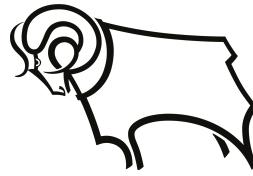


Data Analysis for Derby County F.C.

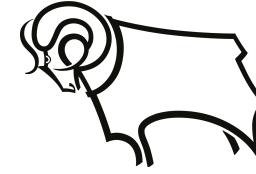
Edward Webster

September 2020

Contents



- **Background slides:**
 - About this presentation pack
 - Task brief
- **Workflow and tools:**
 - Workflow and tools used for this data analysis
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 - Tools used
- **Data analysis slides:**
 - Player profiles – Jayden Bogle and Tom Lawrence
 - Derby County team profile
- **Scouted players (1-4 per position)**
- **Conclusion and next steps**
- **Appendix**

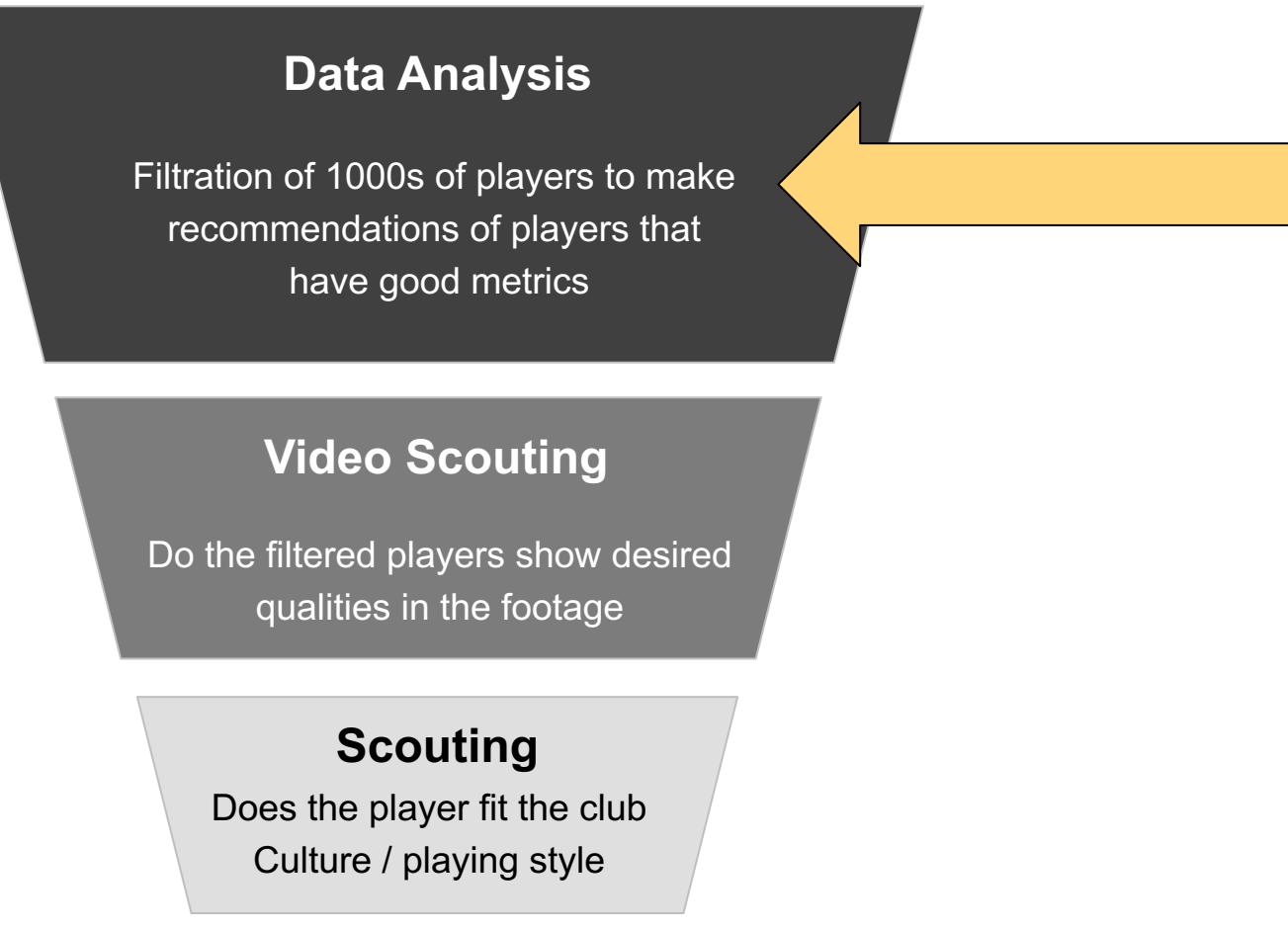
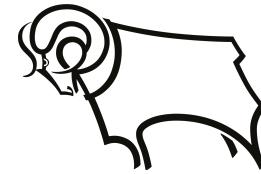


The aim of this presentation pack:

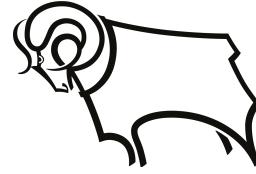
To used data-driven analysis as the starting point to identify replacements for two Derby County players – Jayden Bogle and Tom Lawrence

Why Data Analysis?

Where this analysis fits in the playing staff recruitment funnel



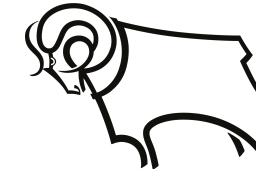
Task Brief



- Suggest ~3 target replacements for each of the two players - Jayden Bogle and Tom Lawrence, using data analysis.
- At least one of your recommendations for each position should be a player aged 23 or younger.
- Due to budgetary restrictions, you should also recommend at least one player from a division lower than the Championship.
- Important considerations when providing recommendations:
 - The attainability of any potential targets given the club's budget and standing;
 - Whether a potential recruit may be undervalued;
 - Whether a potential recruit would fit with Derby's playing style;
 - How far you expect a young player's performances to improve as they gain experience; and
 - How a player's performance might translate from League One or League Two up to the Championship.

Metric used in Analysis

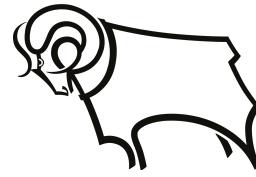
Different metrics selected for the each player's varying position



- Depending on the position, different metrics are required to effectively assess a player's performance.
- Metrics that might be deemed a good measure of performance for an attacking player, such as goals and assists, may not be as well-suited for defensive players that contribute in other aspects such as tackles and aerial duels.
- A per 90 metric was created, to standardised statistics per matches played. This allows players that have played a full season can be compared to those that may have not played a full season. For example, players that joined in the January transfer window, players that are/have been injured, or young players who may drift in and out of the squad
- The metrics provided in the dataset have also been used to derive new, aggregated metrics. Examples of these metrics include Deep Progressions, which is a summation of a player's passes, dribbles, and carries into the box. Depending on the player type, he may be a crosser such as David Beckham, or a dribbler such as Lionel Messi, or an incisive passer such as David Silva, to name but a few, broad examples. These metrics hope to provide a way to compare players that all may be effective, but in different ways.

Full-Back Metrics

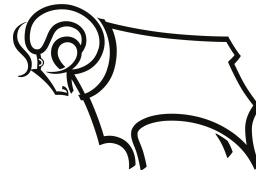
Metrics chosen to best analyse a full-back's abilities



- 1) **Tackles p90** = Tackles per 90 minutes (where p90 is a calculated field of Play Time / 90)
- 2) **Interceptions p90** = Interceptions per 90 minutes
- 3) **Recoveries p90** = Recoveries per 90 minutes
- 4) **Deep Progressions p90** = (Pass Op Box + Dribbles Box + Carries Box) per 90 minutes
- 5) **Blocks p90** = Blocks per 90 minutes
- 6) **Carries p90** = Carries per 90 minutes
- 7) **Passing OP %** = $(\text{Pass OP Box Successful} + \text{Pass OP Final Third Successful} + \text{Pass OP Head Successful}) \div (\text{Pass OP Box} + \text{Pass OP Final Third} + \text{Pass OP Head})$
- 8) **Dribbles %** = Dribbles Successful \div Dribbles
- 9) **Launches %** = Launches Successful / Launches
- 10) **Aerial Duels %** = $(\text{Aerial Duels Att Won} + \text{Aerial Duels Def Won}) \div (\text{Aerial Duels Att} + \text{Aerial Duels Def})$
- 11) **Ground Duels %** = $(\text{Ground Duels Att Won} + \text{Ground Duels Def Won}) \div (\text{Ground Duels Att} + \text{Ground Duels Def})$
- 12) **Crosses OP %** = Crosses OP Successful \div (Crosses OP Left + Crosses OP Right)

Winger Metrics

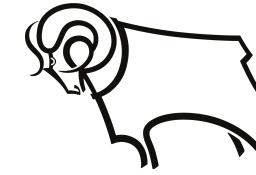
Metrics chosen to best analyse a winger's abilities



- 1) **Shots per Goal** = Shots + Goals
- 2) **Goals p90** = Goals per 90 minutes (where p90 is a calculated field of Play Time / 90)
- 3) **Shots p90** = Shots per 90 minutes
- 4) **Assists p90** = (Pass Op Box + Dribbles Box + Carries Box) per 90 minutes
- 5) **Interceptions p90** = Interceptions per 90 minutes
- 6) **Deep Progressions p90** = (Pass Op Box + Dribbles Box + Carries Box) per 90 minutes
- 7) **Carry Distance p90** = Carry Distance per 90 minutes
- 8) **Carries Box p90** = Carries in the Box per 90 minutes
- 9) **Dribbles %** = Dribbles Successful ÷ Dribbles
- 10) **Crosses OP %** = Crosses OP Successful ÷ (Crosses OP Left + Crosses OP Right)
- 11) **Passing OP %** = (Pass OP Box Successful + Pass OP Final Third Successful + Pass OP Head Successful) ÷ (Pass OP Box + Pass OP Final Third + Pass OP Head)
- 12) **Passing OP Box %** = Pass OP Box Successful ÷ Pass OP Box

How this analysis was put together

Programming languages and visualisation tools used in this analysis



**Back End
(Data Preparation)**



python

The Python logo consists of two interlocking snakes, one blue and one yellow, above the word "python" in a lowercase sans-serif font.

**Front End
(Analysis and Visualisation)**

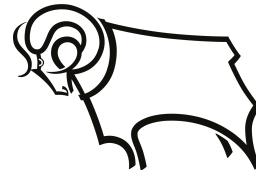


+ tableau

The Tableau logo features a cluster of colorful plus signs (orange, teal, red, blue) arranged in a diamond pattern, followed by the word "tableau" in a bold, lowercase sans-serif font.

Tools

Why Python and Tableau?



Backend (Data Preparation)

- For the data preparation (backend), the data has been acquired (scraped) using [Python](#) webscrapers.
- Scrapped data is then engineered using Python in a Jupyter notebooks environment.

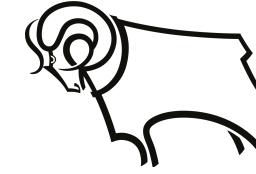


Frontend (Data Visualisation and Presentation)

- The frontend tools created from the data are built using [Tableau](#).
- The reason why I chose to use Tableau to visualise the data is due to the products functionality and ease-of-use to those at all levels of the football club, including coaching staff and players. Tableau dashboards can be published and accessed on iPads and mobile devices, enabling use by the coaches and players on the training field, the changing room, or at home.
- For data analysis to be effective, it needs to be a part of the holistic approach of the club and be accessible not just to power users such as Data Analysts and Data Scientists, but to everyone at every level of the club. In my opinion, Tableau is the best tool for this.
- If Tableau is not available as a product to the club, the data can be visualised using PowerBI or a number of Python packages including matplotlib, Seaborn, or Plotly, to name but a few (examples of different visualisation projects are available in my [GitHub repo](#)).

+ a b | e a u

Workflow Flow Chart



Data Acquisition and Parsing

- Data from [TransferMarkt](#) is scraped using Python webscrapers.
- Data from 21st Club is provided in the task email as a CSV file.

Data Engineering

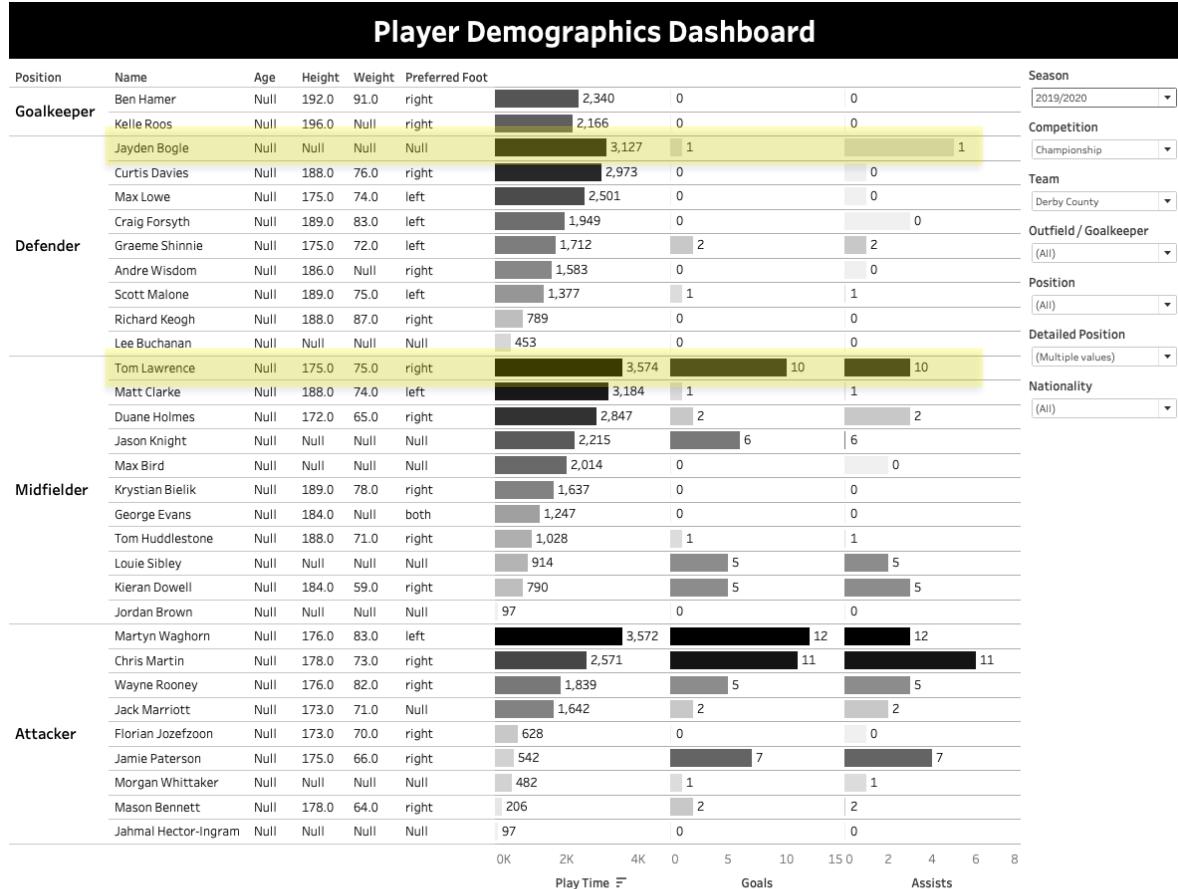
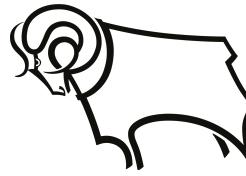
- Scraped data from TransferMarkt is cleaned and engineered using the pandas Python library in Jupyter notebooks.
- Data from 21st Club is engineered to create new KPIs and attributes derived from the raw data to create tailor-made metrics for the coaches and data teams. The combined DataFrame is also melted as a long table as this was required when building the Tableau radar visualisations.
- Fuzzy data matching of the two data sources from 21st Club and TransferMarkt enables creation of new analysis of Stats per £ metrics.

Data Visualisation and Analysis

- Data visualised in Jupyter notebooks, as dashboards using Tableau, and as figures in PowerPoint slides.
- Key observations and comments of the data analysis included in PowerPoint figures.
- Dashboards published to Tableau Public.

Tool 1: Individual Team Dashboard

Simple bar charts deliver key player information quickly and concisely



Dashboard by @eddwebster

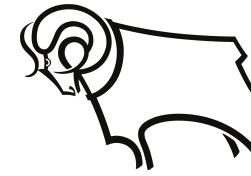


Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt

- The Individual Team dashboard is a simple collection of bar charts, that splits players into their positions – goalkeeper, defender, midfielder, and forward.
- The bars show key statistics for each players including: the minutes played, number of appearances, goals, and assists.
- This dashboard has the potential for various uses but the main purpose for this exercise is to quickly gauge how valuable certain players are to their team and answer basic questions such as player that make up the first XI.
- In this dashboard, we can see that regarding minutes played, both Bogle and Lawrence are the most featured players for the 2019/20 campaign for their respective positions, and are key players for the club.
- Potential data sources that would add additional value if included in this dashboard:
 - No. substitute appearances (on and off); and
 - Percentage of time.

