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Influence of competitive intensity on stadium attendance. An analysis of the French football *Ligue 1* over the 2009-2019 period through a visualization system.

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Abstract

The relationship between competitive balance or intensity and venue attendance has been extensively tested in the literature. These studies have used complex metrics and econometric testing. This does not favor their understanding and application by managers. This article investigates, over a 10 years period (2009-2019), the influence of competitive intensity on stadium attendance for the French men's football *Ligue 1* through a visualization approach. The use of this method provides visual information via a single chart per season about the influence of competitive intensity on attendance, depending on the moment in the season and the sporting stakes. This means that managers can look at relevant information in one single chart. The article shows the positive influence on attendance of competitive intensity in relation to the different sporting stakes, consistent with previous studies. The visualization approach makes the results easy to grasp for managers, facilitating the identification of managerial implications.

Keywords

Visualization approach – Competitive intensity – stadium attendance – football – French *Ligue 1*

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Introduction

Over the course of the 20th century, spectator team sports strongly increased their commercialization and revenues in the US and Europe¹. Such revenues come from the spectators themselves but also businesses such as TV broadcasters and sponsors. The first buy tickets (and merchandise) to attend an emotional show, an entertainment organized during a whole season. The second aim to invest money in a growing but uncertain business. Both managers and scholars have aimed for many decades to understand the key success factors of professional team sports². The central questions asked by stakeholders are: how to ensure that the product (a match, a season, a cup) will keep on being attractive for spectators? How to enlarge the fan base? How to maximize attendance? These are questions of interest because fans are at the heart of the system. They buy tickets to attend a game in the stadium, they subscribe to watch the championship or a single match on television, they purchase licensed products and the more spectators there are in the stadium, the more valuable are the sponsorship deals for the clubs. Then, it became a strategic element to understand how spectators value a match or a season perceived as a product and compared to alternatives³. As with any business, spectator sports must offer a product or service that has value to the market. A company that offers higher value to customers than its competitors can expect superior financial rewards⁴.

In sports economics, a central question over the last decades has been about the relationship between, on one hand, the overall organization and structure of the league and the competition on the field between the different teams involved in the championship and, on the other hand,

attendance⁵. Concepts such as competitive balance and competitive intensity have long been studied⁶. For many years, an important perspective has been to test whether a strong competitive balance or intensity creates higher entertainment value for customers, leads to more tickets sold and confirms the uncertainty of outcome hypothesis, consistent with the assumption made in seminal articles⁷.

Over the last 50 years, numerous studies have been published in order to explain fan attendance. Most of them were dedicated to team sports championships. Boyd and Krehbiel⁸ examined factors influencing game attendance for Major League Baseball (MLB) teams. Falter and Perignon⁹, and Garcia and Rodriguez¹⁰ examined predictors of individual match attendance for the French and Spanish men's football leagues, respectively. Several studies were also conducted by Scelles, Durand, Bonnal, Goyeau and Andreff¹¹, and Andreff and Scelles¹² on the French men's football *Ligue 1* over the 2008-2011 period. These authors examined the predictors of stadium attendance with a focus on the competitive intensity of the championship, including the league standing effect. Competitive intensity has been also studied by Kringstad and Gerrard¹³, Scelles, Desbordes and Durand¹⁴, and Scelles, Durand, Bah and Rioult¹⁵, these authors been focused on how to measure it rather than its impact on fan demand.

Due to the high number of studies testing the relationship between competitive balance or intensity and venue attendance, and because of the large diversity of samples, sports and championships tested so far, one may think that reaching additional original findings is difficult. However, many of these studies used econometric testing in order to test the relationship between these different variables. This method presents some undeniable advantages: this is in line with the great rigor expected in an academic research, delivers data that allow very precise comparisons over time and between different case studies (i.e. different championships, events, etc.) and provides the feeling of a "true picture". Nevertheless, the biggest disadvantage of this method is that it may limit the spread of the findings to the scientific community. In other words,

unless being popularized by their authors, these very technical and sometimes abstruse researches do not appear as being directly usable by managers of sport organizations who look for observations, facts, and useful and more intuitive ideas to make their products more attractive and valuable.

This article investigates the influence of competitive intensity on stadium attendance in using the visualization approach. The latter is not based on complex metrics and provides original findings that are complementary to previous studies, while being also easier to grasp for managers. The key originality and contribution of the visualization method is its ability to bridge the gap between research and practice, as explained further in the methods and discussion sections of the paper. It provides managers with relevant and simple information in a single chart, facilitating the identification of managerial implications. This approach has already been used in several articles developed in different areas (in finance in comparing stock indexes, in economy in comparing GDP of countries and companies, in education in comparing performance of worldwide universities). Nevertheless, to the best of the authors' knowledge, this is the first time that the method is applied to the professional sport context in order to analyze the influence of competitive intensity on stadium attendance, making the present research an original contribution to the literature. This paper examines, for a 10 years period (2009-2019), the influence of competitive intensity on stadium attendance for the French men's football *Ligue 1*. The use of this method provides original findings, presented and discussed in this article. These findings relate to visual information about the influence of competitive intensity on attendance, depending on the season, the moment in the season and the sporting stakes.

Literature review

Factors affecting fan demand and attendance

Because stadium attendance is a key element of spectator sports and their revenues, many studies put this criteria in a central position. Some articles considered the total league

attendance¹⁶, while some others paid attention to match attendance¹⁷. Laverie and Arnett¹⁸ studied regular season attendance for one team. O'Reilly and Nadeau¹⁹ considered attendance as a predictor of the revenue generated by a club. Zhang et al.²⁰ examined fans' likelihood to attend or watch a game.

One of the main concerns of academics has been to understand the different factors that influence attendance, as well as the motives of sport spectators. The sports marketing specialists have traditionally studied factors that affect fan demand from the consumers' perspective. Laverie and Arnett²¹, and Arnett and Laverie²² used consumer behaviour theories to examine attendance as a function of fan identity. Following the model originally developed by Noll²³, Robinson and DeSchrive²⁴ looked at the demographic differences between the fans of two teams competing in the National Professional Soccer League. In their study, market size and household income were found to be statistically significant in predicting attendance, as well as team standings in the league. Based on a survey using principal component analysis, Hansen and Gauthier²⁵ identified 10 factors that affect either game or season attendance. Kim et al.²⁶ and Zhang et al.²⁷ asked residents about factors that determine their attendance at sporting events. Others studies investigated various factors that influence attendance at a game, including game day atmosphere. Others studies in the literature focused on the role of fan loyalty and different criteria such as fan gender (Fink et al.²⁸) and perceived value (Kim et al.²⁹). Although these studies can be considered as some important contributions to the understanding of factors that affect stadium attendance, one could assume that managers of sport organizations (especially leagues and clubs) may face some difficulties in considering these data as component of their development strategies. In other words, the use of sophisticated statistical models rather than data or figures easier to grasp may limit the spread of the findings and lead to theoretical discussions rather than managerial decisions, despite the efforts made by some authors to derive managerial implications.

Competitive balance and competitive intensity: two key indicators only measured through metrics

From a marketing perspective, it is acknowledged that the attractiveness of a product is strongly related to its perceived value. Thus, attendance in spectator sports is likely to be influenced by the intrinsic quality of the play, uncertainty of outcome, top players on the field and the sporting stakes associated to a given match. Since 1956 and the seminal article by Rottenberg³⁰, many sports economists have considered that the attractiveness of a sport, a league, a season or a game is based on one major criteria: competitive balance (CB). CB is defined as the degree by which teams in a given league are evenly matched in terms of playing talent. Numerous works have examined this concept ³¹ strongly related to the uncertainty of outcome. A perfectly balanced league is where every team has the same numbers of wins, draws and losses. If competitive balance is an efficient predictor of stadium attendance, we would notice a decrease in league attendance as competitive balance deteriorates. Outcome uncertainty leads to a more exciting season and thus a higher perceived entertainment value ³². Fans are more likely to attend a game when the outcome is in doubt than when the outcome is perceived as a foregone conclusion ³³. With a different approach, Zhang et al.³⁴ developed a factor to measure fans' perceived attractiveness of a match. In these studies, match uncertainty is statistically significant in explaining attendance.

A key question related to CB is how to measure it. In the literature, CB is measured at the match, seasonal and championship (over several seasons) levels³⁵. CB is often measured at the seasonal level, based on the number of points won by the teams in a national league. Michie and Oughton³⁶ use HICB (Herfindahl Index of Competitive Balance) and the Gini index to capture the overall level of CB in a league. The rationale is that these measures are supposed to make possible comparisons between leagues with a different number of competitors³⁷. However, they do not control for the most unequal distribution in terms of the shares of points,

depending on the number of teams, as done in recent publications³⁸. Even when doing so, CB does not capture the evolution of outcome uncertainty during the season and remains a static measure. Neale³⁹ developed an original concept in order to explain fan attendance. The league standing effect refers to the daily changes in the ranking or the daily changes in the possibilities of changes in the standings. The closer the standings are, the most frequently the standings change, the more spectators there will be in stadium to attend the games. This concept, which is more dynamic than competitive balance, has been studied by Andreff and Scelles⁴⁰ who investigated the league standing effect in the French *Ligue 1* over the 2008-2011 period.

