look-at-michael-jordans-1988-dpoy-award-raises-questions-about-its-validity-has-lebron-james-been-chasing-a-ghost-140452567.html>.
- Keinan, Daniel. FADEAWAY. 2026. https://dkdan10.github.io/analytics_resolution/.
- Kram, Zach. "The NBA's Home-Court Assist Advantage Is Disappearing." *The Ringer*, January 21, 2020. <https://www.theringer.com/2020/01/21/nba/nba-home-court-assist-advantage>.
- Malraux, André. *Museum Without Walls*. Translated by Stuart Gilbert and Francis Price. London: Secker & Warburg, 1967.
- National Basketball Association. "Stats Glossary." <https://www.nba.com/stats/help/glossary>.
- National Basketball Association and National Basketball Players Association. *Collective Bargaining Agreement*. Effective July 1, 2023. <https://www.nbpa.com/cba>.
- National Football League and National Football League Players Association. *Collective Bargaining Agreement*. March 15, 2020. <https://nflpaweb.blob.core.windows.net/website/PDFs/CBA/March-15-2020-NFL-NFLPA-Collective-Bargaining-Agreement-Final-Executed-Copy.pdf>.
- NBA Communications. "NBA and Sony's Hawk-Eye Innovations Launch Strategic Partnership Powering Next Generation Tracking Technology." March 9, 2023. <https://pr.nba.com/nba-sony-hawk-eye-innovations-partnership/>.
- NBA Communications. "NBA Announces Multiyear Partnership with Sportradar and Second Spectrum." September 22, 2016.
- NBA Stats. "Shots Closest Defender." Player tracking shooting splits.
- Sportradar Group AG. Form 6-K. November 16, 2021. <https://www.sec.gov/Archives/edgar/data/1836470/000119312521331929/d261556d6k.htm>.
- van Bommel, Michael, and Luke Bornn. "Adjusting for Scorekeeper Bias in NBA Box Scores." *Data Mining and Knowledge Discovery* 31, no. 6 (2017): 1622–42. <https://doi.org/10.1007/s10618-017-0497-y>.
- Wojnarowski, Adrian. "NBA to Allow LaMelo Ball to Expose Once-Banned Tattoo." ESPN, January 12, 2024. https://www.espn.com/nba/story/_/id/39296398/nba-allow-lamelo-ball-expose-once-banned-tattoo.