Tool 2: Team Ranking by Metrics

Interactive visualisation of per positions metrics



Team Demographics Dashboard - Attacking Metrics

Season	2019/2020
Leeds United	716
Brentford	676
West Bromwich Albion	660
Fulham	649
Barnsley	618
Millwall	574
Swansea City	574
Nottingham Forest	573
Sheffield Wednesday	571
Cardiff City	569
Birmingham City	567
Middlesbrough	549
Hull City	543
Queens Park Rangers	538
Preston North End	531
Stoke City	531
Reading	517
Wigan Athletic	517
Blackburn Rovers	498
Derby County	495
Huddersfield Town	465
Bristol City	442
Luton Town	414
Charlton Athletic	407
Brentford	82
West Bromwich Albion	80
Cardiff City	76
Bristol City	74
Nottingham Forest	73
Queens Park Rangers	71
Leeds United	70
Derby County	69
Stoke City	69
Swansea City	68
Fulham	67
Sheffield Wednesday	67
Blackburn Rovers	62
Reading	61
Stoke City	59
Hull City	58
Nottingham Forest	57
Wigan Athletic	56
Birmingham City	55
Brentford	55
Barnsley	53
Huddersfield Town	51
Charlton Athletic	50
Luton Town	49
Middlesbrough	47
Leeds United	57
Millwall	55
Fulham	51
West Bromwich Albion	49
Sheffield Wednesday	49
Stoke City	48
Nottingham Forest	46
Middlesbrough	45
Birmingham City	44
Barnsley	44
Wigan Athletic	43
Preston North End	43
Hull City	42
Blackburn Rovers	42
Bristol City	41
Cardiff City	41
Swansea City	40
Luton Town	39
Brentford	39
Charlton Athletic	36
Huddersfield Town	34
Queens Park Rangers	34
Derby County	33
Reading	29
Leeds United	1,130
Millwall	1,027
Fulham	996
West Bromwich Albion	986
Sheffield Wednesday	962
Stoke City	943
Nottingham Forest	931
Middlesbrough	906
Birmingham City	887
Barnsley	878
Wigan Athletic	877
Preston North End	861
Hull City	857
Blackburn Rovers	846
Bristol City	835
Cardiff City	829
Swansea City	828
Luton Town	818
Brentford	815
Charlton Athletic	812
Huddersfield Town	756
Queens Park Rangers	732
Derby County	727
Reading	719

Dashboard by @eddwebster

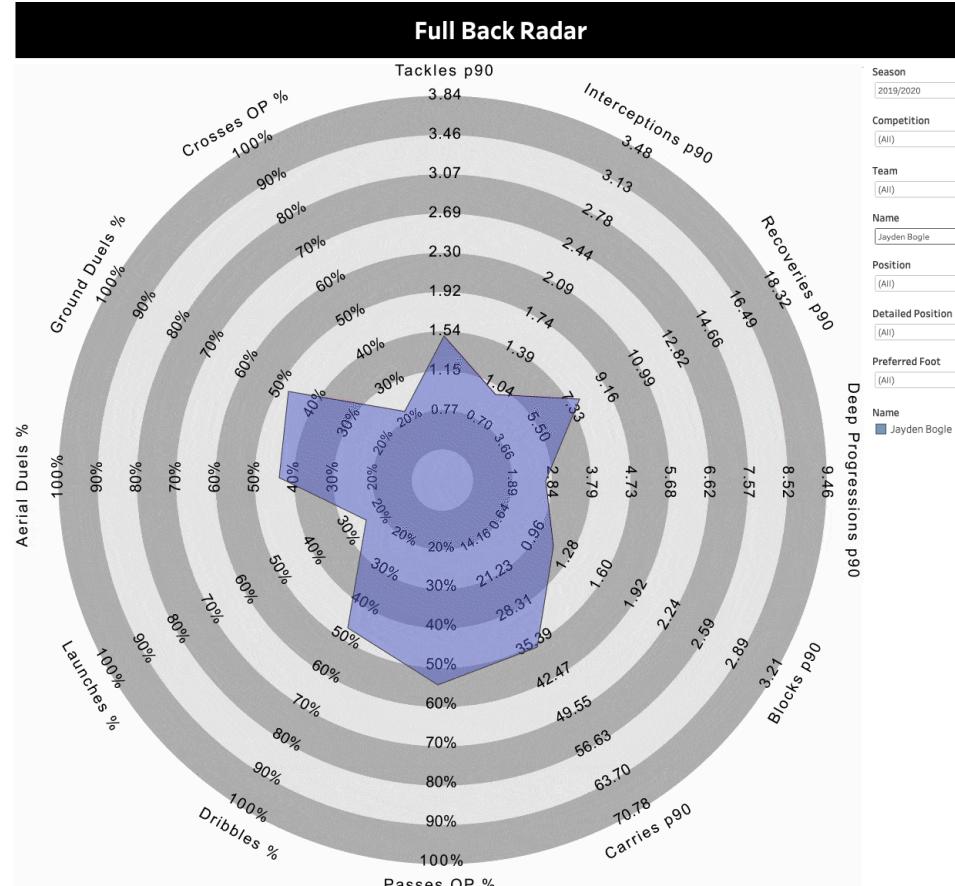
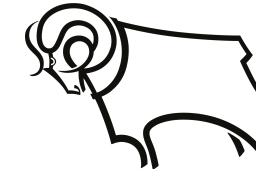


- A dashboard of simple bar charts that show the key metrics of teams.
 - Selecting a team in one of the metrics highlights that same team in the other metrics.
 - The metrics have been split across two dashboards – attack and defensive metrics.
 - Dashboards can be filtered by:
 - Season;
 - Competition; and
 - Team.
 - The purpose of this dashboard is to quickly gauge an idea of a team's playing style and the aspects of the game in which they excel/do less well compared to other teams.
 - In this attacking metrics table, we can suggest that Derby County are a possession-based (5th/24 for passes) and a high scoring team (4th) for who take relative few shots (20th). These statistics suggests Derby are efficient at taking their chances. They are averagely ranked for Open Play Passes into the Final Third and Box, and Carries into the Box, and cross the ball very little (23rd for crosses), which suggests that their build-up play is very patient and they prefer to have players who are happy to have the ball.
 - Metrics that could be used to improve the performance of this radar with additional Event data:
 - 'Expected' metrics: Expected Goals (xG), Expected Assists (xA), xGBuildup, and Expected Threat (xT); and
 - Team possession.

Team performance data provided by 21st Club.

Tool 3: Radar Dashboards

Interactive visualisation of players per positions metrics



Dashboard by @eddwebster

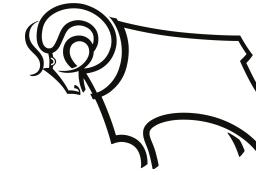


Team performance data provided by 21st Club.

- Interactive Player Radars dashboards designed to show a number of key, position-specific metrics, in a visually appealing way.
- Data can be filtered by:
 - Season;
 - Competition;
 - Estimated Player Value;
 - Preferred Foot;
 - Age;
 - Minutes Played; and
 - Goals Scored.
- Bespoke radars created per position to assess the metrics of the most important KPIs for different roles in the team.
- Metrics calibrated per 90 minutes to standardised so that players that have played a full season can be compared with those that may not have, for whatever reason.
- Metrics that could be used to improve the performance of this radar with additional Event data:
 - Expected Goals (xG);
 - Expected Assists (xA);
 - xGBuildup;
 - Expected Threat (xT);
 - Turnovers (how often a player loses the ball via a miscontrol or a failed dribble per 90 minutes);
 - Possession Adjusted (PAdj) metrics to recalibrate metrics based on a team's possession;
 - Fouls; and
 - Tackles verse Dribbles Past.
- It's important to note when viewing radars, area is not a part of the assessment, only where the points themselves lie of the axes, as illustrated in the following tweet from Luke Bornn: <https://twitter.com/LukeBornn/status/864856335191388162>.

Tool 4: Player Ranking by Metrics per Position

Further breakdown of the selected metrics per position to rank players



Full-Back Demographics Dashboard											
Tackles p90	Interceptions p90	Recoveries p90	Deep Progressions p90	Blocks p90	Carries p90	Season					
Kilian Ludewig	2.92	Matty Cash	1.30	Jordan Williams	11.87	Alfie Doughty	2.92	Kilian Ludewig	1.97	Jayden Bogie	42.88
Omar Richards	2.76	Rico Henry	1.05	Toby Sibbick	10.30	Jayden Bogie	2.91	Matty Cash	1.90	Rico Henry	42.44
Matty Cash	2.53	Ryan Nyambe	1.28	Rico Henry	10.14	Djed Spence	2.80	Jaden Brown	1.88	Ryan Nyambe	40.26
Pedro Pereira	2.46	Jordan Williams	1.27	Omar Richards	9.78	Pedro Pereira	2.58	Jordan Williams	1.73	Jordan Williams	37.74
Benjamin Willi..	2.31	Jayden Bogie	1.04	Kilian Ludewig	9.46	Matty Cash	2.50	Omar Richards	1.71	Matty Cash	37.28
Jordan Williams	2.30	James Bree	0.87	Matty Cash	9.20	Rico Henry	2.44	Djed Spence	1.66	Thomas Edwar..	36.49
Clarke Oduor	2.17	Alfie Doughty	1.19	Benjamin Willi..	9.13	Kilian Ludewig	2.03	Rico Henry	1.59	Jaden Brown	36.02
Toby Sibbick	2.13	Omar Richards	1.16	Jayden Bogie	8.92	Ryan Nyambe	1.97	Alfie Doughty	1.54	Clarke Oduor	34.33
Luke Bolton	2.08	Benjamin Willi..	1.54	Ryan Nyambe	8.69	Clarke Oduor	1.84	Benjamin Willi..	1.48	Omar Richards	34.11
Jaden Brown	1.72	Kilian Ludewig	1.27	Clarke Oduor	8.66	Jaden Brown	1.80	Ryan Nyambe	1.44	Benjamin Willi..	32.97
Jayden Bogie	1.70	Toby Sibbick	1.04	Alfie Doughty	8.58	Luke Bolton	1.69	Toby Sibbick	1.42	Pedro Pereira	31.95
Rico Henry	1.42	Pedro Pereira	1.08	Pedro Pereira	8.21	Omar Richards	1.63	Clarke Oduor	1.36	Alfie Doughty	30.98
Djed Spence	1.28	Wes Harding	1.57	Thomas Edwar..	8.02	Thomas Edwar..	1.57	Pedro Pereira	1.32	James Bree	29.58
Thomas Edwar..	1.27	Thomas Edwar..	1.27	Jaden Brown	7.67	Jordan Williams	1.43	James Bree	1.23	Kilian Ludewig	28.90
Ryan Nyambe	1.25	Clarke Oduor	1.28	Luke Bolton	7.28	Benjamin Willi..	1.25	Jayden Bogie	1.21	Toby Sibbick	28.61
Alfie Doughty	1.23	Djed Spence	0.76	James Bree	7.00	James Bree	1.23	Luke Bolton	1.17	Luke Bolton	24.30
James Bree	0.93	Luke Bolton	1.04	Djed Spence	6.26	Toby Sibbick	1.14	Thomas Edwar..	0.90	Djed Spence	23.77
Wes Harding	0.78	Jaden Brown	0.16	Wes Harding	6.01	Wes Harding	0.87	Wes Harding	0.78	Wes Harding	22.56
Min Minutes Played											
Kilian Ludewig	22.0	Ryan Nyambe	70.7%	Benjamin Willi..	35.6%	Jaden Brown	70.0%	Benjamin Willi..	63.2%	Clarke Oduor	46.2%
Matty Cash	21.2	Benjamin Willi..	70.0%	Pedro Pereira	34.4%	Luke Bolton	65.2%	Jaden Brown	60.4%	Wes Harding	33.3%
Jaden Brown	21.0	Jordan Williams	64.6%	Djed Spence	33.3%	Clarke Oduor	55.0%	James Bree	59.2%	Alfie Doughty	25.8%
Jordan Williams	19.4	Jaden Brown	62.5%	Ryan Nyambe	31.9%	Rico Henry	52.7%	Thomas Edwar..	52.6%	Rico Henry	24.8%
Omar Richards	19.1	James Bree	62.5%	Jaden Brown	29.6%	Benjamin Willi..	52.6%	Rico Henry	51.8%	Omar Richards	22.6%
Djed Spence	18.6	Matty Cash	59.7%	Jordan Williams	28.7%	Omar Richards	51.6%	Omar Richards	51.3%	Kilian Ludewig	22.2%
Rico Henry	17.8	Rico Henry	54.1%	Toby Sibbick	28.2%	Toby Sibbick	51.4%	Jayden Bogie	50.3%	Thomas Edwar..	21.7%
Alfie Doughty	17.2	Jayden Bogie	53.7%	James Bree	26.1%	James Bree	51.2%	Wes Harding	50.0%	Jayden Bogie	21.2%
Benjamin Willi..	16.6	Thomas Edwar..	52.6%	Jayden Bogie	23.7%	Matty Cash	49.0%	Pedro Pereira	45.8%	Jordan Williams	20.8%
Ryan Nyambe	16.1	Clarke Oduor	50.0%	Wes Harding	23.5%	Ryan Nyambe	48.6%	Matty Cash	44.7%	Matty Cash	20.5%
Toby Sibbick	15.8	Luke Bolton	50.0%	Clarke Oduor	21.6%	Kilian Ludewig	47.9%	Ryan Nyambe	43.4%	Pedro Pereira	20.4%
Clarke Oduor	15.2	Alfie Doughty	45.8%	Omar Richards	21.6%	Jayden Bogie	47.5%	Jordan Williams	41.5%	James Bree	20.0%
Pedro Pereira	14.7	Wes Harding	45.0%	Alfie Doughty	19.7%	Pedro Pereira	47.0%	Kilian Ludewig	40.7%	Djed Spence	19.6%
James Bree	13.7	Pedro Pereira	44.4%	Matty Cash	19.0%	Alfie Doughty	45.8%	Alfie Doughty	40.0%	Ryan Nyambe	18.2%
Jayden Bogie	13.5	Toby Sibbick	44.4%	Luke Bolton	18.2%	Wes Harding	45.5%	Toby Sibbick	37.3%	Toby Sibbick	15.0%
Luke Bolton	13.1	Djed Spence	41.7%	Rico Henry	17.2%	Jordan Williams	44.9%	Djed Spence	35.5%	Benjamin Willi..	13.0%
Thomas Edwar..	10.0	Omar Richards	37.9%	Thomas Edwar..	16.0%	Djed Spence	42.6%	Clarke Oduor	22.0%	Jaden Brown	11.1%
Wes Harding	8.8	Kilian Ludewig	34.6%	Kilian Ludewig	13.0%	Thomas Edwar..	40.0%	Luke Bolton	20.9%	Luke Bolton	5.3%

Dashboard by @eddwebster

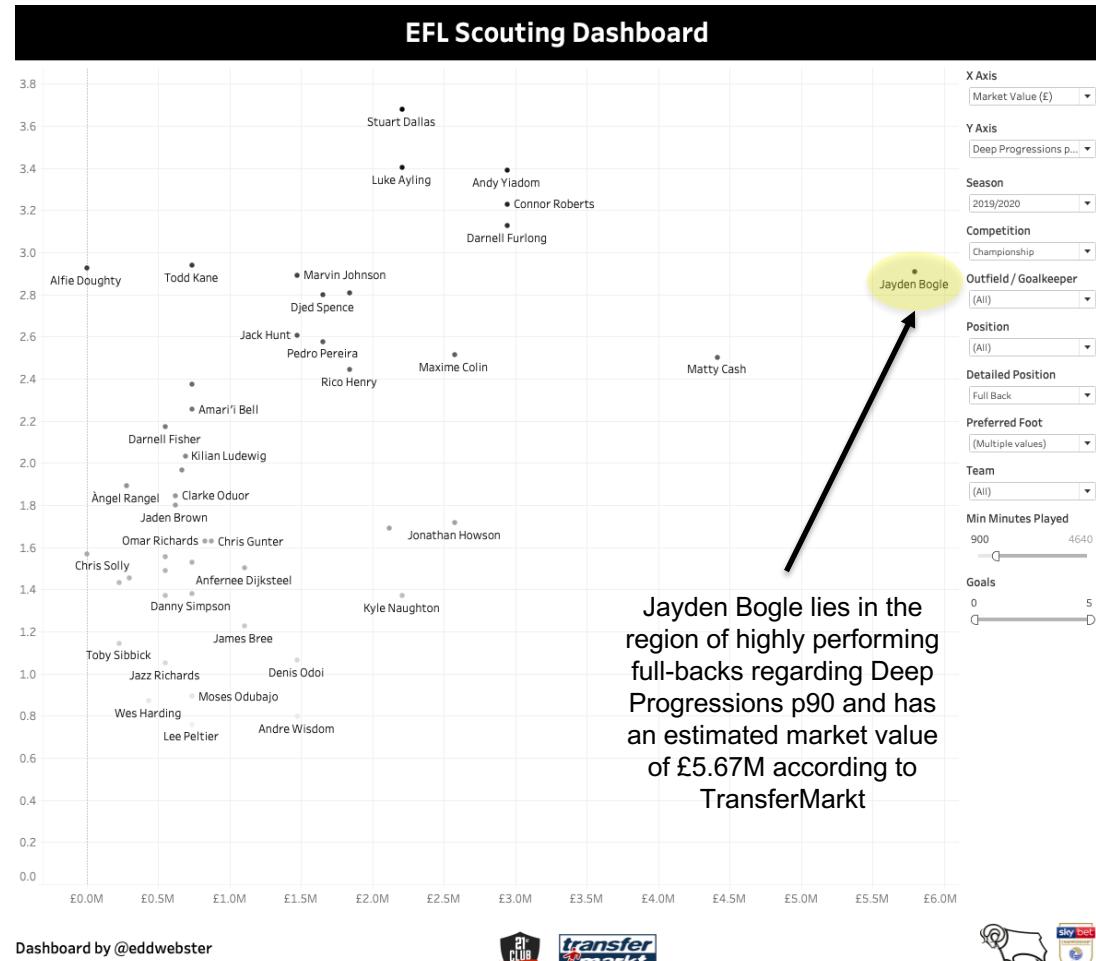
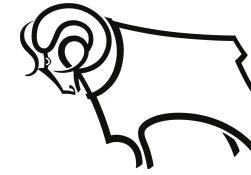


Team performance data provided by 21st Club.