Furthermore, Kringstad and Gerrard⁴¹ considered competitive intensity (CI) as a concept capturing the league standing effect. CI is measured by the point difference for a team in relation to ranks with sporting stakes. Thereby, this concept appears as a relevant tool when “*there is a multi-prize system that brings teams into a number of subtournaments*”⁴². The prize is not only winning the championship but also, in Europe, qualifying for UEFA European competitions, avoiding relegation and being selected for the playoffs. Regardless of a criticism sometimes expressed in the literature about the importance given to the respective prizes⁴³, the definition of competitive intensity refers to the degree of competition within the league or tournament with regard to its prize structure.

Over time, this concept took a growing importance in analyzing the value of spectator sports. Scelles, Desbordes and Durand⁴⁴ measured intra-league competitive intensity, while Scelles, Durand, Bah and Rioult⁴⁵ measured intra-match competitive intensity. Then, Scelles, Durand, Bonnal, Goyeau and Andreff⁴⁶ tested and confirmed the positive impact of intra-league outcome uncertainty linked to sporting stakes on fan attendance in the French *Ligue 1* over the 2008-2011 period, while Scelles⁴⁷ found a similar result but on TV audience in the English Premier League in 2013-2014. More recently, Bond and Addesa⁴⁸ confirmed these results for the Italian Serie A over the 2012-2015 period, while also finding that attendance increases when

the home team performs better than expected preseason. Also, Wagner, Preuss and Könecke⁴⁹ developed a new model to measure ex-post competitive intensity.

In summary, the concept of competitive intensity encompasses competitive balance, uncertainty of outcome and sporting prizes. Besides, Scelles et al.⁵⁰ found that, contrary to competitive intensity, competitive balance between both teams before a game had an insignificant impact on fan attendance. Thus, competitive intensity can be considered as a relevant concept to capture the value of a sport championship from an economic and marketing perspective, with a view of explaining fan attendance.

Using the visualization approach to derive original findings

In this article, the central research question is: can the influence of competitive intensity on fan attendance be visualized? In other words, is visualization a credible alternative to a statistical approach when it comes to look at the influence of competitive intensity on fan attendance? If so, the following sub research questions are of interest:

1. Is this influence visualized for every season of a given championship?
2. Is this influence visualized all the season long or only at key moments?
3. Is this influence visualized for every prize?
4. Is this influence visualized for every club?

Methods

Information visualization approach as a research method

The information visualization (InfoVis) domain emerged formally in the late 1980s from the computer human interaction community. It is defined as the study of visual representations of abstract data to reinforce human cognition. However, researchers reckon previous works using ink and paper instead of computer as contributions of the field (William Playfair's work on line graphs in 1786 is often cited as the first one). The field has been organized around the Vis (for Visualization) conference and the IEEE Transactions on Visualization and Computer Graphics

journal (TVCG) from the early 1990s, along with two other domains. The first companion domain is Visual Analytics (VAST) which focuses on problems that integrate data analysis algorithms and visual interfaces to support data analysis and analytical reasoning. The second companion domain is Scientific visualization (SciVis or Vis) which typically focuses on the visualization of data related to science and engineering. InfoVis relates to the design or evaluation of new or improved visual encodings or interaction techniques of abstract data. Almost all papers from the Vis conference are published in the TVCG journal. The whole visualization community (InfoVis + VAST + SciVis) can be estimated as gathering 5000+ researchers (authors of articles) and 6000+ articles. The online public database of the Vis conference alone contains 3101 articles (<http://keyvis.org>). The keyvis site allows for online search (e.g. on sport analytics). Specifically on sport data visualization, a recent survey paper⁵¹ synthesizes the recent advances (98 articles).

The heart of every information visualization system is the choice of a spatial representation for the information. The prior step of cleaning and organizing the data into information is also part of the field, as well as the later step of designing visual attributes (i.e.: line widths, colors, point sizes, etc.). These steps are well known in the field and are often called the Infovis pipeline after Card, Mackinlay and Shneiderman⁵². The field also extends from models (like taxonomies of data structures, user models, perception models and tasks models) to evaluations (from lab experiments to measure and compare performances to case studies to report valuable feedback on usability and usefulness with end users). However, the value of visualization to other fields is somehow tricky to quantify. Fekete et al.⁵³ argue that it can be seen in the exploration phase, when no clear hypothesis is yet settled. At this early stage, the value of information visualization is to help find a hypothesis. When this hypothesis can be expressed, then statistics are well suited to validate or invalidate it. Information visualization is also known to be valuable at the

latest phase, when data scientists want to present and convince others about a discovery in the data.

Data collection

Data was collected and cross checked from several sources. We first used rsssf (rsssf.com, The Rec.Sport.Soccer Statistics Foundation), a text based source of many football championships to compute points and rankings at every championship day. We then used the official Ligue 1 website (lfp.fr) to cross check the number of points and goal differences (for every team and every championship day). Last, we manually copied stadium attendance of every championship day from the official Ligue 1 website and reported this attendance to the team playing at home for this match. In total, we gathered 3800 match data (38 days x 10 matches played at home x 10 seasons).

Data analysis

Figure 1 helps illustrate the visualization chart used and its advantages over other charts. We used a graph called Gap Chart to perform our analysis. A Gap Chart encodes the gap of points between a set of competitors over a season in a championship (x axis always represents time). Comparatively Rank Chart only encodes the rankings so it does not show competitive intensity. Slope Graph encodes the raw number of points so it produces some overlapping when multiple competitors share the same number of points. A numeric table of points is displayed to compare readability. In the fictive championship between six countries illustrated in Figure 1, Gap Chart allows to identify clearly when two competitors have the same number of points because the two corresponding curves then touch each other (illustrated by the two red circles). One can also spot when two competitors keep the same gap of points between each other and evaluate this gap as it is proportional to the white space between curves (illustrated by the red polygon). The white space between curves is very important in Gap Chart. A constant white space shows

a constant gap between teams, but one can also track increasing or decreasing gaps. The white space can also be visually quantified.

FIGURE 1 NEAR HERE

In the 10 seasons of the Ligue 1 presented later in this article, grey lines are added within this white space to highlight packs of three points. When one can see two grey lines cutting the white space into three parts, it means that the lowest ranked team needs at least three wins to catch up with the highest ranked team (if this latter team loses three times in a row). Together with the proximity of the right border (end of the championship) and the colored background (prizes, explained below), one can evaluate when a team is not in contention anymore to reach a prize. In the example in Figure 2 corresponding to the end of the first half of the 2016-2017 Ligue 1 season, the first three ranked teams (Nice, Monaco and Paris, with a blue background because they would reach the Champions League if they remain in the top 3) are followed by a fourth team (Lyon, not with a blue background because only the first three ranked teams will reach the Champions League). However, the grey lines within the red rectangle show how the gap is shrinking over time. When two grey lines are visible on the left, it means Lyon is more than six points away from Paris and needs more than two games to catch up. At first, the gap remains constant and the two lines remain visible. Then, one of the two lines disappears and just after the second line also disappears so it means the gap is shrinking. Finally, the gap without grey line remains constant on the right (not in the red rectangle). However, another gap appears below Lyon (in the yellow background, first with one grey line then with a second grey line).

FIGURE 2 NEAR HERE

Gap Chart is also a good visualization tool to observe when curves crossed each other, e.g. for counting how many times two curves are crossing. One can see in the example in Figure 1 that the two grey curves (Italy and Portugal) are crossing each other two times, similar to the yellow

curves (Spain and Germany), while the two green curves (France and England) cross each other only one time (early in the championship). The Gap Chart layout is well suited to analyze competitive intensity, with the curve color remaining free to highlight another variable. In this article, we used color to highlight stadium attendance in order to explore how competitive intensity influences it. To do so, we first computed the average attendance in the first half season for every stadium. Stadium attendance is then reported only in the second half season (matchdays 20 to 38), relative to the computed average. As color plays the role of highlighter, we chose a dual color scale coding (blue and red).

Teams are colored in white when they play away. They are colored blue when they play at home and the stadium attendance is larger than the computed average of the first half season for this particular team. Different shades of blue encode if the attendance is only slightly better (light blue) or strongly better (dark blue). Over 20% above the computed average, the darkest blue applies. The same applies for attendances under the average of the first half season but shades of red are used instead.

Using a local average computed on the first half season helps to mitigate the effect of several variables like new or enlarged stadiums and new players (although some can still arrive at half season). Meteorological variables are also partially mitigated as the two half-seasons contain both cold and warm periods. Besides, it can be considered that the first half of the season is less relevant to tackle competitive intensity due to the impact of the outcomes and gaps between teams likely to be perceived by fans as less decisive for the final ranking than in the second half, when more is at stake ⁵⁴. Thus, we can assume that because the end of the season is still quite far, fans consider that sporting stakes are not so significant and they have not a strong influence on fan attendance. Moreover, during the first quarter of the season, the point differences between teams are not important and fans know that the current standings are likely to change several times during the next days. This is why one can say that the influence of

competitive intensity on fan attendance is more likely to occur during the second half season, when sporting stakes become more obvious to fans.