- This simple Ranking of Players per Metric dashboard shows the key metrics per player position.
- In this example for full-backs, the dashboard shows the ranking of the players for the Championship 2019/20 season as per twelve, selected metrics, deemed to be of most importance for that position. These metrics include: Tackles per 90, Interceptions per 90, Recoveries per 90, Deep Progressions per 90, Blocks per 90, Carries per 90, Passes in Open Play Success %, Dribbles Success %, Launches Success %, Aerial Duels Success %, Ground Duels Success %, Crosses Open Play Success %.
- In real world scouting, these metrics would be agreed upon between the coaches and manager, and put into action by the data analysts, to ensure that players are assessed for the right playing style.

Tool 5: Dynamic Performance vs Valuation Dashboard

Comparison of real-world performance and estimated market value



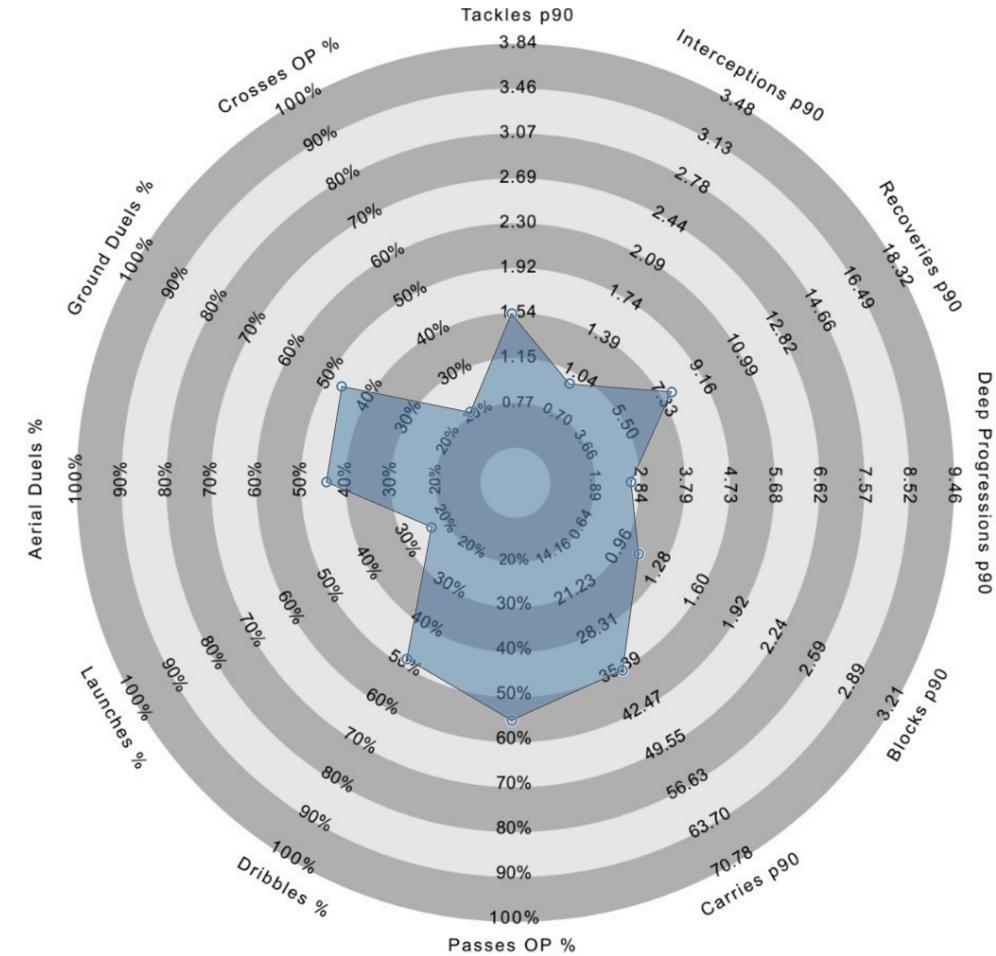
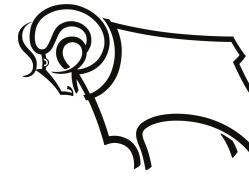
- Interactive player recruitment dashboard created by fuzzy matching two independent datasets - player performance data from 21st Club and player valuation data from TransferMarkt.
- Data can be filtered by:
 - Season;
 - Competition;
 - Estimated Player Value;
 - Preferred Foot;
 - Position;
 - Detailed Position;
 - Preferred Foot;
 - Team;
 - Min Minutes Played;
 - Goals.
- The X and Y Axis are dynamic and can be changed to show difference attributes, such as:
 - Value;
 - Goals p90 and Assists p90; and
 - Derived metrics including Deep Progressions p90 (as shown in this example).
- Metrics that could be used to improve the performance of this dashboard with additional data:
 - 'Potential Impact' - derived metric based on professional opinion;
 - Contract expiry information;
 - International status;
 - Career league minutes;
 - Scout reports; and
 - Current/expected wages.

Jayden Bogle

Player profile



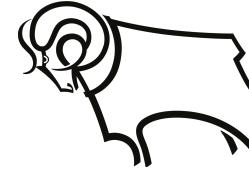
- DoB:** 27/07/2000
- Age:** 20
- Place of birth:** Reading
- Foot:** Right
- Height:** 1.78m
- Nationality:** English
- Senior International caps (goals):** 0 (0)
- Main position:** Right-Back
- Other position(s):** Left-Back
- Total appearances for Derby County in all competitions:** 91
- Goals for Derby:** 3
- Assists for Derby:** 17
- Estimated market value:** £5.67M



Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.

Full-Back Metric Ranking

Comparison of Wingers in the Championship



- The Ranking of Players per Metric dashboard for full-backs shows the ranking of the players for the Championship 2019/20 season per twelve selected metrics, deemed to be of most importance. These metrics include: Tackles per 90, Interceptions per 90, Recoveries per 90, Deep Progressions per 90, Blocks per 90, Carries per 90, Passes in Open Play Success %, Dribbles Success %, Launches Success %, Aerial Duels Success %, Ground Duels Success %, Crosses Open Play Success %.

This data has been filtered to show only full-backs, the 2019/20 season, and players that have played at least 10 matches (900 minutes).

Bogle's (highlighted in red) highest ranked metrics include:

 - Carries p90 (10th / 42.88);
 - Deep Progressions p90 (10th / 30.7);
 - Interceptions (18th / 1.04);
 - Dribbles Success % (25th / 53.7%); and
 - Recoveries p90 (27th / 8.92).

This data suggests that the strongest aspects of Bogle's game the attacking-aspect of being a full-back. He contributes significantly to the attack, ranking 10th for Deep Progressions and Carries p90, and ranks less for defensive metrics such as Tackles p90, and Aerial and Ground Duel Success %. These maybe due to Derby's playing style and actions calibrated per possession may be more appropriate.

As mentioned with the Full-Backs Dashboard, in real world scouting, these metrics would be agreed between the data analysts, the coaches, and the manager, to ensure that players are asses for the right playing style.

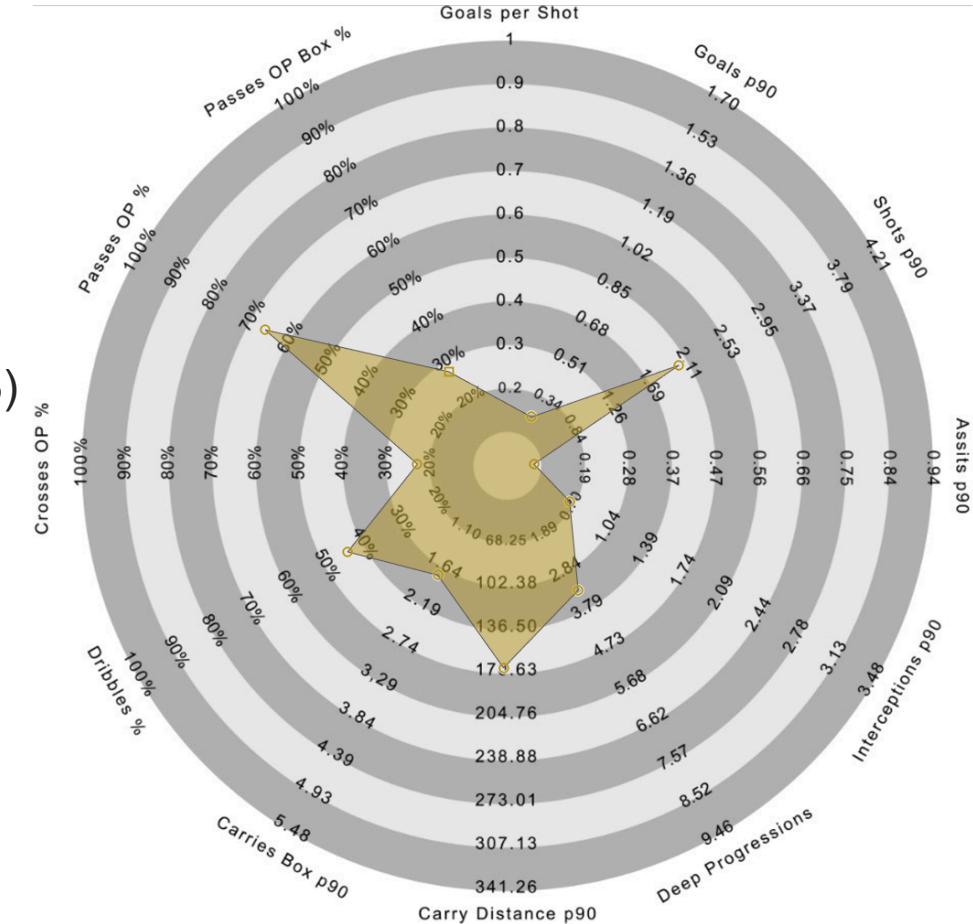
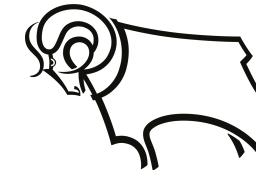
Team performance data provided by 21st Club.

Tom Lawrence

Player profile



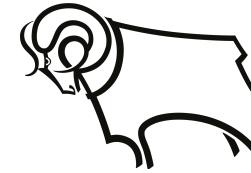
- DoB:** 13/01/1994
- Age:** 26
- Place of birth:** Wrexham
- Foot:** Right
- Height:** 1.75m
- Nationality:** Welsh
- Senior International caps (goals):** 20 (3)
- Main position:** Left Winger
- Other position(s):** Second Striker, Right Winger
- Total appearances for Derby County in all competitions:** 124
- Goals for Derby:** 23
- Assists for Derby:** 18
- Estimated market value:** £4.32M



Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.

Winger Metric Ranking

Comparison of Wingers in the Championship



Shots per Goal	Goals p90	Shots p90	Assists p90	Interceptions p90	Deep Progressions p90
Adama Diakhaby	0.0000	Andre Green	1.718	Mallik Wilks	4.602
Gavin Masey	0.0000	Mason Bennett	1.079	Kamil Grosicki	3.739
Gavin Whyte	0.0000	Kamil Grosicki	0.885	Said Benrahma	3.739
Sergi Canós	0.0000	Mallik Wilks	0.874	Mason Bennett	3.312
Luke Thomas	0.0250	Jarrod Bowen	0.507	Adama Diakhaby	2.777
Frank Lampard	0.0000	Adam Armstrong	0.466	Pablo Hernández	2.757
Jérémie Bela	0.0377	Billy Bodin	0.388	Junior Hollett	2.577
Kadeem Harris	0.0462	Said Benrahma	0.374	Jeremie Bela	2.523
Calum O'Dowda	0.0651	Neeskens Kebé..	0.355	Jack Routh..	2.417
Brad Potts	0.0714	Wayne Routled..	0.328	Grady Diangana	2.331
Billy Bodin	0.0714	Garry Hooper..	0.322	Nathanel Men..	2.222
Jon Rothwell	0.0741	Pablo Hernández..	0.293	Connor Mahon..	2.220
Calum Robinson	0.0769	Tom Lawrence	0.252	Sergi Canós	2.220
Yves Bissouma	0.0770	Joe Ralls	0.246	Connor Mahon..	2.211
Jude Bellingham	0.0816	Tom Barkhuizen	0.226	Pablo Hernández..	2.202
Jack Harrison	0.0833	Jed Wallace	0.225	Said Benrahma	2.183
Nathaniel Men..	0.0909	Junior Hollett	0.213	Jack Routh..	2.183
Said Benrahma	0.1000	Calum Robinson	0.213	Grady Diangana	1.806
Ivan Cavaleiro	0.1040	Mathew Phillips	0.202	Nathanel Men..	1.766
Jamal Lowe	0.1071	Billy Bodin	0.184	Junior Hollett	1.746
Jed Wallace	0.1099	Chris Willock	0.183	Jack Harrison	1.645
Bright Osayi-S..	0.1111	Kyle Edwards	0.170	Josh Harrop	1.645
Tom Lawrence	0.1122	Adam Armstrong	0.169	Tom Barkhuizen	1.625
Matt Phillips	0.1148	Jamal Lowe	0.145	Brad Potts	1.499
Connor Mahon..	0.1250	Bright Osayi-S..	0.142	Gavin Whyte	1.474
Elias Kachunga	0.1250	Jack Harrison	0.137	Ivan Cavaleiro	1.452
Pablo Hernández..	0.1269	Nathaniel Men..	0.137	Junior Hollett	1.452
Junior Hollett	0.1269	Jude Bellingham	0.117	Luke Thomas	1.426
Josh Harrop	0.1515	Tom Barkhuizen	0.103	Grady Diangana	1.382
Chris Willock	0.1538	Elias Kachunga	0.091	Nathanel Men..	1.382
Jarrod Bowen	0.1549	Neeskens Kebé..	0.089	Adam Armstrong	1.364
Tom Barkhuizen	0.1562	Joe Rothwell	0.082	Mathew Phillips	1.347
Adam Armstrong	0.1649	Jérémie Bela	0.072	Bright Osayi-S..	1.282
Grady Diangana	0.1778	Kadeem Harris	0.073	Chris Willock	1.192
Andre Green	0.1828	Frank Villalba	0.070	Calum O'Dowda	0.948
Neeskens Kebá..	0.2633	Adama Diakhaby	0.068	Gavin Whyte	0.948
Wayne Routled..	0.3333	Luke Thomas	0.035	Mathew Phillips	0.948
Albert Adomah	0.3633	Adama Diakhaby	0.000	Elias Kachunga	0.948
Mallik Wilks	0.3761	Gavin Masey	0.000	Neeskens Kebá..	0.948
Mason Bennett	0.5818	Gavin Whyte	0.000	Calum O'Dowda	0.718
Kamil Grosicki	0.7273	Gavin Whyte	0.000	Mason Bennett	0.708