When analyzing the data collected, one has to pay attention to the specific organizational structure of the French *Ligue 1*. The French championship is known to be part of the five strongest football championships in Europe (5th at the UEFA men's country ranking at the time of writing, UEFA being the Union of European Football Associations and its men's country ranking being based on the past results of the domestic clubs in European competitions, i.e. the Champions League and the Europa League). 20 teams are involved in the competition. The championship is organized over 38 game weeks. All the European football championships deliver prizes to the teams involved but the distribution is specific to each national championship and depends on the UEFA ranking. For the *Ligue 1*, prizes are delivered as follows:

- the best ranked team is champion and the first three clubs qualify for the next Champions League, the first two for the group stage and the third for the preliminary round (blue background in the Gap Chart);
- the fourth qualifies for the Europa League (as well as the winner of the *Coupe de France* or the fifth if this winner is one of the four best ranked teams);
- the fifth club (or the winner of the *Coupe de la Ligue* or the sixth) qualifies for the preliminary round of the Europa League (yellow background for the two Europa League prizes);
- the 18th club is involved in a relegation playoffs since 2016-2017;
- the last two clubs are relegated (three clubs before 2016-2017; red background for the relegation / relegation playoffs positions).

The visualization approach gives the opportunity to identify some trends and results that would not have been observed through a statistical approach. In particular, the influence of competitive

intensity (CI) on fan attendance may design an area of over-performance. This area can be triangular or rectangular shaped. For the triangular shaped area, the results will provide a number of cases where the vertex is oriented to the left (toward the beginning of the season) and the base is oriented to the right (toward the end of the season) and lined up in the last day of the championship. The meaning of such area of over-performance is that: i) the influence of CI on fan attendance increases (more teams involved) as the championship comes to the end; ii) the point of maximum influence of CI on fan attendance is reached at the last day of the championship. The rectangular shaped area represents a constant number of competitors during several days encompassed in the area of over-performance.

Results

The results section is structured as follows. A gap chart is provided for every season of the 2009-2019 period, with comments in relation to competitive intensity and its impact on stadium attendance for each one. The rationale for providing an account of every single season is to identify the similarities across seasons but also their peculiarities.

2009-2010

Figure 3 shows one single area of over-performance (more fans attending matches compared to the first half season for the same clubs). This area lasted 10 games until the end of the season, with teams competing for the title or a qualification in the European competitions. As Marseille won the *Coupe de la Ligue* but already qualified for the Champions League (being ranked first), the fifth (Montpellier) qualified for the preliminary round of the Europa League. This may explain its over-performance during the last home games. The over-performance of Lorient may be explained by its on-pitch performance being better than expected, despite the club having no chance to reach a prize during the last matches of the season. At the bottom of the table, there is no area of over-performance, consistent with the fact that the clubs relegated were already known for several games. There is a lot of red mid-table, consistent with the fact that the teams involved had no prize to compete for.

FIGURE 3 NEAR HERE

2010-2011

Figure 4 shows two different areas of over-performance. The first one relates to the teams competing for the qualification in the European competitions (last 12 games). The second one is about the teams (7) competing to avoid relegation (Lens and Arles-Avignon were relegated before the end of the season, then some fans gave up to support them). Lille (champion) did not strongly over-perform in terms of fan attendance, even when Marseille was competing for the championship, due to the number of fans already quite high since the beginning of the season.

FIGURE 4 NEAR HERE

2011-2012

Figure 5 shows two areas of over-performance but with two different situations compared to the previous season. The first one relates to the very intense competition between Montpellier and Paris to win the championship. This season is the first of the Qatar Sports Investments (QSI) era, QSI becoming the owner of Paris Saint-Germain a few months before. The over-performance of the club in terms of fan attendance can be related to the competitive intensity during the last days of the season. It is even higher for Montpellier. The first reason is that it was the first opportunity for the club to win the championship. The second reason is that the level of fan attendance in Paris was already high in the first half so, even if the club competed for the championship, it was not possible to gain much more attendees. Lyon is also an interesting case. It was a club used to qualify for the Champions League, being champion seven times in a row during the previous decade. Thus, a qualification for the Europa League was not considered particularly attractive by the fans, explaining why the club underperformed in terms of fan attendance.

The second area of over-performance is related to the teams (10) competing to avoid relegation and lasted 11 games. That season provided a good illustration of the influence of a high

competitive intensity related to the battle against relegation on fan attendance, with several teams in contention to avoid relegation over a sustained period.

FIGURE 5 NEAR HERE

2012-2013

Figure 6 shows two different areas of over-performance. This first one relates to the clubs competing for a qualification for the European competitions (lasting 11 games). The second is about the fight to avoid the relegation zone. This area encompasses 10 teams (9 when the fans of Brest knew their team was relegated three games before the end of the championship). Paris won the championship with a large gap (12 points) over Marseille. There was a low competitive intensity so the club did not strongly over-perform in terms of fan attendance (and the stadium was already almost full during the first half season).

FIGURE 6 NEAR HERE

2013-2014

Figure 7 presents two areas of over-performance in terms of fan attendance. The first one lasted 13 games and encompasses three teams fighting for the qualification to the European competitions: Lille qualified for the Champions League (preliminary round), and Saint-Etienne and Lyon (local rivals) for the Europa League. Marseille was in contention to qualify for the Europa League but underperformed as this result was not considered attractive enough by fans. The second area of over-performance relates to four teams in contention to avoid the third position leading to relegation (both Valenciennes and Ajaccio were relegated for several games so some fans stopped attending and the clubs underperformed).

FIGURE 7 NEAR HERE

2014-2015

Similarly to previous seasons, Figure 8 presents two main areas of over-performance. The first one (lasting 14 games) relates to the qualification in European competitions (6 teams having

the opportunity to qualify). The second one is centered on the competition between six teams fighting to avoid the third position leading to relegation. Lens and Metz were the first two clubs to be relegated (far from the lowest ranked team out of the relegation zone early, approximately 13 games before the end of the season). As a result, without any competitive intensity, these two teams underperformed.

This season is interesting to examine as the two areas of over-performance almost represent one single large area of over-performance encompassing 15 teams. This would have meant that the season provided a high level of competitive intensity for $\frac{3}{4}$ of the clubs. Only three cases of light underperformance prevented the single area of over-performance.

FIGURE 8 NEAR HERE

2015-2016

Figure 9 presents two areas of over-performance. In that season, the competition was intense for a direct qualification in the Champions League as well as in the Europa League. This first area of over-performance encompasses 1 to 5 different clubs from 11 matches before the end of the season to the final match. The second area of over-performance has a small-sized triangular shape, with 1 to 6 teams from 6 matches before the end of the season to the final match). This area mostly encompasses the teams in contention to avoid relegation.

FIGURE 9 NEAR HERE

2016-2017

Figure 10 is the only one in our sample that presents three different areas of over-performance. The high sporting performance of Monaco during that season increased the competitive intensity at the top of the ranking. This intensity had no influence on fan attendance for Paris as, similar to previous seasons, all the matches were already almost sold out. Monaco overperformed during a few home matches close to the end, but underperformed before despite its high sporting performance. However, Monaco is a special case in terms of fan attendance as its

fan base is quite narrow (58% of occupancy rate and an average of 9586 spectators during that season). Nice only over-performed during the last two home matches in the second half season. An explanation may be that the club was performing so well on the pitch during the first half (being even the best-ranked team at mid-season) that it was difficult to sustain such performance during the second half and over-perform in terms of stadium attendance.

The second area of over-performance lasted 8 matches and represents the 6 teams in contention for the qualification in the Europa League.

The last area encompasses the last 10 teams in the table. This is unusual as our sample shows that most of the time at least one team is (almost) sure to be relegated early before the end of the season. In that season, half of the teams still competed to avoid relegation almost until the end.

FIGURE 10 NEAR HERE

2017-2018

Figure 11 shows two different areas of over-performance. The first one lasted 6 matches and relates to the qualification for European competitions.

As the reader can see on the right, Rennes and Bordeaux finished fifth and sixth, respectively (in yellow), and qualified for the Europa League. The huge gap between ranks 4 and 5 shows a lack of uncertainty with regards to the identity of the first four teams, but there was competitive intensity between teams 2 to 4 on one hand, teams 5 to 8 on the other hand. The second area of over-performance relates to teams (up to 9) in contention to avoid relegation from 9 games before the end to the final match (Metz was already relegated early).

FIGURE 11 NEAR HERE

2018-2019

Figure 12 presents two different areas of over-performance. Similarly to previous seasons, there is no competitive intensity for the champion: Paris was far above the other teams since mid-season, with all matches almost sold out. The first area of over-performance is a large area that

encompasses from 1 to 12 teams from 10 matches before the end of the season to the end and represents the competition for the European competitions. The second area is triangular shaped and represents a total of 6 teams competing to avoid relegation. The examination of this chart also shows a “last game effect” as almost all teams over-performed during the 38th game of the season. This could be explained by many teams close to each other (less than 3 points), meaning the final match had a direct influence on their final position.

FIGURE 12 NEAR HERE

Discussion

In this research, a visualization approach has been used to assess the influence of competitive intensity (CI) on fan attendance. It is acknowledged that this approach does not consider several variables such as population, unemployment, team budgets, match broadcasted or not, household income like Scelles and al.⁵⁵ or Falter and Perignon⁵⁶. However, the use of the average attendance in the first half season as a baseline captures to some extent this information. In an attempt to answer the central research question (can the influence of CI on fan attendance be visualized?), four sub research questions have been addressed. The first one was: is the influence of CI on fan attendance visualized for every season? Our findings confirm this is the case. Thus, the influence of CI on fan attendance is not limited to a few seasons. In other words, CI has a sustained influence on fan attendance in the French men’s football *Ligue 1*. This is consistent with Andreff and Scelles⁵⁷ and Scelles et al.⁵⁸ but over 10 seasons instead of only 3. Another finding is more specifically related to the use of a visualization approach. The influence of CI on fan attendance designs, for every season, at least one area of over-performance. As mentioned in the methods section, this area can be triangular or rectangular shaped. The triangular shaped areas have been found in 8 out of the 10 seasons. The vertex is always oriented to the left (toward the beginning of the season) and the base is oriented to the right (toward the

end of the season) and lined up in the last day of the championship. As underlined earlier, the meaning of such area of over-performance is that: i) the influence of CI on fan attendance increases (more teams involved) as the championship comes to the end; ii) the point of maximum influence of CI on fan attendance is reached at the last day of the championship. As a reminder, the rectangular shaped areas relate to a constant number of competitors encompassed in the area of over-performance during several days. This shape has been noticed 7 times out of 10 seasons.

The second question was: is the influence of CI on fan attendance visualized all the season long? The duration related to the area of over-performance is also one of our findings. Our study only focused on the second half season. We have explained in the methods section why omitting the first half season is not only methodologically needed but also sensible (CI less likely to impact fan attendance then because less is at stake). The minimum duration observed is 6 match days and the maximum is 14. The average duration of an area of over-performance is about 10 days long. This means that the influence of CI on fan attendance can be approximately observed during $\frac{1}{4}$ of the championship. It is worth noting that we did not, prior analysis, define a time horizon for considering changes in the standings. We empirically observed that most of the time no club over-performed in terms of fan attendance when the point difference with the closest team was more than 9 (3 victories in a row), which is in line with Scelles et al.⁵⁹.

The third question was: is the influence of CI on fan attendance visualized for every prize? Three key prizes have been identified in our study : i) winning the championship; ii) qualifying for European competitions; iii) avoiding relegation. However, these three situations do not appear systematically for every season. For the *Ligue 1*, the most usual situation over the period studied is an influence of CI on fan attendance among teams competing for European competitions and avoiding relegation (7 seasons out of 10). The influence of CI on fan attendance for clubs competing to win the championship was quite rare (3 out of 10), as over

the last decade the champion was already known several days before the end of the season (7 times out of 10). The uncertainty about the future champion no longer exists. Then, there was no influence on fan attendance. Paris won the championship or was competing for the title 8 seasons over the 2009-2019 period. Because of both the attractiveness of the club and its famous players, almost all its matches were already sold out all the season long. As the stadium could not host more fans because it was already full, our study was unlikely to identify an area of over-performance for Paris, even when competing for (rather than being almost sure of) winning the championship.

In relation to the relegation zone (three direct relegations or two direct relegations and one relegation round since 2016-2017), it should be noted that the battle to avoid relegation has an influence on fan attendance. For example, during the seasons 2010-2011, 2013-2014, 2014-2015 and 2016-2017, two clubs were relegated quite early and underperformed during the last days of the championship in terms of fan attendance. Yet, there was still a high competitive intensity between several clubs to avoid the third position leading to relegation (or relegation playoffs) and this had a positive influence on fan attendance. A similar situation could be noticed for the seasons 2012-2013, 2015-2016 and 2017-2018, but to avoid not only the 18th but also the 19th position (only one team relegated early and not two).

In the end, the uncertainty of outcome in relation to the different prizes is a powerful predictor of fan attendance⁶⁰. As such, the competitiveness of the French clubs in European competitions is a key element to make the national championship uncertain and attractive. Indeed, their performance determines the number of clubs qualifying for the European competitions the coming seasons and these prizes have a significant impact on fan attendance.

The last question was: is the influence of CI on fan attendance visualized for every club? The first comment is that most of the teams observed a positive influence on fan attendance as soon as they competed for a prize with a high CI. By contrast, the impact was negative as soon as

they were not in contention anymore. However, there were some exceptions. In 2015-2016, Troyes over-performed in terms of fan attendance during its last three home games, despite the club being relegated. One can hypothesize that fans wanted to enjoy a few more *Ligue 1* games before the club was going to play in *Ligue 2* for an unknown duration. Another (complementary) explanation is that two of these games involved Reims (local rivalry) and Marseille (high attractiveness). Conversely, a high CI can have no influence on fan attendance if the sporting stakes do not meet fan expectations, consistent with Bond and Addesa⁶¹. For instance, in 2011-2012, Lyon underperformed in terms of fan attendance while the club was competing to qualify for the Europa League. This competition was less attractive than the Champions League for local fans used to the latter and, as a consequence, there was no influence on fan attendance. In the end, the influence of CI on fan attendance is visualized for every club but not every season, due to fan expectations moderating this impact.

Conclusion

Over the last 50 years, numerous studies have been published in order to explain fan attendance. A number of authors mentioned in the literature review examined the predictors of stadium attendance with a focus on the competitive intensity of a championship, including the league standing effect. The present study provides a complementary approach, using a visualization information system. The interest of this approach is to give an overview of the influence of competitive intensity on fan attendance over a season based on a single chart. Despite being a static chart, it represents the dynamics of competitive intensity and its impact on fan attendance over a season. Such dynamic dimension is absent in usual indicators of competitive balance and intensity relying on a single value. The single chart eases comparisons and the identification of similarities and differences across seasons, compared to traditional approaches based on sophisticated metrics and econometric testing.

Managers need to familiarize themselves with the approach to be able to identify the most relevant pieces of information and reflect on the changes they could make in the format of their competitions. However, this approach is much more accessible than findings provided by sophisticated metrics and econometric testing that require advanced skills. As such, managers can use it to communicate about the impact of competitive intensity on fan attendance and the rationale for their decisions to a large audience. Based on the gap charts provided for the French men's football *Ligue 1* over the 2009-2019 period, their managers could identify that there has never been a single area of over-performance in terms of fan attendance comprising all teams and sporting prizes. This is due to the recurrence of mid-table teams having nothing to compete for anymore towards the end of the season. As a consequence of the new UEFA Europa Conference League starting in 2021-2022, the fifth position now qualifies for this competition from 2020-2021. This may reduce the issue of mid-table teams without competitive intensity towards the end of the season but not necessarily remove it. A managerial implication may be to organize a playoffs for the Europa Conference League qualification, e.g. between the teams ranked 5 to 10.

The present research has been conducted for the French men's football *Ligue 1*. Similar studies could be conducted for other European championships. However, it is worth considering that the average occupancy rate in *Ligue 1* is 72% (source: LFP, 1st half of the 2019-2020 season, before the COVID-19 pandemic). This percentage is adapted to examine changes in fan attendance due to competitive intensity since it enables room for improvement in the second half season. Nevertheless, the situation is different in England for example. The average occupancy rate for the English Premier League was 94% during the season 2019-2020 (source: www.football365.fr). This means that this championship is very attractive and almost all the tickets of the fixtures are already sold out, regardless of the rank of the club and sporting prizes. As a result, the relationship between competitive intensity and fan attendance may be more

difficult to examine. In this case, another criterion than fan attendance should be selected in order to test the influence of competitive intensity on fans' interest. This opens the door for future studies where fan attendance may be replaced by demand for tickets, number of tweets from fans before/during a game, number of people who purchased a single pay-per-view match, number and monetary amount of bets on matches, etc. All these criteria are important economic and marketing factors for organizers of sports leagues. This makes the visualization approach in relation to competitive intensity applied to these factors a relevant direction for further research.