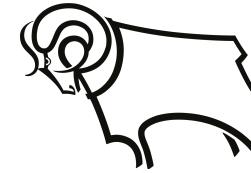
Carry Distance p90	Carries Box p90	Dribbles %	Crosses OP %	Passes OP %	Passes OP Box %
Albert Adomah	379.3	Kamil Grosicki	6.874	Albert Adomah	145.2%
Kamil Grosicki	337.1	Mason Bennett	5.499	Kamil Grosicki	97.8%
Adama Diakhaby	303.8	Joe Ralls	5.288	Adama Diakhaby	85.3%
Said Benrahma	303.8	Bright Osayi-S..	4.166	Albert Adomah	84.1%
Jed Wallace	263.3	Jack Harrison	4.341	Andre Green	76.8%
Mason Bennett	257.0	Albert Adomah	4.323	Mason Bennett	39.3%
Kadeem Harris	254.5	Grady Diangana	4.135	Jarrod Bowen	73.3%
Brad Potts	240.4	Chris Willock	4.047	Junior Hollett	70.8%
Kyle Edwards	235.6	Chris Willock	4.003	Mathew Phillips	36.1%
Mallik Wilks	225.4	Kyle Edwards	4.003	Elias Kachunga	68.0%
Bright Osayi-S..	224.9	Pablo Hernández..	3.886	Josh Harrop	29.7%
Andrea Belotti	224.9	Joe Rothwell	3.886	Gavin Whyte	29.7%
Jack Harrison	220.8	Tom Barkhuizen	3.207	Wayne Routled..	66.7%
Ivan Cavaleiro	213.6	Andre Green	3.163	Joe Rothwell	63.8%
Sergi Canós	213.5	Grady Diangana	3.021	Frank Villalba	58.1%
Grady Diangana	201.0	Mathew Phillips	2.980	Connor Mahon..	58.1%
Tom Lawrence	193.4	Wayne Routled..	2.870	Neeskens Kebá..	57.1%
Joe Rothwell	193.4	Mathew Phillips	2.853	Grady Diangana	50.0%
Chris Willock	184.2	Adama Diakhaby	2.841	Calum Robinson	55.0%
Nathaniel Men..	184.2	Adam Armstrong	2.814	Luke Thomas	52.6%
Jarrod Bowen	181.8	Adama Diakhaby	2.801	Pablo Hernández..	52.6%
Fran Villalba	179.6	Tom Barkhuizen	2.432	Junior Hollett	52.6%
Billy Bodin	171.3	Kadeem Harris	2.425	Kyle Edwards	51.5%
Matt Phillips	171.3	Nathaniel Men..	2.195	Gavin Whyte	51.5%
Jude Bellingham	165.7	Luke Thomas	2.195	Said Benrahma	51.2%
Junior Hollett	164.1	Calum O'Dowda	1.962	Grady Diangana	51.2%
Calum O'Dowda	163.6	Tom Lawrence	1.914	Mathew Phillips	50.0%
Adam Armstrong	163.6	Joe Ralls	1.914	Grady Diangana	48.0%
Neeskens Kebá..	153.8	Junior Hollett	1.829	Gavin Masey	22.6%
Jérémie Bela	153.8	Neeskens Kebá..	1.702	Pablo Hernández..	22.6%
Jamal Lowe	147.2	Jude Bellingham	1.663	Joe Rothwell	47.1%
Calum Robinson	147.2	Junior Hollett	1.643	Matt Phillips	47.1%
Wayne Routled..	139.0	Calum O'Dowda	1.643	Said Benrahma	46.3%
Gavin Whyte	128.6	Fran Villalba	1.538	Grady Diangana	19.0%
Tom Barkhuizen	126.5	Jed Wallace	1.538	Kyle Edwards	18.8%
Elias Kachunga	124.9	Mathew Phillips	1.474	Mathew Phillips	18.8%
Brad Potts	117.4	Joe Rothwell	1.397	Grady Diangana	18.0%
Connor Mahon..	107.7	Brad Potts	1.137	Calum Robinson	18.0%
Gavin Masey	97.4	Connor Mahon..	0.974	Connor Mahon..	18.0%

Team performance data provided by 21st Club.

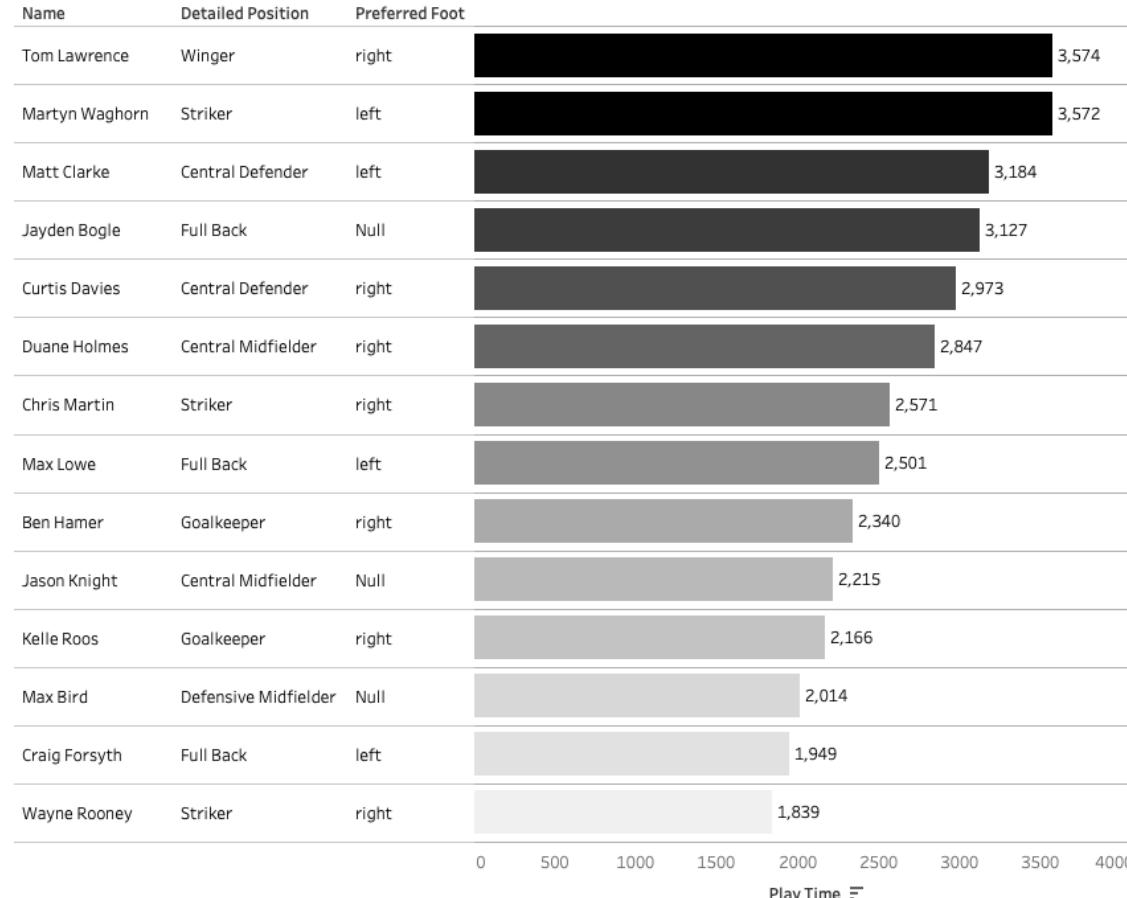
- The Ranking of Players per Metric dashboard for wingers shows the ranking of the players for the Championship 2019/20 season per the twelve selected metrics, deemed to be of most importance. These metrics include: Shots per Goal, Goals per 90, Shots per 90, Assists per 90, Interceptions per 90, Carry Distance per 90, Carries into the Box per 90, Dribbles Success %, Crosses in Open Play Success %, Passes in Open Play Success % and Passes into the Box in Open Play Success %
- This data has been filtered to show only wingers, the most recent 2019/20 season, and players that have played at least 10 matches (900 minutes).
- Lawrence's (highlighted in red) highest ranked metrics include:
 - Interceptions p90 (3rd / 0.71);
 - Goals p90 (13th / 0.252);
 - Shots p90 (13th / 2.226);
 - Carry Distance p90 (17th / 197.8m);
 - Crosses OP Success % (18th / 22.9%); and
 - Passes OP Success % (18th / 11.8%).
- This data suggests that Lawrence takes quite a lot of shots but does have quite good output. He also contributes a lot to the team and may likely also be a strong initiator of the press with his rating of 3rd for interceptions. He is also mostprobably Derby's best outlet when on the attack, carrying the ball and having good passing and crossing accuracy.
- As mentioned with the Full-Backs Dashboard, in real world scouting, these metrics would be agreed between the coaches and the manager, and acted upon by the data analysts, not the other way round.

Derby County's Starting XI

Team Profile - most featured players for the 2019/20 season as per Play Time



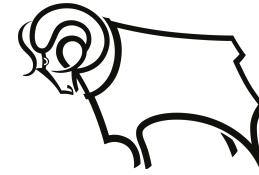
Starting XI by Minute Played



- Derby's most common formation was a 4-3-3 with the captain Wayne Rooney playing deep in the midfield.
- The players in question, Tom Lawrence and Jayden Bogle, were both regular starters, featuring 1st (Lawrence) and 4th (Bogle) in terms of minutes during the campaign.
- Lawrence was by far Derby's most used winger, with 3,574 minutes played. The next closest was Florian Jozefzoon with 628 minutes and then Morgan Whittaker with 482 minutes.
- Likewise, Bogle was Derby's most used right-back with 3,127 minutes, ahead of Derby's alternative right-back Andre Wisdom with 1,583 minutes, who at times played as a centre-back.

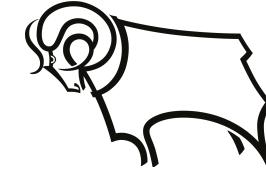
Starting XI graphic produced using StartingEleven.co.uk available: <https://startingeleven.co.uk/user-formation/325511>

Scouting Process



For each player, four potential replacements have been identified. These candidates are categorised as per the following criteria:

- 1) Recommendation based on strong performance in the Championship for the 2019/20 season. These players are 'top-end' of what can be expected;
- 2) Recommendation of an under-23 player for the 2019/20 season, ideally from the Championship;
- 3) Recommendation of a player in a division lower than the Championship, ideally League One; and
- 4) Recommendation of a strong performing, undervalued player within Derby's budget, ideally from the Championship.

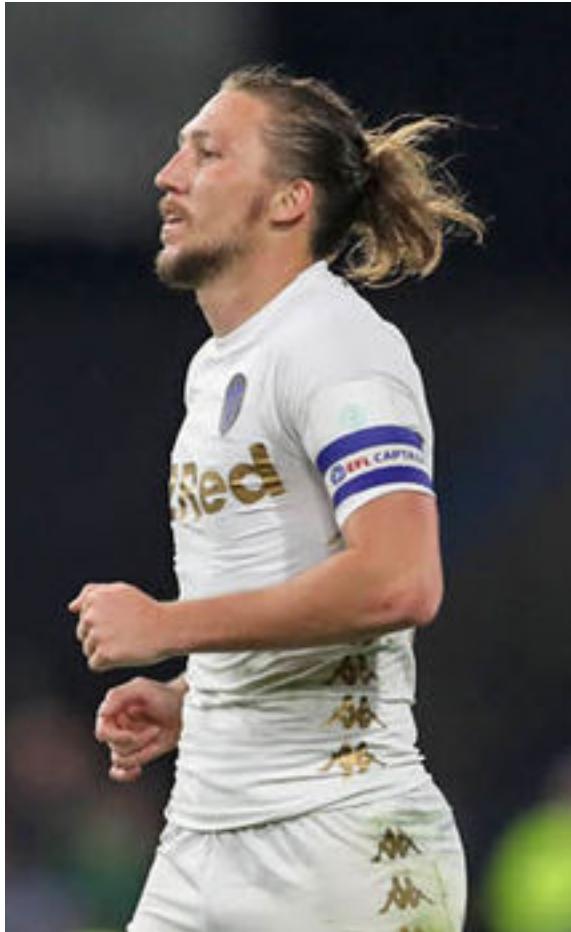


Player choice 1:

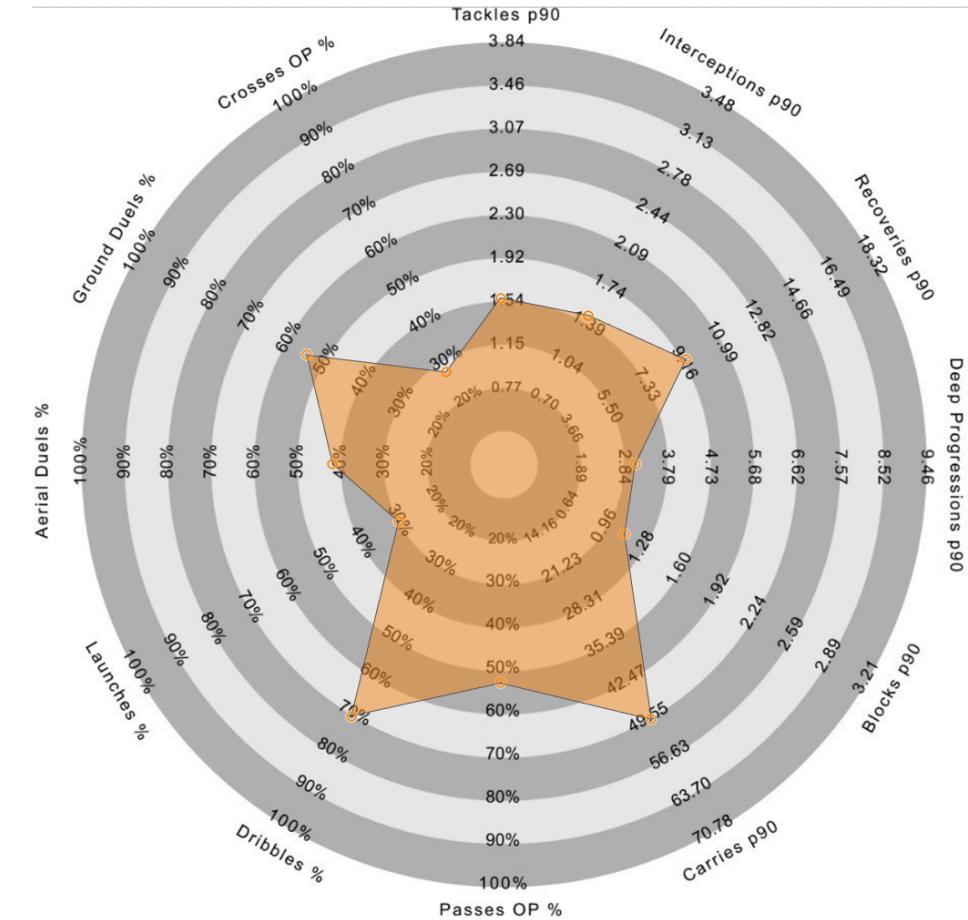
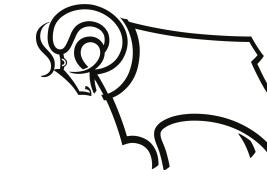
**Best performing player in the Championship
for the 2019-2020 season**

Right-Back Recommendation 1: Luke Ayling

Player profile



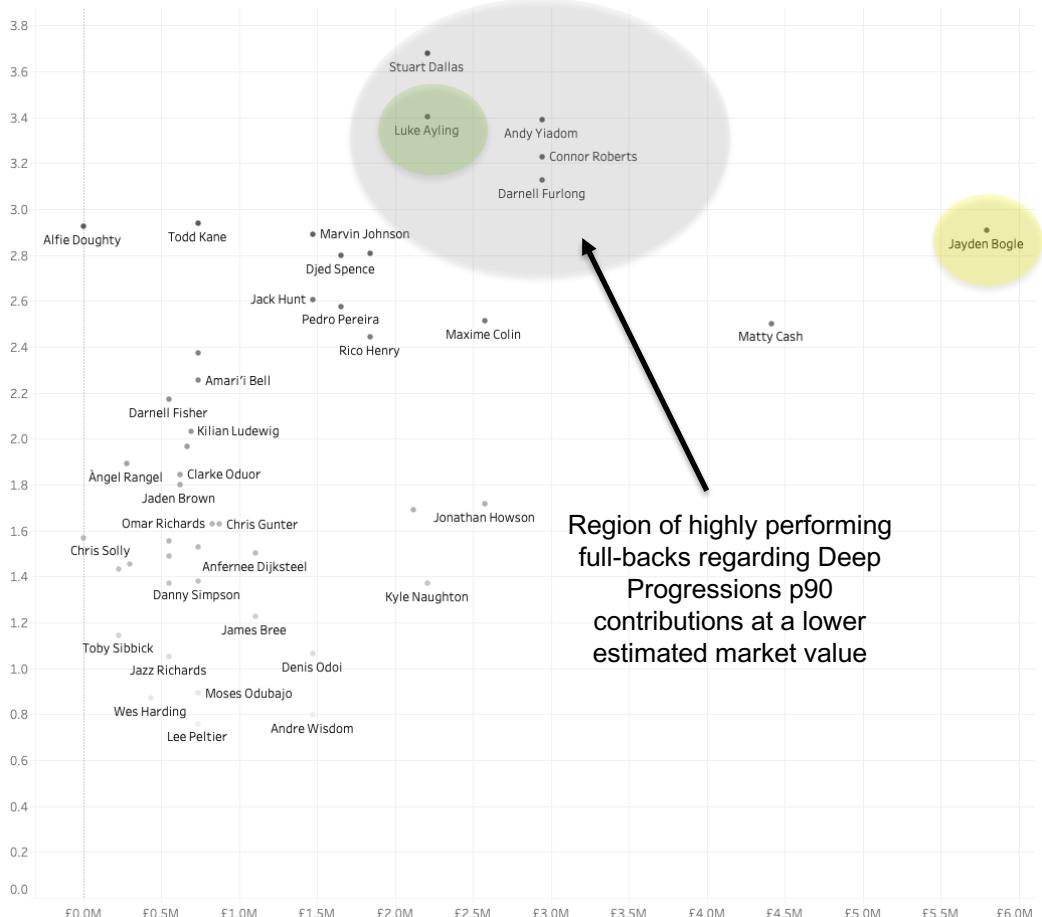
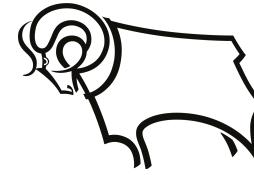
- DoB:** 25/08/1991
- Age:** 29
- Place of birth:** London, England
- Foot:** Right
- Height:** 1.83m
- Nationality:** English
- Senior International caps (goals):** 0 (0)
- Main position:** Right-Back
- Other position(s):** Centre-Back
- Total appearances for Leeds in all competitions:** 156
- Goals for Leeds:** 6
- Assists for Leeds:** 16
- Estimated market value:** £2.16M



Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.