Notes

1. Andreff, Staudohar, 'The evolving European model of professional sports finance'
2. Rascher et al., 'The unique economic aspects of sport'
3. Deighton, 'The consumption of performance'
4. Hunt, 'A general theory of competition'
5. Fort and Maxcy, 'Comment'; Valenti et al., 'Attendance in elite women's football'
6. Andreff, Scelles, 'Walter C. Neale 50 years after'; Plumley et al., 'Mind the gap'; Plumley et al., 'The unintended consequences of financial fair-play'; Ramchandani et al., 'A longitudinal and comparative analysis of competitive balance'; Scelles et al., 'Competitive balance versus competitive intensity'; Scelles et al., 'Determinants of competitive balance'
7. Rottenberg, 'The baseball players' labor market'; Neale, 'The peculiar economics of professional sports'; Sloane, 'The labour market in professional football'
8. Boyd, Krehbiel, 'Promotion timing in major league baseball'
9. Falter, Perignon, 'Demand for football and intramatch winning probability'
10. Garcia, Rodriguez, 'Determinants of football match attendance revisited'
11. Scelles et al., 'Competitive balance versus competitive intensity'; Scelles et al., 'My team is in contention'; Scelles et al., 'Do all sporting prizes have significant positive impact'
12. Andreff, Scelles, 'Walter C. Neale 50 years after'
13. Kringstad, Gerrard, 'The concepts of competitive balance'; 'Theory and evidence on competitive intensity'
14. Scelles et al., 'Marketing in sport leagues'
15. Scelles et al., 'Intra-match competitive intensity'
16. Baade, Tiehen, 'An analysis of major league baseball attendance'; Noll, 'Attendance and price setting'; Wells et al., 'Attendance at division II football games'
17. Buraimo et al., 'Attendance demand in a developing football market'; Storm et al., 'The complex challenge of spectator demand'; Valenti et al., 'Attendance in elite women's football'; Welki, Zlatoper, 'US professional football'
18. Laverie and Arnett, 'Factors affecting fan attendance'
19. O'Reilly and Nadeau, 'Revenue generation in professional sport'
20. Zhang et al., 'General market demand variables'
21. Laverie and Arnett, 'Factors affecting fan'

22. Arnett and Laverie, 'Fan characteristics and sporting event attendance'
23. Noll, 'Attendance and price setting'
24. Robinson and DeSchrive, 'Consumer differences across large and small market teams'
25. Hansen and Gauthier, 'Factors affecting attendance'
26. Kim et al., 'Market segmentation in the K-League'
27. Zhang et al., 'General market demand variables'
28. Fink et al., 'Environmental factors associated with spectator attendance'
29. Kim et al., 'Market segmentation in K-League'
30. Rottenberg, 'The baseball players' labor market'
31. Baird et al., 'Dominance in college in football' ; Bennet et al., 'Telecast deregulation' ; Fort and Maxcy, 'Comment' ; Fort and Quirk, 'Pay dirt' ; Groot, 'Economics, uncertainty and European football' ; Humphreys, 'Alternative measures of competitive balance'; Scelles et al., 'Determinants of competitive balance' ; Scully, 'The business of Major League Baseball' ; Szymanski, 'The economics design of sporting contests'
32. Whitney, 'Winning games versus winning championships'
33. Scully, 'The business of MLB'
34. Zhang et al. 'General market demand variables'
35. Szymanski, 'The economic design of sporting contests'
36. Michie, Oughton, 'Competitive balance in football'
37. Plumley et al., 'Mind the gap'; Plumley et al., 'The unintended consequences of financial fair-play'; Ramchandani et al., 'A longitudinal and comparative analysis of competitive balance'
38. See e.g. Scelles et al., 'Determinants of competitive balance'
39. Neale, 'The peculiar economics of professional sports'
40. Andreff, Scelles, 'Walter C. Neale 50 years later'
41. Kringstad, Gerrard, 'The concepts of competitive balance'; 'Theory and evidence on competitive intensity'
42. Andreff, Scelles, 'Walter C. Neale 50 years later', 825
43. It has been assumed that all the prizes in a national championship do not have the same value: the sporting prizes at the top of the standing would be more attractive than the challenge of avoiding relegation. This is the reason why Pawlowski or Kringstad and Gerrard suggested weightings for the European men's football leagues. The latter authors considered 1 for title, $1/1.5^2$ for direct entry to the Champions League, $1/1.75^2$ for

- entry to the Champions League qualifying rounds, $1/2^2$ for entry to the Europa Cup (League now) and $1/3^2$ for relegation. Pawlowski, 'Testing the uncertainty of outcome hypothesis'
44. Scelles, Desbordes, Durand, 'Marketing in sport leagues'
 45. Scelles et al., 'Intra-match competitive intensity'
 46. Scelles et al., 'Competitive balance vs competitive intensity'; 'My team is in contention' ; 'Do all sporting prizes have significant positive impact'
 47. Scelles, 'Star quality and competitive balance'
 48. Bond and Addesa, 'TV demand for the Italian Serie A' ; 'Competitive intensity'
 49. Wagner et al., 'Measuring competitive intensity in sports leagues'
 50. Scelles et al., 'Competitive balance vs competitive intensity'
 51. Perin et al., 'State of the Art of Sports data visualization'
 52. Card et al., 'Readings in information visualization'
 53. Fekete et al., 'The value of information'
 54. Scelles, 'Star quality and competitive balance'
 55. Scelles et al., 'Competitive balance versus competitive intensity' ; 'My team is in contention' ; 'Do all sporting prizes have a significant positive impact'
 56. Falter, Perignon, 'Demand for football and intramatch winning probability'
 57. Andreff, Scelles, 'Walter C. Neale 50 years later'
 58. Scelles et al., 'Competitive balance vs competitive intensity' ; 'My team is in contention' ; 'Do all sporting prizes have a significant positive impact'
 59. Scelles et al., 'My team is in contention' ; 'Do all sporting prizes have a significant positive impact'
 60. Scelles et al., 'Do all sporting prizes have a significant positive impact'
 61. Bond and Addesa, 'Competitive intensity'

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Figure 1 Different charts used in the visualization approach

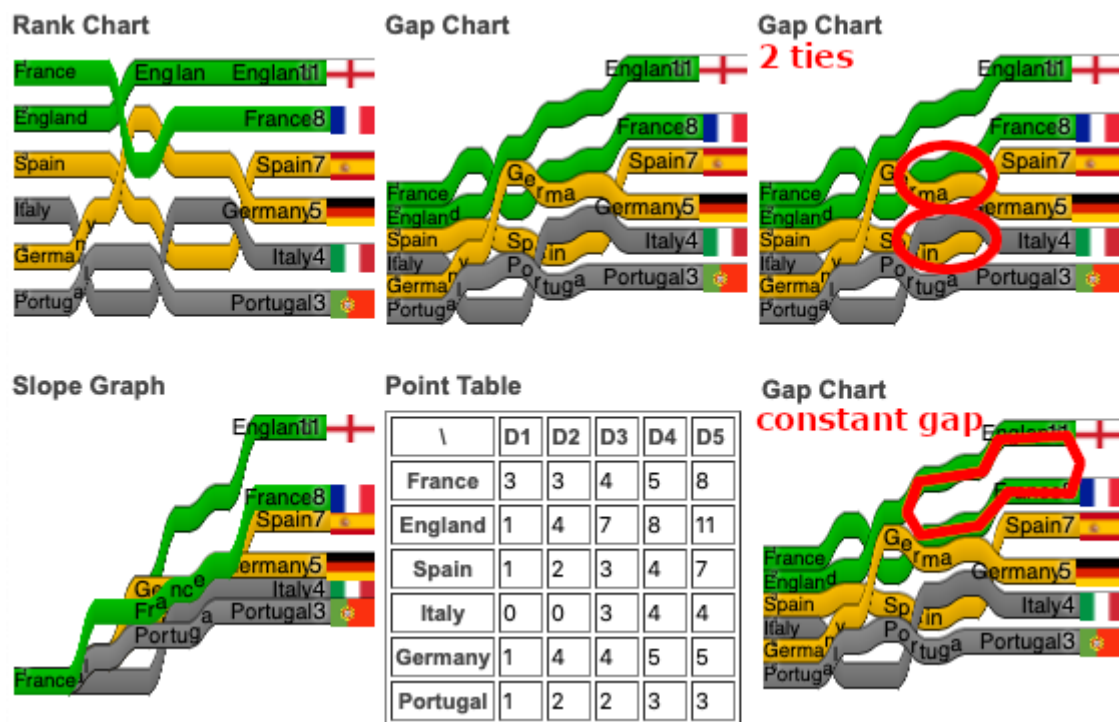


Figure 2 Illustration of how the Gap Chart works

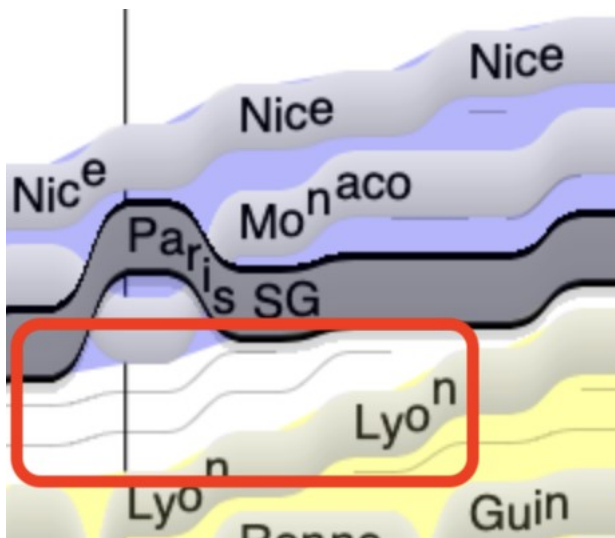


Figure 3 Gap Chart, 2009-2010

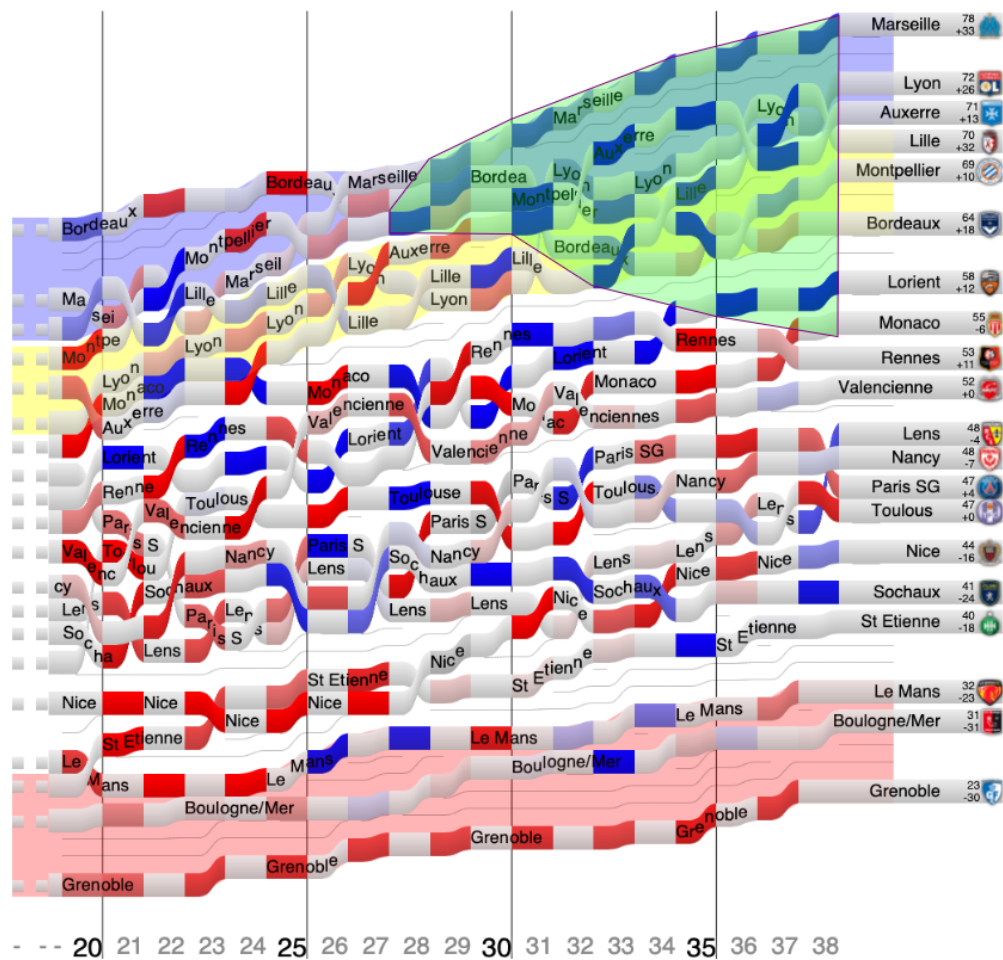


Figure 4 Gap Chart, 2010-2011

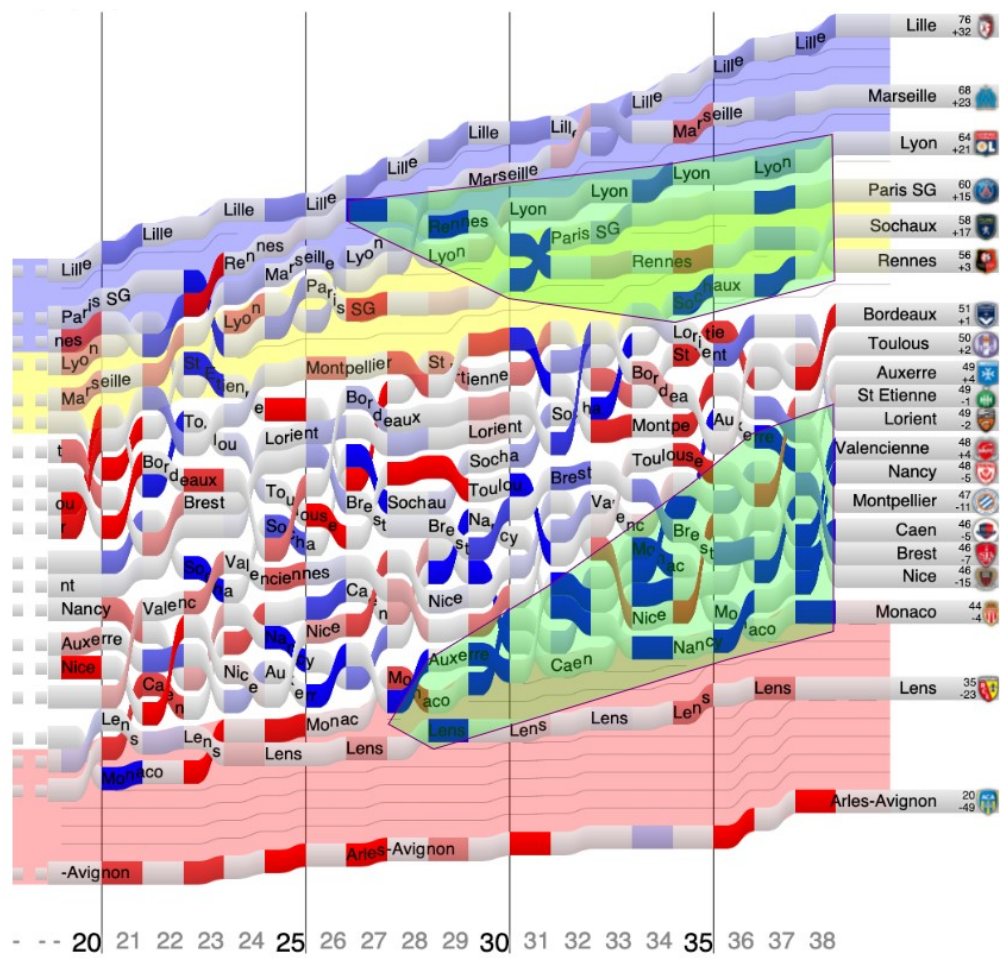