Right-Back Recommendation 1: Luke Ayling

Deep Progressions per 90 Player against Estimated Market Value



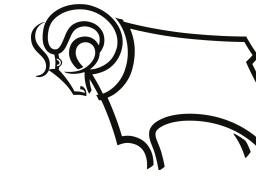
- A strong aspect of Bogle's game is his contribution of Deep Progressions p90, where he finished the 2019/20 season 10th (2.91), a metric in which Ayling of Leeds United finished 1st (3.40), which would suggest he would suit Derby's playing style.
- Ayling also finished 1st for Interceptions p90 (1.63), Carries p90 (58.15), Dribbles % (79.5%). He finished 2nd for Recoveries p90 (10.65) and in the top 10 for other full-back metrics including Tackles p90, Ground Duels %, and Crosses OP%.
- Ayling's performance have been recognised outside of the stats. For the 2019/20 season, Ayling was promoted to the Premier League with Leeds United, was named in Professional Footballers' Association's 2019–20 EFL Championship Team of the Season and also won the EFL Championship PFA Player of the Year for 2019/20 award after beating off competition from nominees including Ollie Watkins and Aleksandar Mitrovic.
- Since Leeds have since been promoted to the Premier League, Ayling is most likely out of price range of most Championship teams, including Derby, and he is unlikely to want to leave the club during a Premier League campaign.

Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.

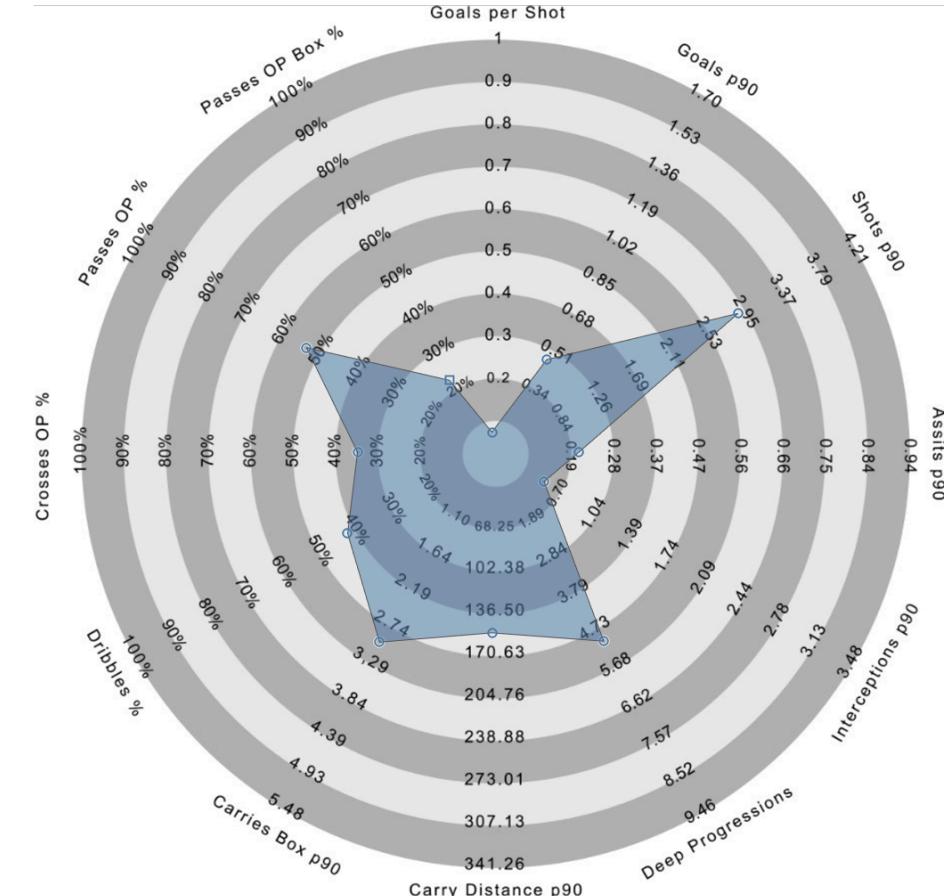
All players have been filtered for Full-Back; Right, Both, or Null foot; and have played at least 10 matches (900 minutes)

Right-Winger Recommendation 1: Jarrod Bowen

Player profile



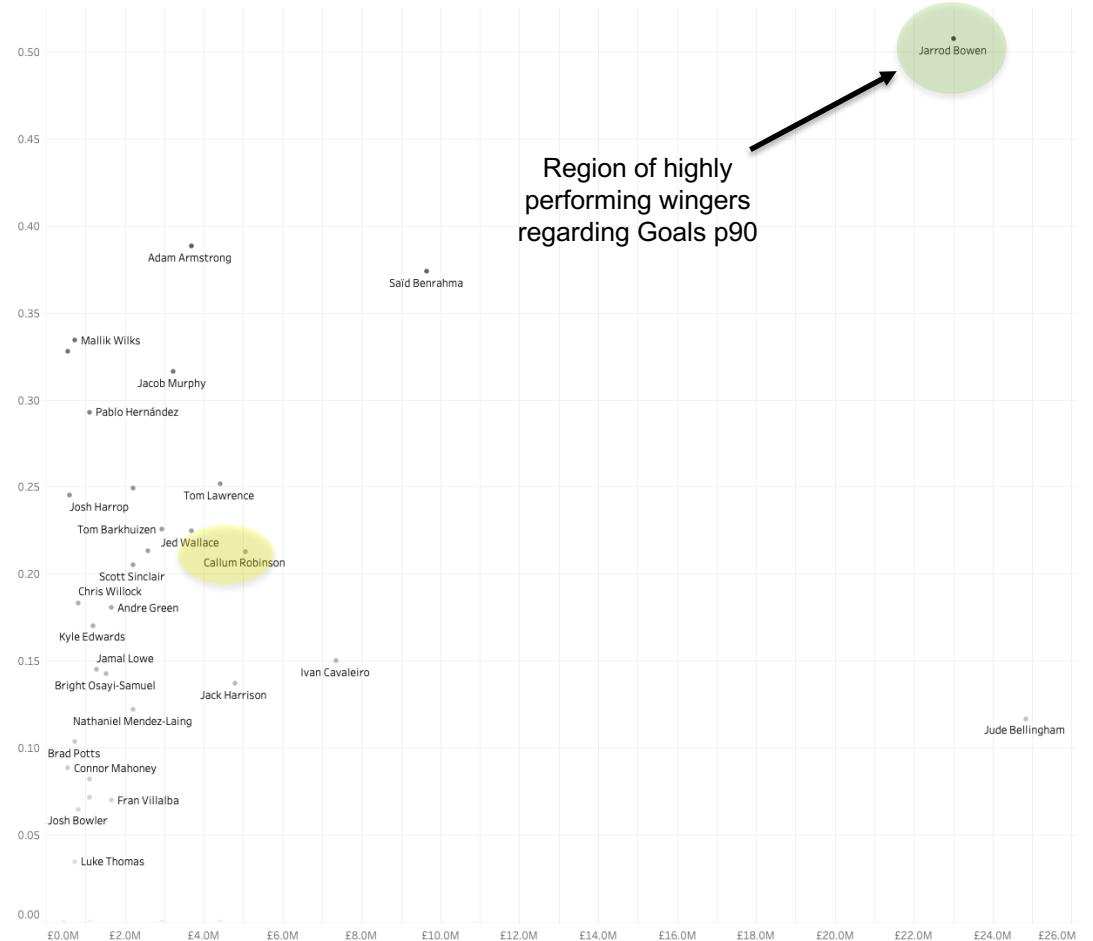
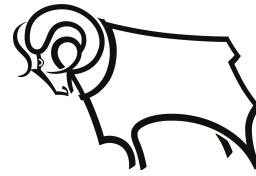
- DoB:** 20/12/1996
- Age:** 23
- Place of birth:** Leominster, England
- Foot:** Left
- Height:** 1.75m
- Nationality:** Polish
- Senior International caps (goals):** 0 (0)
- Main position:** Right-Winger
- Other position(s):** Left-Winger
- Total appearances for Hull in all competitions:** 131
- Goals for Hull:** 54
- Assists for Hull:** 14
- Estimated market value:** £22.5M



Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.

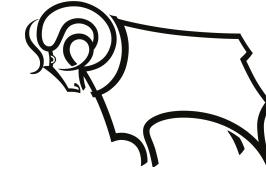
Winger Recommendation 1: Jarrod Bowen

Goals per 90 Player against Estimated Market Value



- A strong aspect of Lawrence's game is his goal contribution to the team with 0.252 Goals per 90 minutes (13th in the Championship for 2019/20), a metric in which Hull City, now of West Ham, finishes 1st (0.507).
- Bowen also finished 2nd for Shots per 90 minutes (3.27), 8th for Assists per 90 minutes (0.222).
- Bowen was bought by West Ham in January and now plays in the Premier League. At his young age and impressive Premier League performances, he is definitely out of the price range of all Championship clubs.

Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.
All players have been filtered for Winger; Right, Both, or Null foot; and have played at least 10 matches (900 minutes).

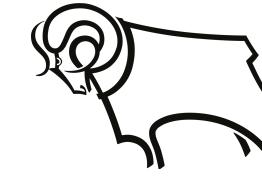


Player choice 2:

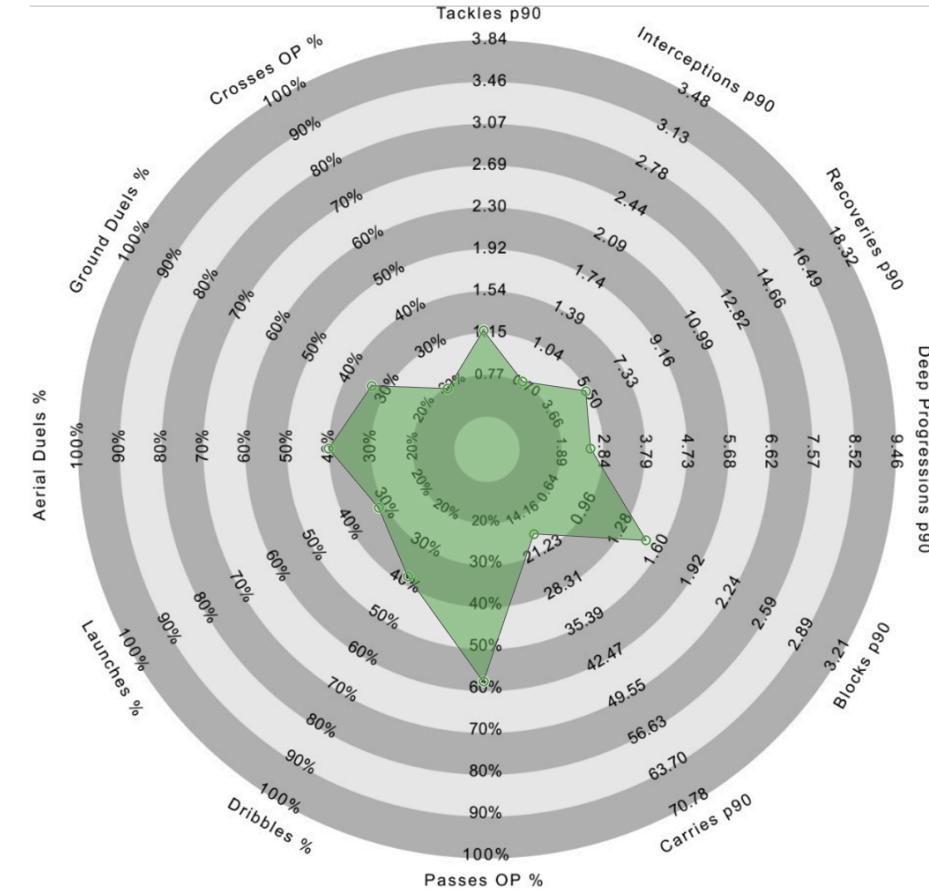
**Best U-23 player in the Championship
for the 2019-2020 season**

Right-Back Recommendation 2: Djed Spence

Player profile



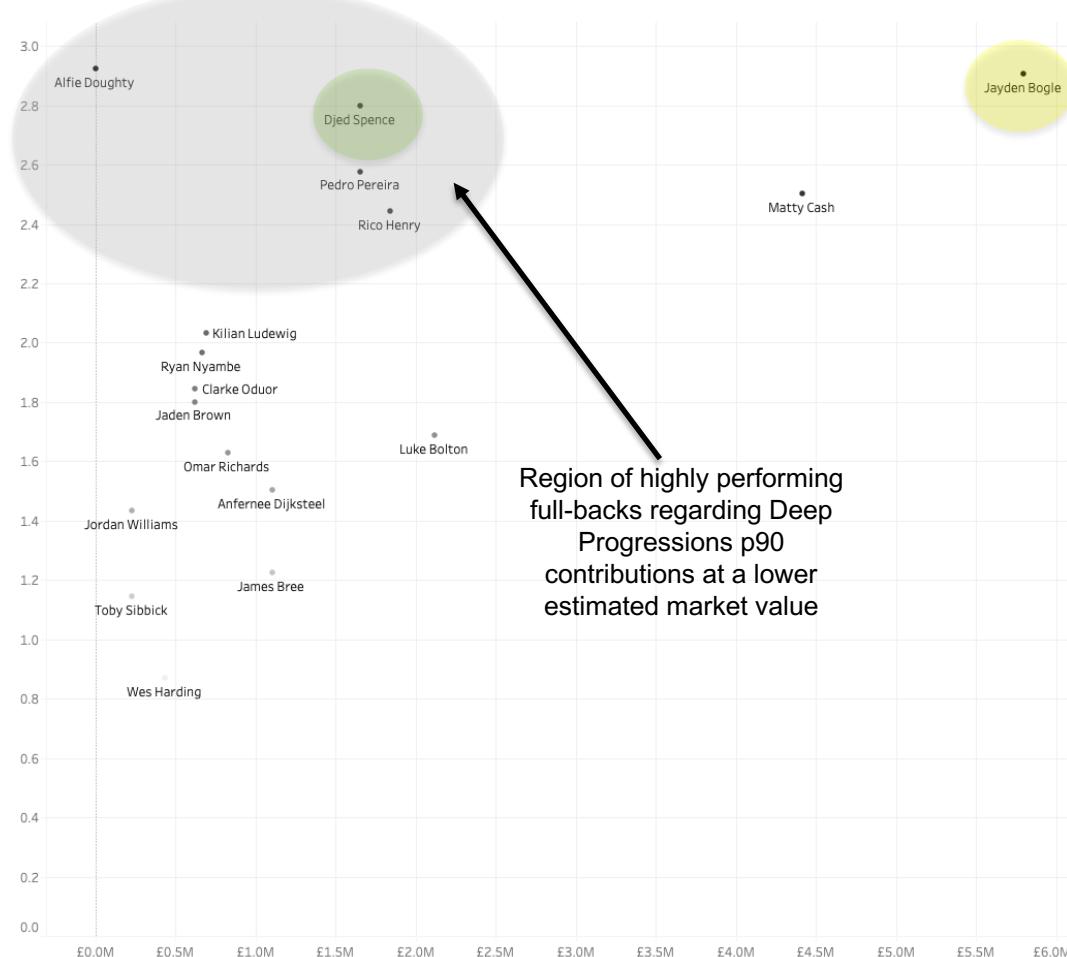
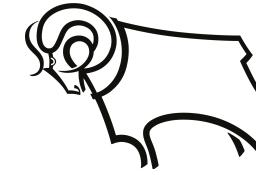
- **DoB:** 09/08/2000
 - **Age:** 20
 - **Place of birth:** London, England
 - **Foot:** Right
 - **Height:** 1.84m
 - **Nationality:** English
 - **Senior International caps (goals):** 0 (0)
 - **Main position:** Right-Back
 - **Other position(s):** n/a
 - **Total appearances for Middlesbrough in all competitions:** 29
 - **Goals for Middlesbrough:** 1
 - **Assists for Middlesbrough:** 0
 - **Estimated market value:** £1.62M



Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.