Figure 5 Gap Chart, 2011-2012

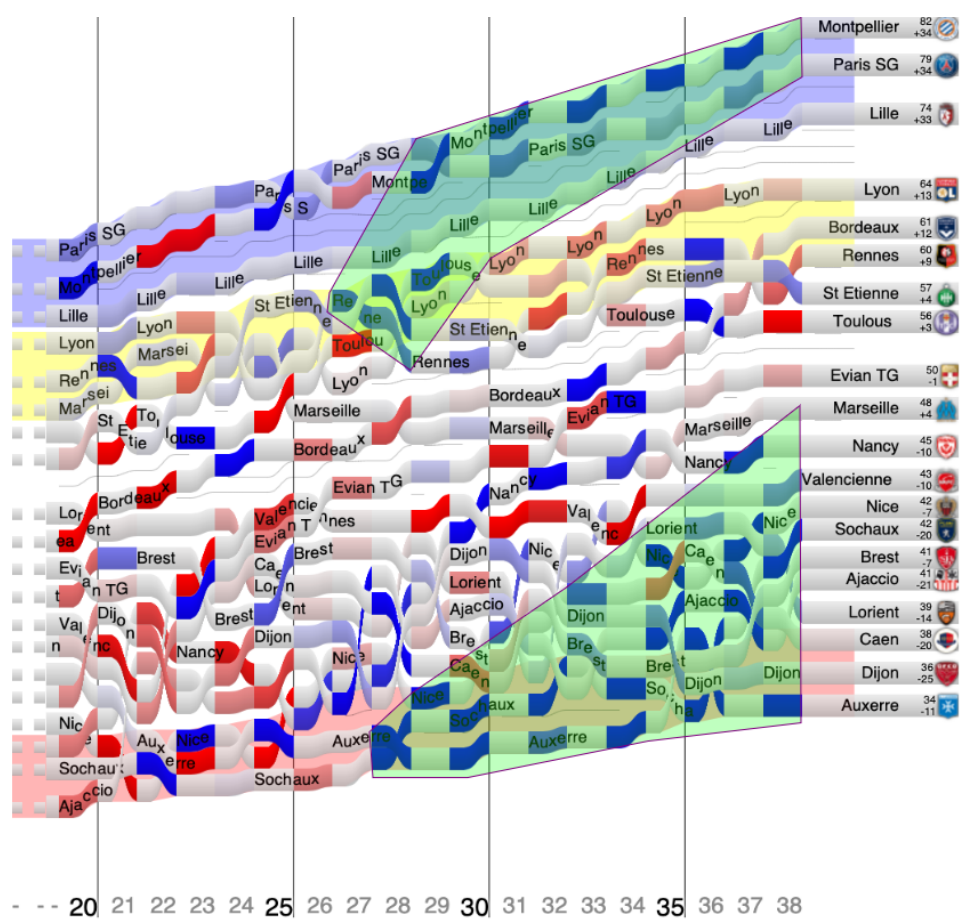


Figure 6 Gap Chart, 2012-2013

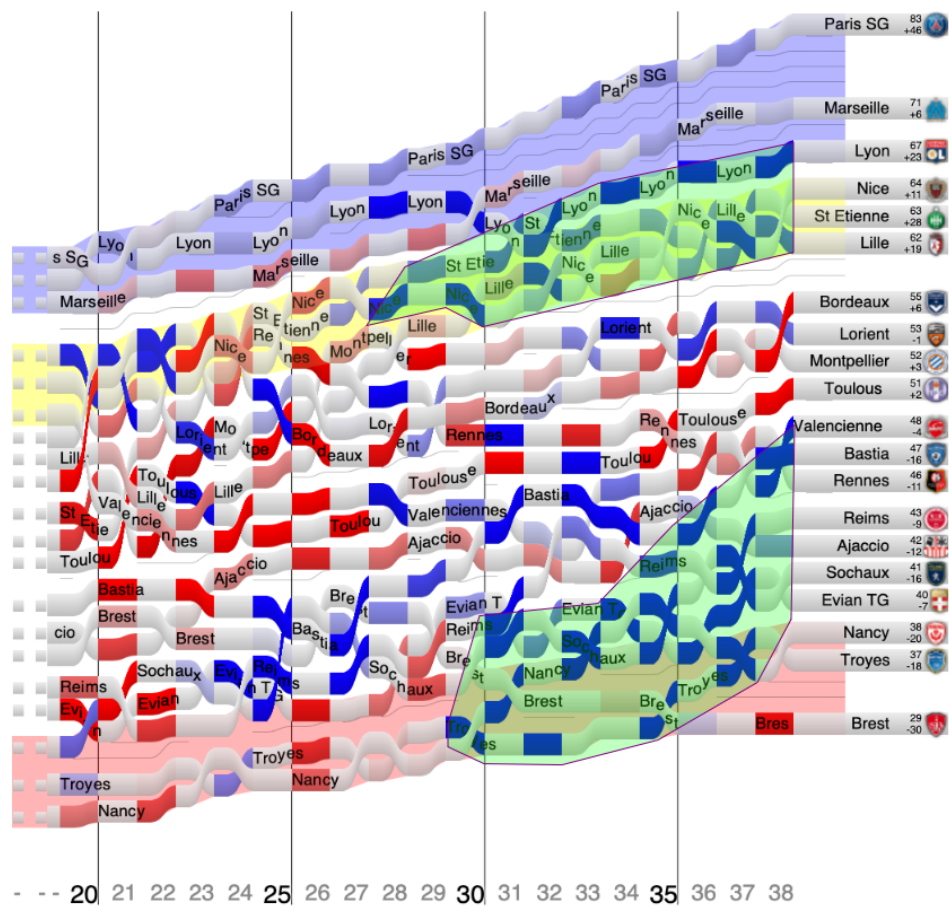


Figure 7 Gap Chart, 2013-2014

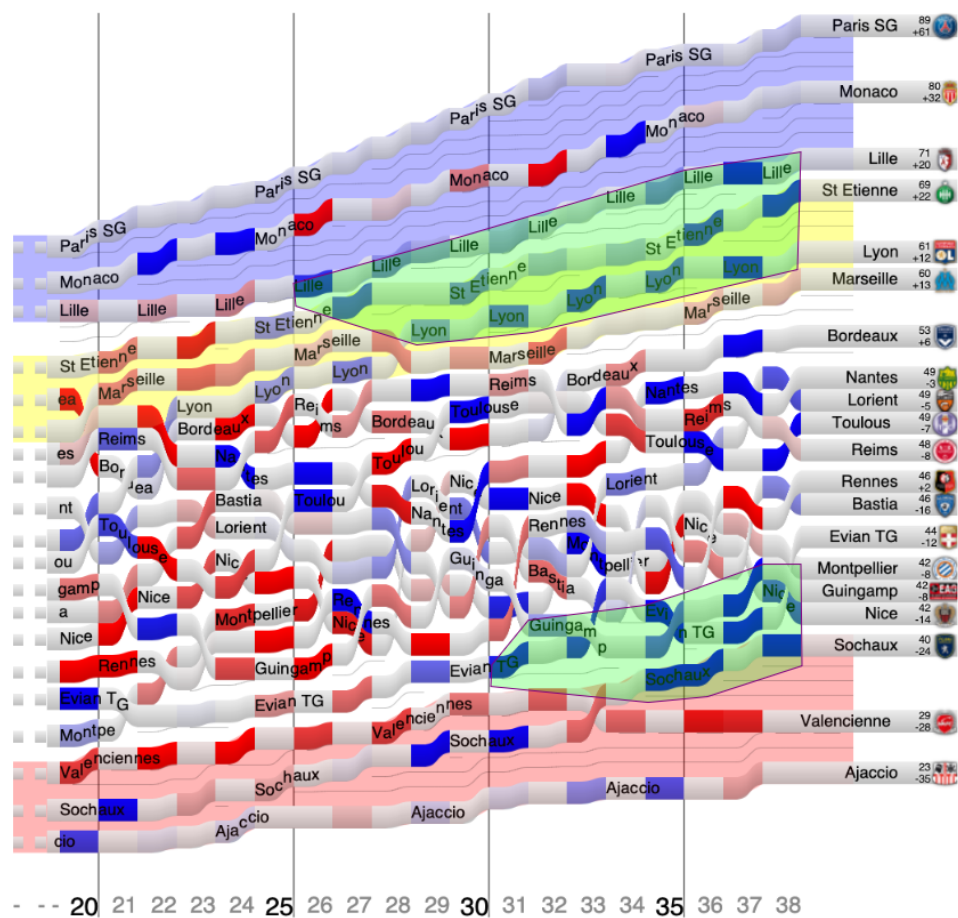


Figure 8 Gap Chart, 2014-2015