Right-Back Recommendation 2: Djed Spence

Deep Progressions per 90 Player against Estimated Market Value

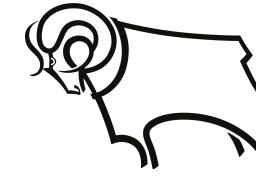


- A strong aspect of Bogle's game is his contribution of Deep Progressions p90, where he finished the 2019/20 season 2nd (2.91) for U-23 players, a metric in which Spence of Middlesbrough finished 3rd (2.80), which would suggest he would suit Derby's playing style.
- Alfie Doughty finishes 1st for all U-23 players for Deep Progressions per 90 minutes with 30.9, just ahead of Bogle. However, despite being both left and right-footed in the 21st Club dataset, as per TransferMarkt he is a left-back/left-midfielder and for this reason he has been discounted as a possible candidate.
- Spence also finished 6th for Blocks p90 (1.66) and 6th for Passing Open Play Success % (18.6) for U-23 players in the Championship.
- According to TransferMarkt, Spence's current value is £1.7M compared with Bogle's of £5.8M, £3.9M less. Spence may well be within Derby's price range

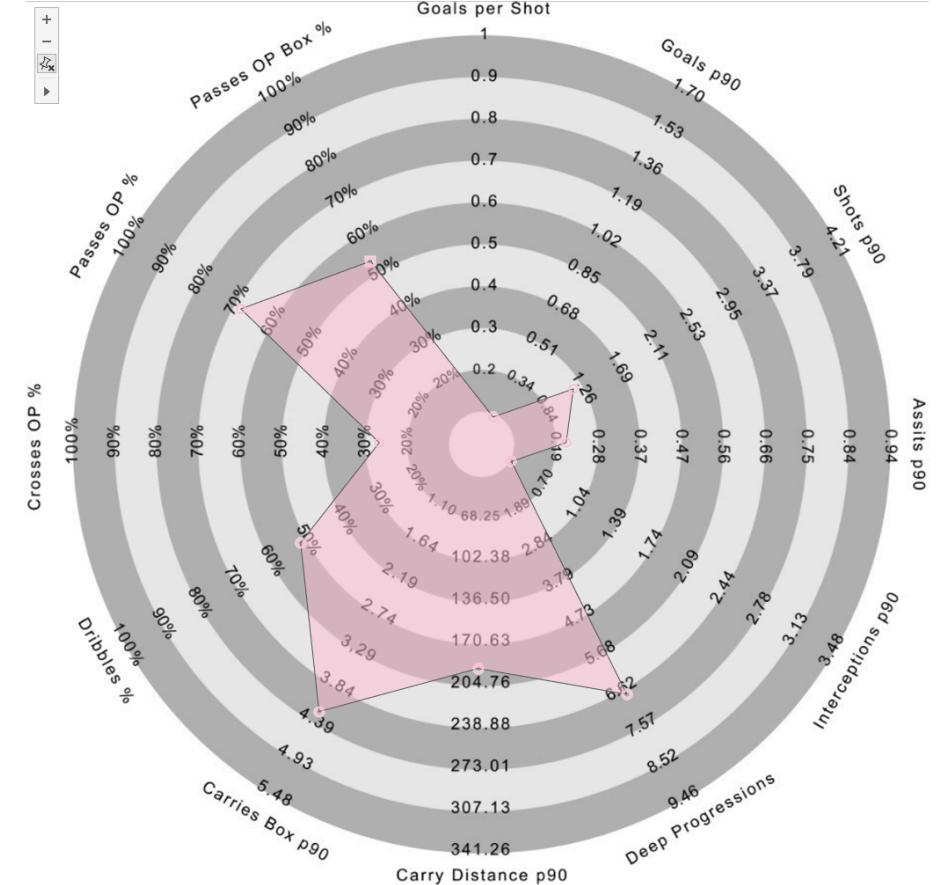
Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.
All players have been filtered for Full-Back; Right, Both, or Null foot; and have played at least 10 matches (900 minutes)

Right-Winger Recommendation 2: Bright Osayi-Samuel

Player profile



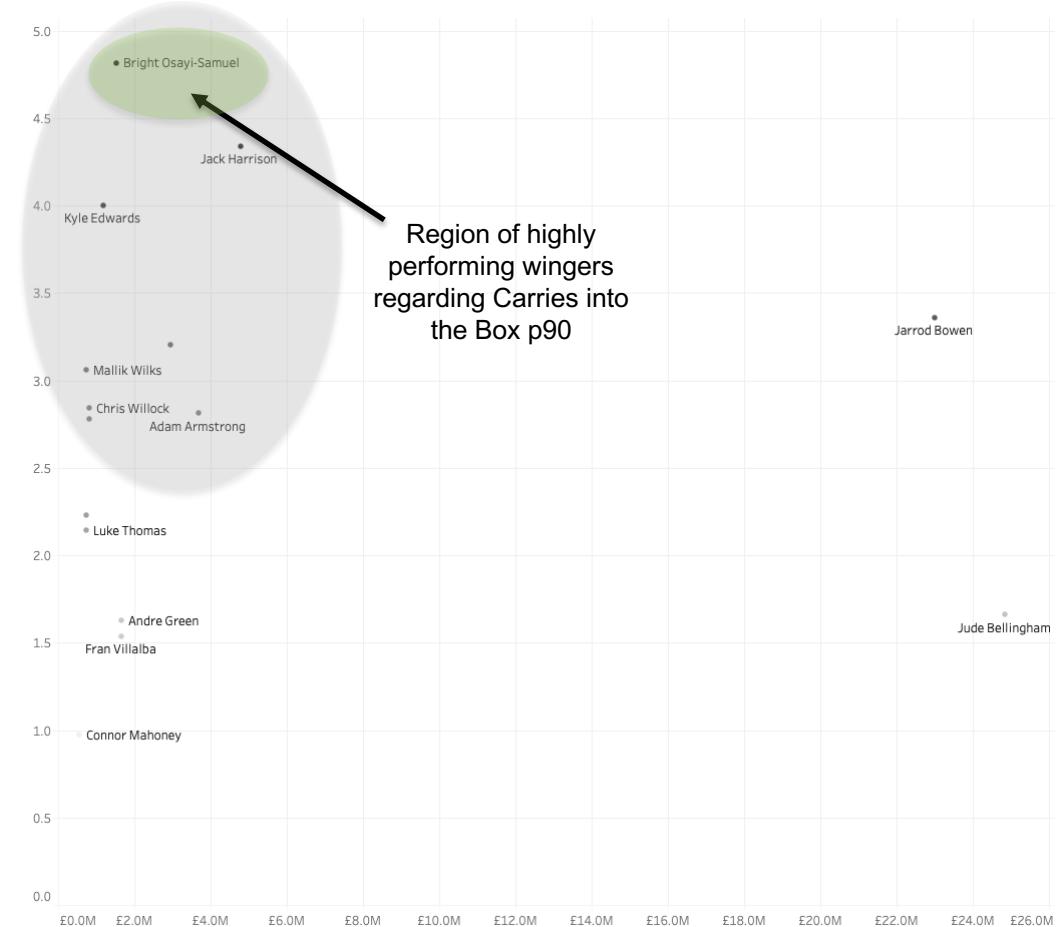
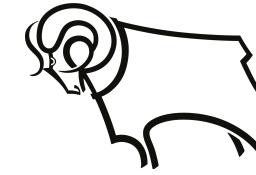
- DoB:** 31/12/1997
- Foot:** Right
- Place of birth:** Okija, Nigeria
- Age:** 22
- Height:** 1.75m
- Nationality:** Nigerian/English
- Senior International caps (goals):** 0 (0)
- Main position:** Right-Winger
- Other position(s):** Left-Winger
- Total appearances for QPR in all competitions:** 95
- Goals for QPR:** 10
- Assists for QPR:** 10
- Estimated market value:** £1.53M



Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.

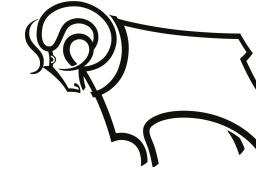
Winger Recommendation 2: Bright Oyasi-Samuel

Goals per 90 Player against estimated market value



- A strong aspect of Lawrence's game is his goal contribution to the team with 0.252 Goals per 90 minutes (13th in the Championship for 2019/20), a metric in which Oyasi-Samuel of QPR finishes 3rd for U-23 players with 0.143 goals.
- Other U-23 players such as Jarrod Bowen (West Ham), Kyle Edwards (West Brom), and Grady Diangana (West Brom), who have a higher Goals per 90 minutes, all now play in the Premier League. Chris Willock who was on Loan at Arsenal is now currently with Benefica B in Portugal. For this reason, these players have been discounted as potential candidates.
- Oyasi-Samuel is a consistently good performer in the Championship, with many other strong aspects to his game when compared with other U-23s, finishing 1st for Carries in the Box p90 (4.816), 1st for Passes Open Play into the Box Success % (59%), 2nd for Carry Distance p90 (224.9m), 2nd for Assists p90 (0.2280), 2nd for Crosses Open Play Success % (27.3%), 3rd for Deep Progressions (82.2), 4th for Dribbles Success % (56.6%), and 7th for Interceptions p90 (0.37).
- Another potential player of interest regarding high Goals p90 output is Adam Armstrong of Blackburn Rovers. Armstrong however has a higher market value of £3.6M according to TransferMarkt.

Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.
All players have been filtered for Winger; Right, Both, or Null foot; and have played at least 10 matches (900 minutes).



Player choice 3:

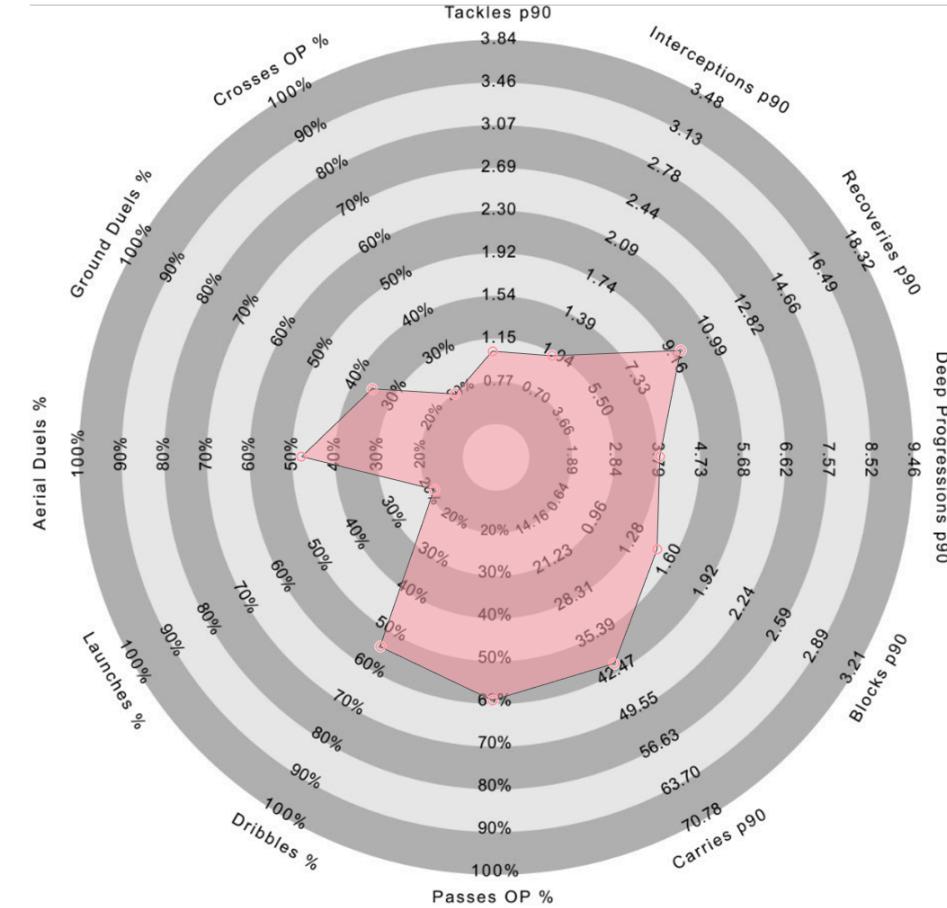
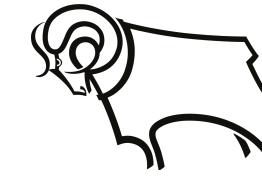
**Best performing player outside the Championship
for the 2019-2020 season**

Right-Back Recommendation 3: Callum Brittain

Player profile



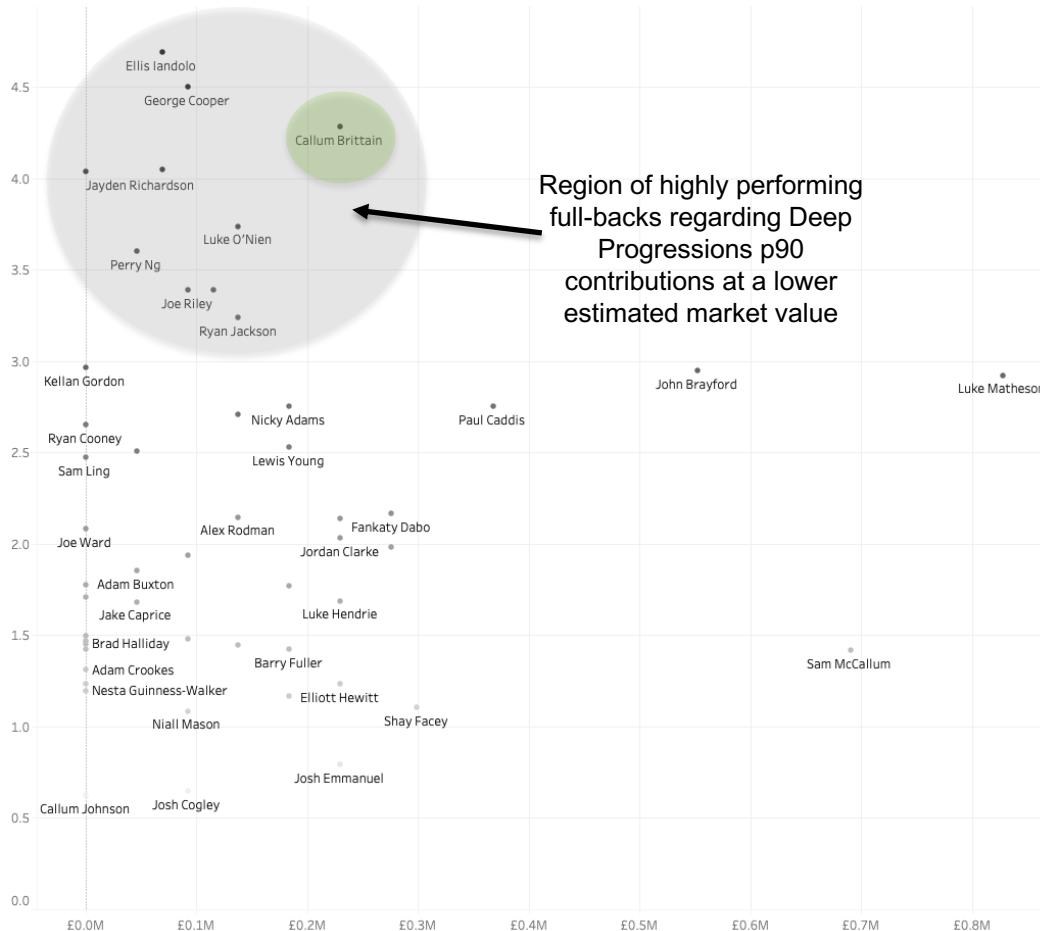
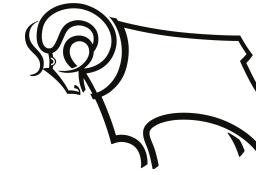
- DoB:** 12/03/1998
- Age:** 22
- Place of birth:** Bedford, England
- Foot:** Right
- Height:** 1.79m
- Nationality:** English
- Senior International caps (goals):** 0 (0)
- Main position:** Right-Back
- Other position(s):** n/a
- Total appearances for MK Dons in all competitions:** 118
- Goals for MK Dons:** 5
- Assists for MK Dons:** 4
- Estimated market value:** £225k



Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.