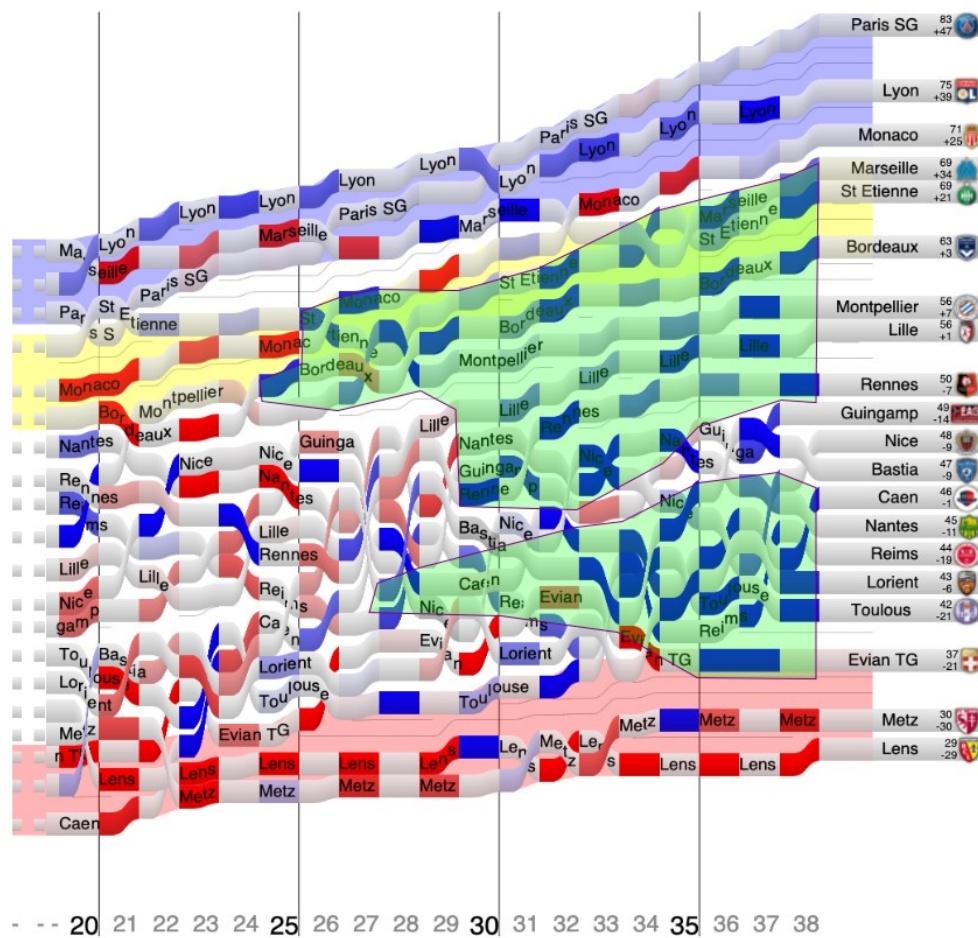


Figure 9 Gap Chart, 2015-2016

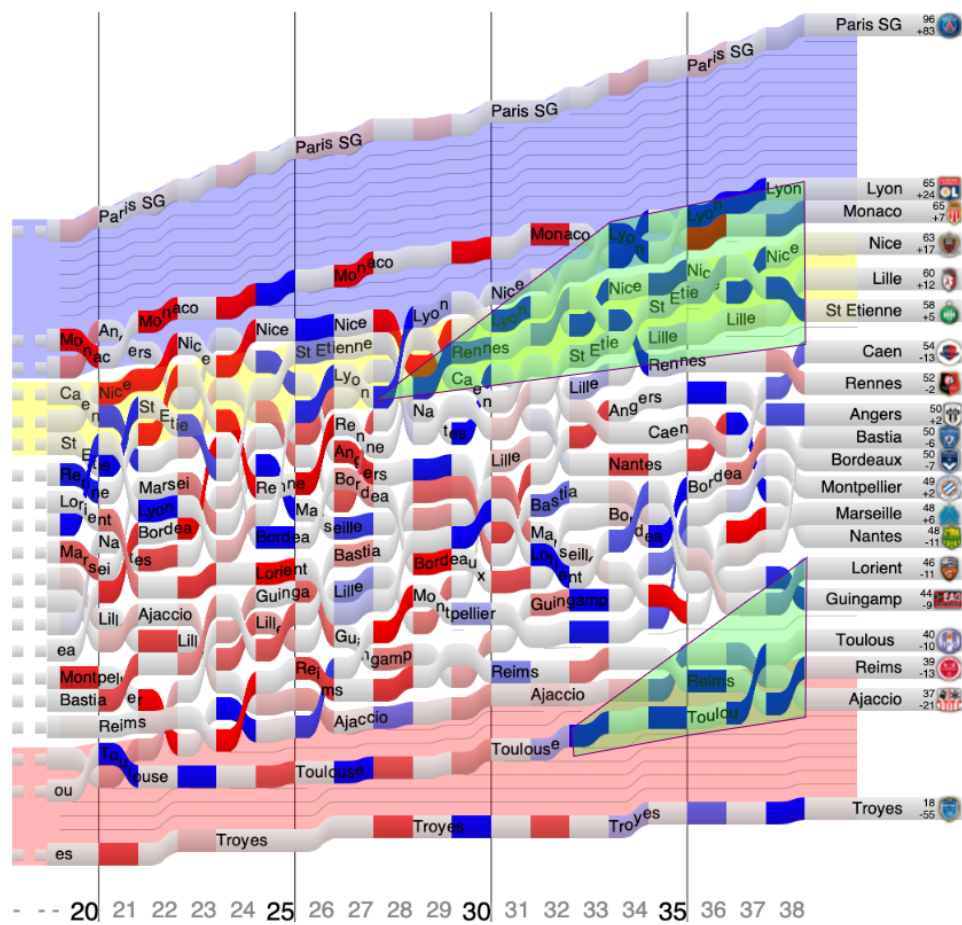


Figure 10 Gap Chart, 2016-2017

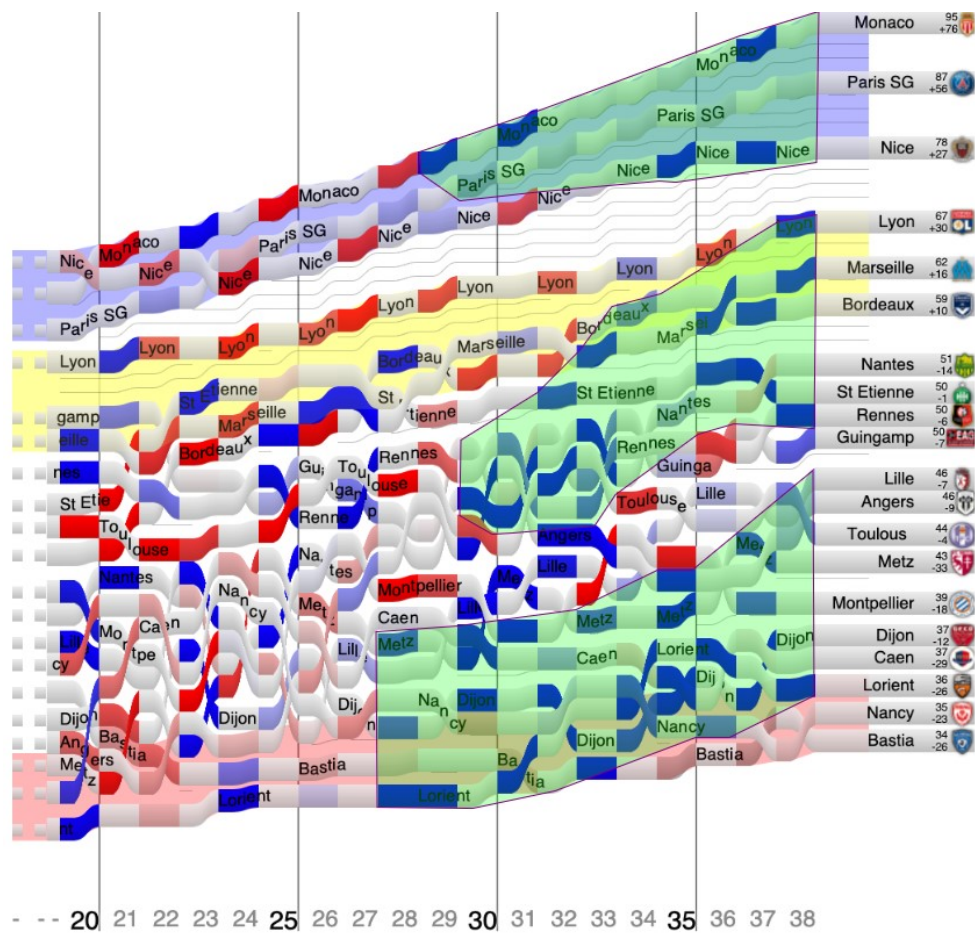


Figure 11 Gap Chart, 2017-2018

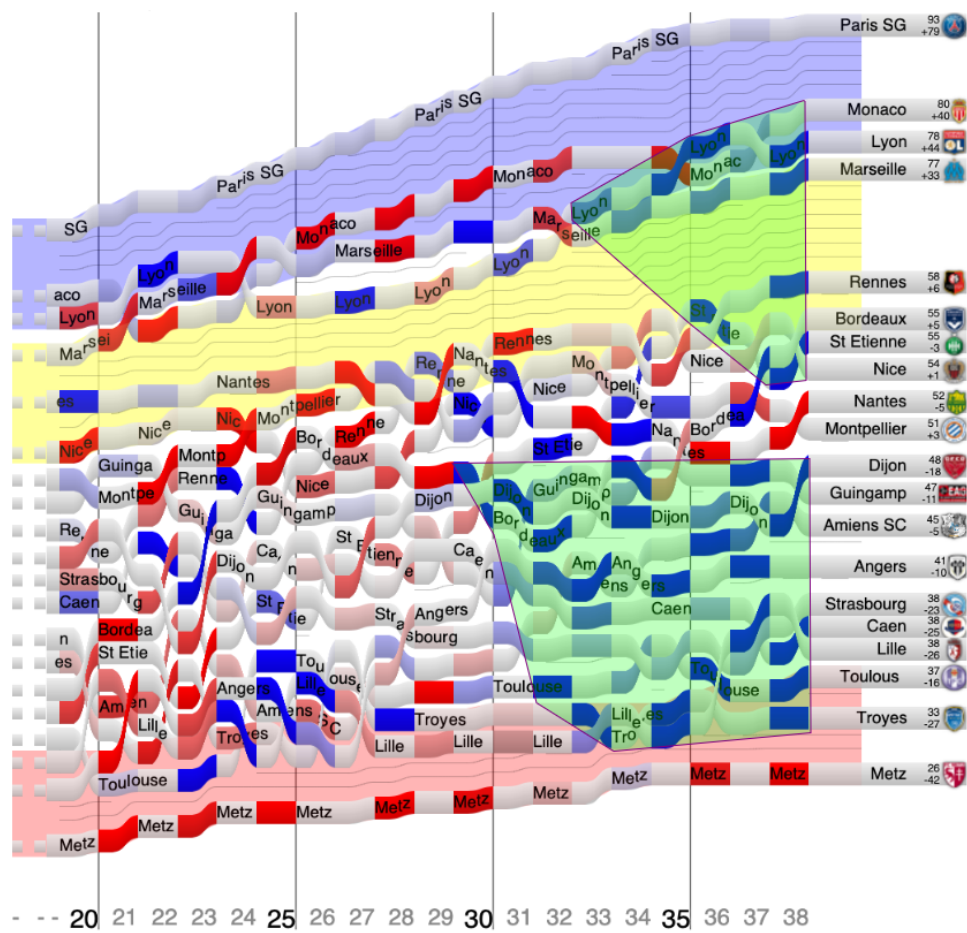


Figure 12 Gap Chart, 2018-2019