Right-Back Recommendation 3: Callum Brittain

Deep Progressions per 90 Player against estimated market value



- A strong aspect of Bogle's game is his contribution of Deep Progressions p90, where he finished 4th in the Championship for the 2019/20 season (2.91), a metric in which Callum Brittain finished 1st for League One (4.28), which would suggest he would suit Derby's playing style.
- Brittain also finished League One 2nd for Carries p90 (49.68), 8th for Recoveries p90, 9th for Dribbles Success % (60.7%), 11th for Passing Open Play Success % (18.4%), and 11th for Blocks p90 (1.65).
- Brittain is also 22 years of age and would qualify as an U-23 selection instead of Djed Spence. He has played over 100 games for MK Dons at just 22 years of age, which suggests that despite his young age, he has already had a lot of first team experience and would have the potential to make the jump up to league one.
- With an estimated value of £225k as per TransferMarkt, compared with Djed Spence valued at £1.62mil, Brittain may potentially be a under-valued player that would have the potential to improve as a player.
- In 118 games, Brittain has 5 goals and 4 assists. This may be due to MK Dons style of play, but Bogle with 17 assists with a similar number of games (91) has a greater output and Brittain would maybe need to improve his on his contribution to goals. Of course, assists don't always tell the full story, and Brittain's contribution may show up better for other metrics such as Expected Threat (xT).

Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.

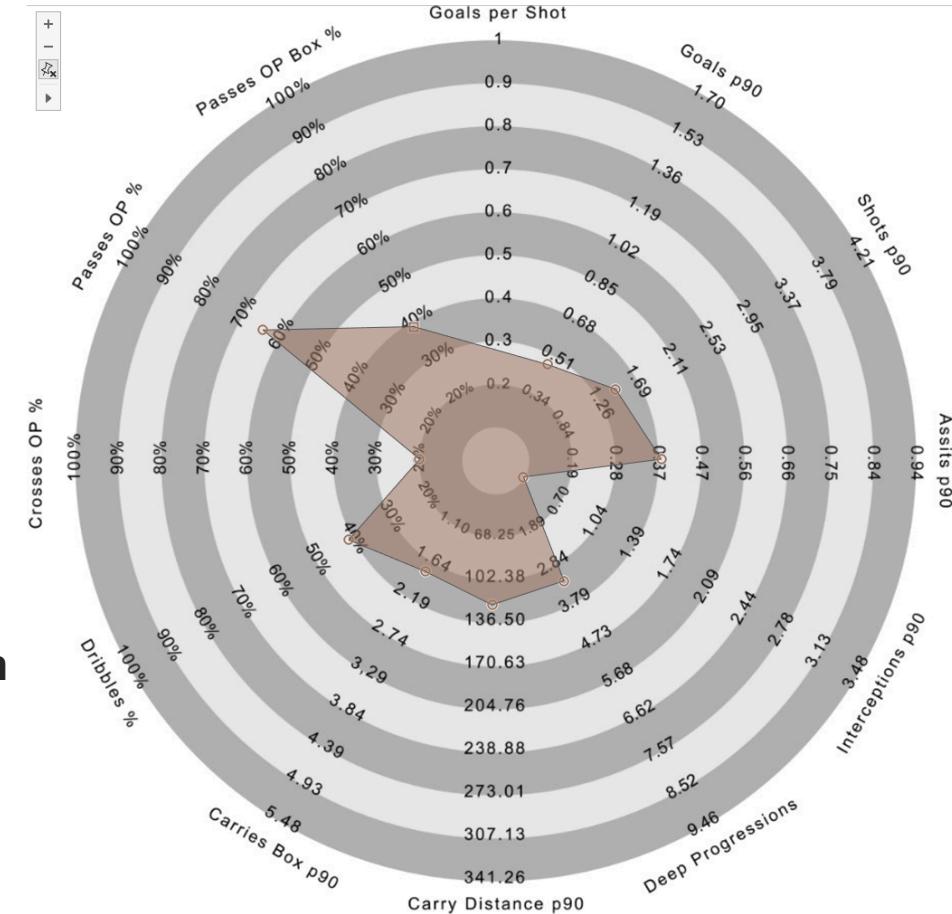
All players have been filtered for Full-Back; Right, Both, or Null foot; and have played at least 10 matches (900 minutes)

Right-Winger Recommendation 3: Marcus Harness

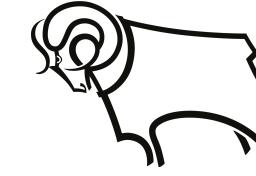
Player profile



- DoB:** 24/02/1996
- Age:** 24
- Place of birth:** Coventry, England
- Foot:** Right
- Height:** 1.82m
- Nationality:** English
- Senior International caps (goals):** 0 (0)
- Main position:** Right-Winger
- Other position(s):** Left-Winger, Attacking Midfield
- Total appearances for Portsmouth in all competitions:** 41
- Goals for Portsmouth:** 12
- Assists for Portsmouth:** 6
- Estimated market value:** £90k

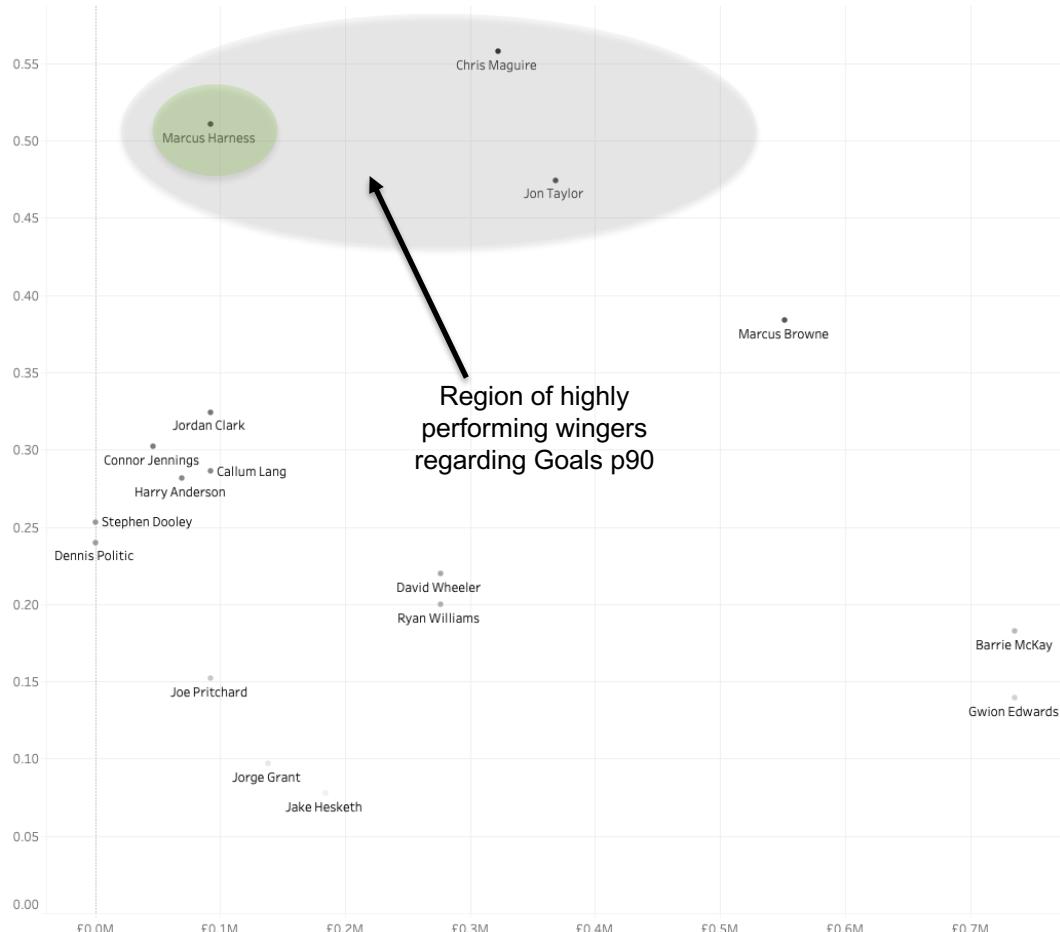
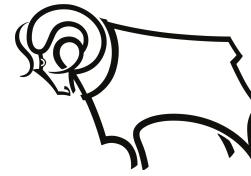


Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.



Winger Recommendation 3: Marcus Harness

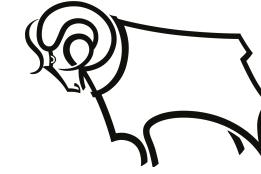
Goals per 90 Player against estimated market value



- A strong aspect of Lawrence's game is his goal contribution to the team with 0.252 Goals per 90 minutes (13th in the Championship for 2019/20), a metric in which Marcus Harness of Portsmouth finishes 5th (0.51) in League One.
- Harness also finished 2nd in League One for Assists p90 (0.43), 6th for Passes Open Play into the Box Success % (42%), 12th for Carries into the Box per 90 (1.96).
- At 24 years old, Harness does not fit within the U-23 category, but he is still a young-player that shows good end-product statistic in terms of goals and assists per 90 mins.
- Harness has an estimated market value of £90k, a player that would be within Derby's budget.
- Other considered players included Sunderland's Chris Maguire and Rotherham's Kieran Sadlier. Despite the data showing he plays with both feet, Sadlier from additional research is a left-winger and was discount. Maguire was also discount as at 31 years old, he may have less opportunity to continue to grow to be Championship level.
- Other potential players include Lynden Gooch of Sunderland who at 24, may also be a good potential target with 0.55 Goals per 90 mins. He performs less well with assists (0.055 per 90 mins), for this reason, Harness was selected.

Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.

All players have been filtered for Winger; Right, Both, or Null foot; and have played at least 10 matches (900 minutes).



Player choice 4:

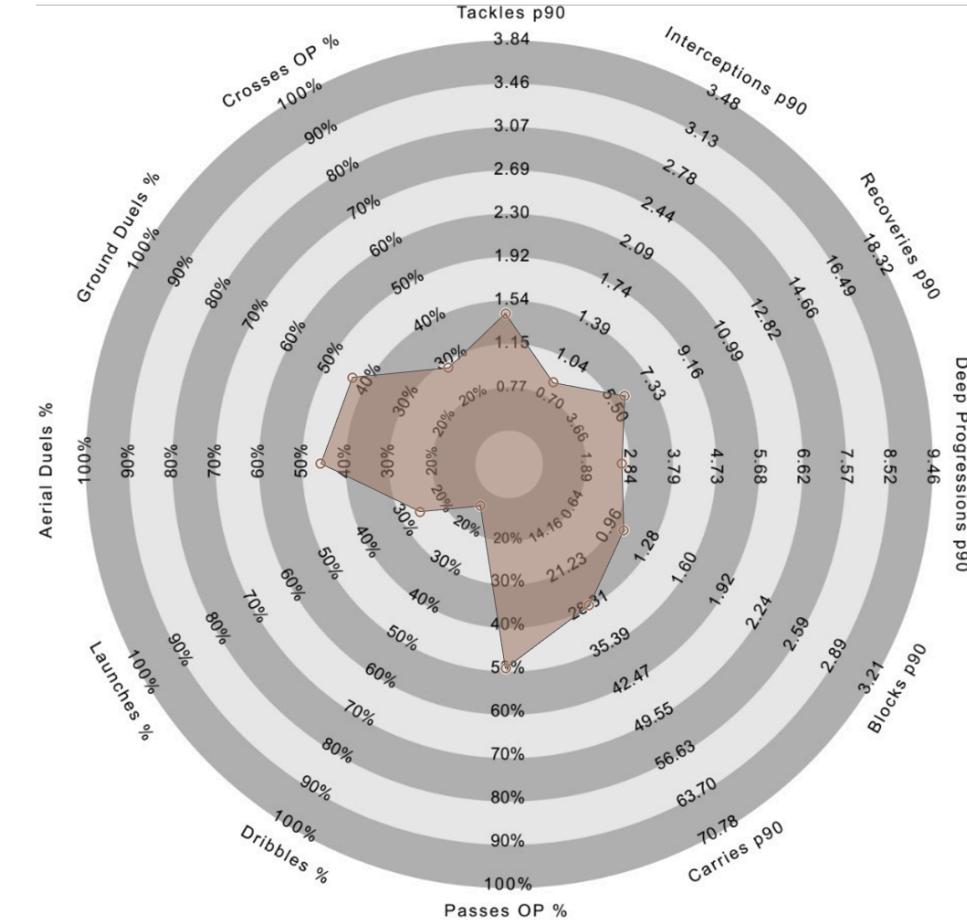
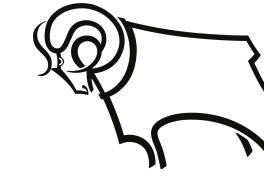
**Strong Performing Championship players within Budget
for the 2019-2020 season**

Right-Back Recommendation 4: Todd Kane

Player profile



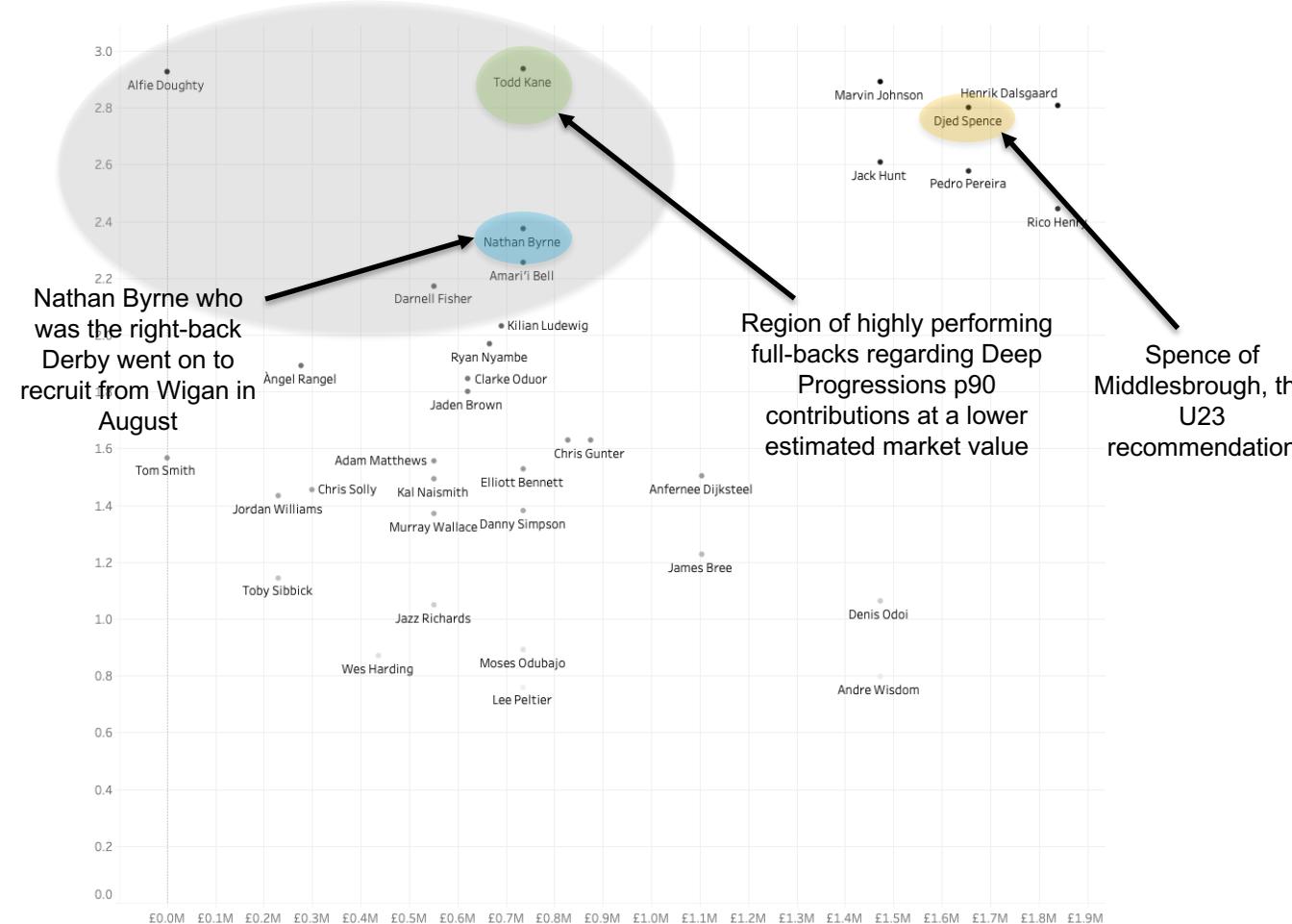
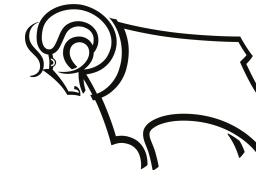
- DoB:** 17/09/1993
- Age:** 27
- Place of birth:** Huntingdon, England
- Foot:** Right
- Height:** 1.80m
- Nationality:** English
- Senior International caps (goals):** 0 (0)
- Main position:** Right-Back
- Other position(s):** n/a
- Total appearances for QPR in all competitions:** 36
- Goals for QPR:** 1
- Assists for QPR:** 2
- Estimated market value:** £720k



Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.

Right-Back Recommendation 4: Todd Kane

Deep Progressions per 90 Player against estimated market value

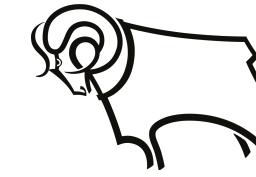


- A strong aspect of Bogle's game is his contribution of Deep Progressions p90, where he finished the 2019/20 season 4th (2.91), a metric in which Kane finishes slightly ahead with 2.94.
- For this analysis, the players were filtered for values of £2M or under according to TransferMarkt, to try and find players within Derby's budget.
- £2M was chosen as this is approximately half the estimated of the players we are replacing.
- Kane is 27 years of age and value at £720k according to TransferMarkt. He is potentially an under-valued right-back.
- We can also see highlighted Nathan Byrne (blue) who Derby went on to sign from Wigan Athletic on September 10th 2020 as a replacement for Bogle. He also scores highly in the Deep Progressions metric (2.87).

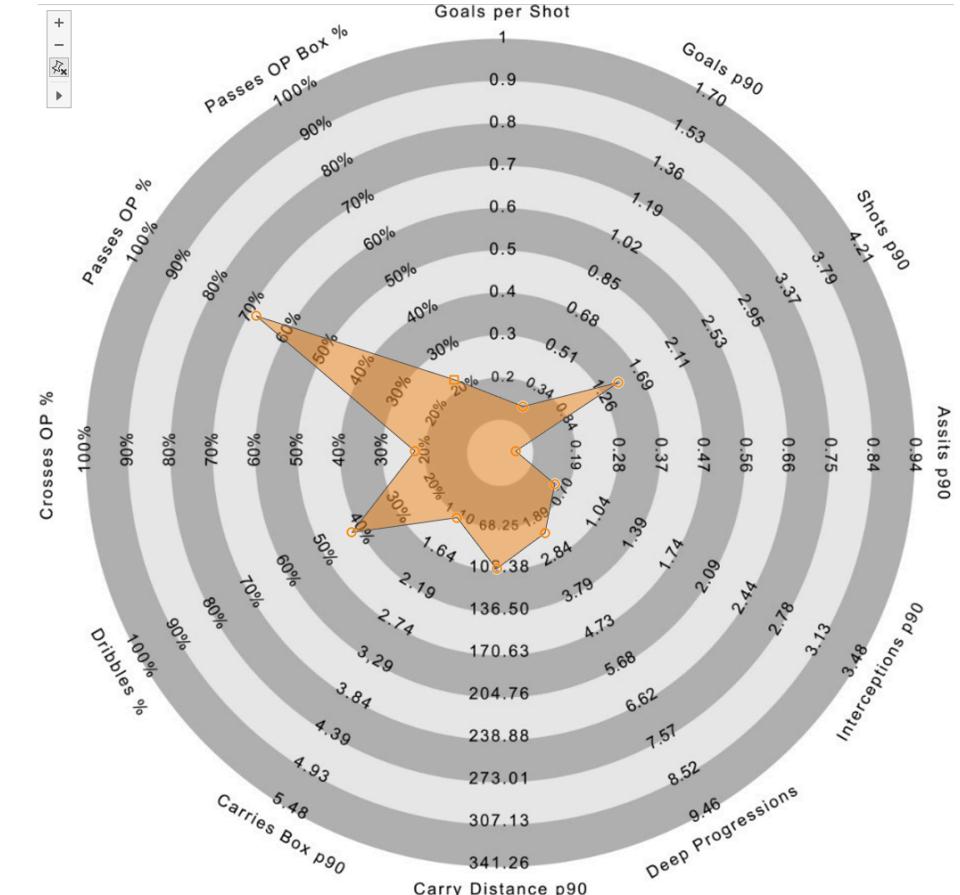
Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.
All players have been filtered for Full-Back; Right, Both, or Null foot; and have played at least 10 matches (900 minutes)

Right-Winger Recommendation 4: Josh Harrop

Player profile



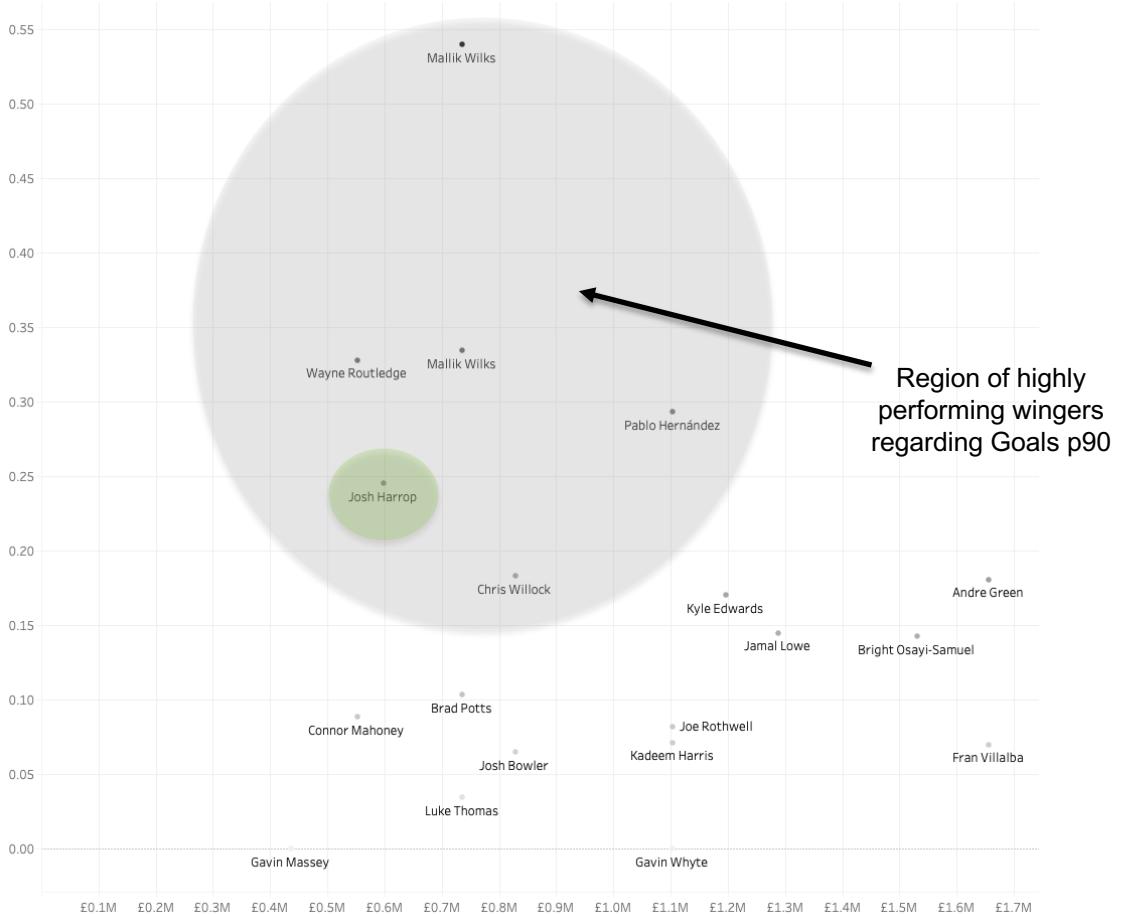
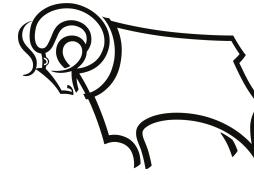
- DoB:** 15/12/1995
- Age:** 24
- Place of birth:** Stockport
- Foot:** Right
- Height:** 1.75m
- Nationality:** English
- Senior International caps (goals):** 0 (0)
- Main position:** Right-Winger
- Other position(s):** Attacking-Midfield
- Total appearances for Preston in all competitions:** 88
- Goals for Preston:** 13
- Assists for Preston:** 5
- Estimated market value:** £585k



Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.

Winger Recommendation 4: Josh Harrop

Goals per 90 Player against estimated market value

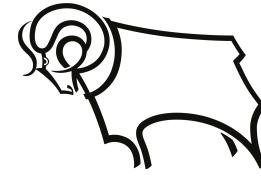


- A strong aspect of Lawrence's game is his goal contribution to the team with 0.252 Goals per 90 minutes (13th in the Championship for 2019/20), a metric in which Harrop finishes slightly behind with 0.245 Goals per 90 minutes.
- For this analysis, the players were filtered for values of £2M or under according to TransferMarkt to try and find players within Derby's budget.
- Harrop is 24 years of age, much younger than other stronger performers for Goals per 90 minutes that are also under £2M such as Pablo Hernandez (35) of recently promoted Leeds United and Wayne Routledge (35) of Swansea City.
- Mallik Wilks of Hull City was also considered due to his strong statistics for Goals p90 (0.874) and Deep Progressions (96.8). However, he is considered a Left-Winger according to TransferMarkt and was therefore discounted in this analysis to find a direct replacement for Lawrence on the right-wing. He could however prove a good signing on the left-wing, a position in which Derby are also light, or be converted to a right-winger. Wilks is valued at £720k according to TransferMarkt.

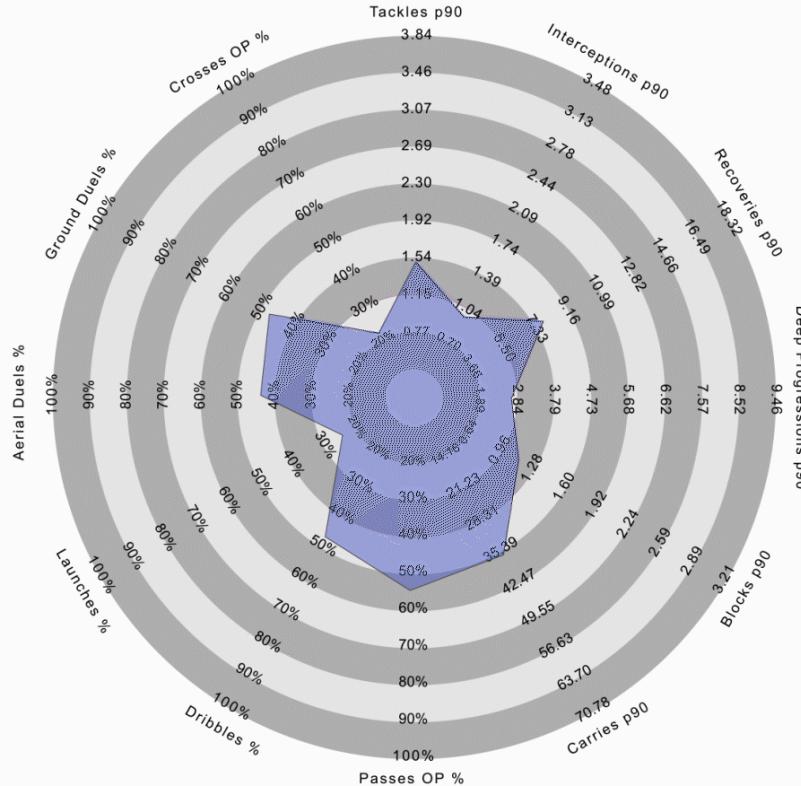
Player performance data provided by 21st Club and estimated market value data provided by TransferMarkt. Correct as of 16th September 2020.
All players have been filtered for Winger; Right, Both, or Null foot; and have played at least 10 matches (900 minutes).

Right-Backs Summary

Comparison of Bogle and the four scouted players



Right Backs



Jaydon Bogle

Age 20

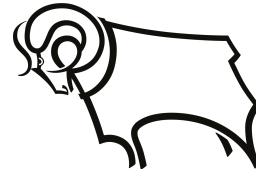
Market Value £5,670,000

Club

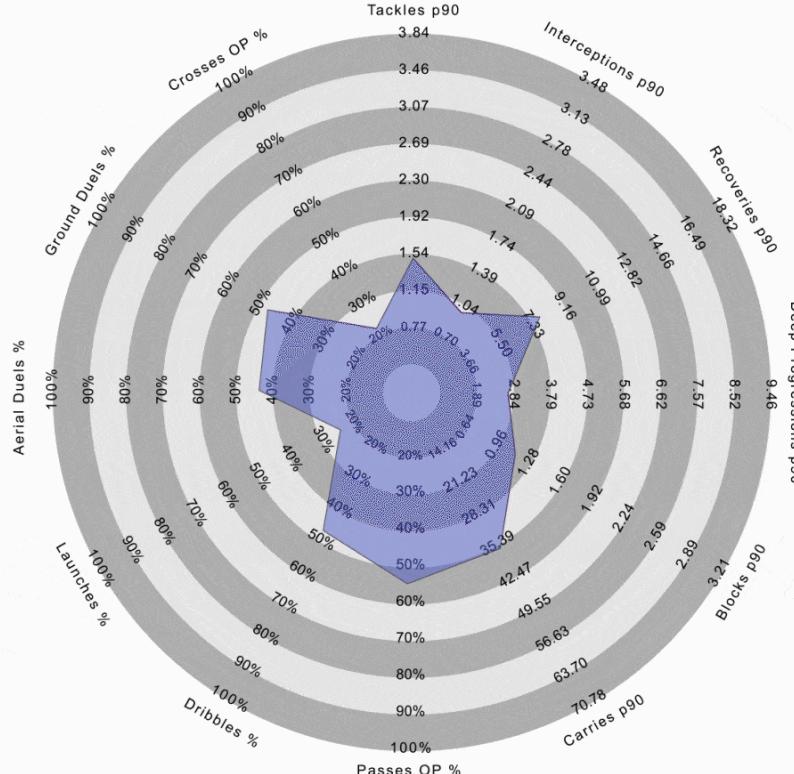


Right-Wingers Summary

Comparison of Lawrence and the four scouted players



Right Wingers



Tom Lawrence

Age 26

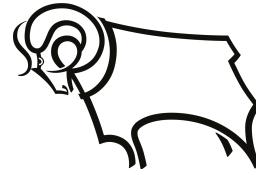
Market Value £4,320,000

Club

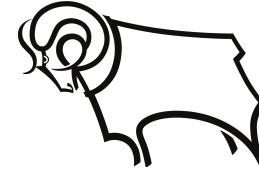


Next Steps...

Examples of analysis I plan/wish to conduct with more time and/or data



- Formation analysis – further analyse player that fit into certain playing styles e.g. three-at-the-back formations, 4-3-3, strikers that play in a two, etc. This data has been provided but was not used as part of the recruitment recommendation, due to time constraints.
- Principle Component Analysis (PCA) of players similarity. Potentially try and find the metrics most associated to players with a higher TransferMarkt value. This would require most likely require significant volumes of Event data.
- Further improvement of the Knutson radars [\[link\]](#) of player metrics. Certain metrics could be standardised better with more time. Improved metrics could be included, such as: Expected Goals (xG), Expected Assists (xA), xGBuildup, and Expected Threat (xT) metrics and subsequent derived metrics such a Pressures. The radars would all benefit from possession adjustment of certain metrics.
- Continue to enrich the data with additional datasets. In this example we added TransferMarkt financial estimation data to the player performance data provided by 21st Club. Other data sources and vendors include: StatsBomb, Opta, Wyscout, WhoScored?, Understat, to name but a few.



Appendix

For More Information

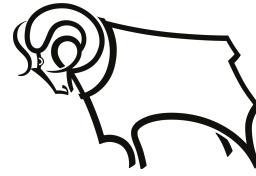
If you would like to find out more...



- Tableau Public profile: public.tableau.com/profile/edd.webster. See the dashboard titled 'Edd Webster Derby County Data Analysis' for all the visualisation featured in this deck.
- GitHub:
 - General: github.com/eddwebster
 - Football analytics specifically, including all notebooks to scrape, wrangle and engineer the data used in this notebook:
github.com/eddwebster/derby_county_data_task
- Website: eddwebster.com
- LinkedIn: linkedin.com/in/eddwebster
- Twitter: [@eddwebster](https://twitter.com/eddwebster)
- Email: edd.j.webster@gmail.com



References



Player profile Information:

- Jayden Bogle: <https://www.transfermarkt.co.uk/jayden-bogle/profil/spieler/465717>
- Tom Lawrence: <https://www.transfermarkt.co.uk/tom-lawrence/profil/spieler/229970>
- Luke Ayling: <https://www.transfermarkt.co.uk/luke-ayling/profil/spieler/67420>
- Jarrod Bowen: <https://www.transfermarkt.co.uk/jarrod-bowen/profil/spieler/314875>
- Djed Spence: <https://www.transfermarkt.co.uk/djed-spence/profil/spieler/483348>
- Bright Osayi-Samuel: <https://www.transfermarkt.co.uk/bright-osayi-samuel/profil/spieler/358948>
- Callum Brittain: <https://www.transfermarkt.co.uk/callum-brittain/profil/spieler/416368>
- Marcus Harness: <https://www.transfermarkt.co.uk/marcus-harness/profil/spieler/288323>
- Todd Kane: <https://www.transfermarkt.co.uk/todd-kane/profil/spieler/154287>
- Josh Harrop: <https://www.transfermarkt.co.uk/josh-harrop/profil/spieler/289844>

Data Sources:

- Player performance data from [21st Club](#)
- Estimated player valuations data from [TransferMarkt](#)

Visualisation:

- Knutson Radars [[link](#)]

Key Python libraries used:

- [pandas](#)
- [Matplotlib](#)
- [Beautiful Soup](#)
- [Record Linkage](#)

Python APIs:

- [Tyrone Mings TransferMarkt scraper by FCrSTATS](#)