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## Measuring Film Popularity

### Principles and Applications

Film popularity is an important subject for film historians and film theorists because of what it tells them about the tastes and preferences of film audiences and the strategies developed by producers to direct and satisfy them. Critical to this perspective is the assumption that filmgoers are, for the most part, attracted to the cinema primarily by the qualities inherent in the films they go to see: or, to put it another way, although there may be many reasons why filmgoers choose to see a particular film at a particular cinema, at a particular time, and on a particular date, in general these reasons are dominated by the anticipated quality of the chosen film. How else is it possible to explain the fact that in more-or-less all cinemas everywhere, attendances, and with them box-office revenues, varied (and vary today) greatly from film programme to film programme?<sup>1</sup> The incontrovertible fact that different films attracted varying numbers of filmgoers to the same cinema provides justification for the development of a methodology that connects levels of film popularity, empirically established, with the particular film characteristics that attracted audiences at moments in time, and over periods of time that can be shown to be characterized by life-cycle limitations that result from the persistent underlying desire for (not too off-the-wall) novelty on the part of audiences. Although this chapter confines itself to the empirical issue of how film popularity can be measured, it should be seen as a contribution to the development of such a methodology.

Of course, film popularity also matters to the agents who are instrumental in supplying movies for audience consumption – namely, producers, distributors, and exhibitors. Within a capitalist context, these agents are compelled to produce a rate of return on capital that is positive within a time frame that is, if not contractually, then implicitly, defined by the need to keep shareholders and project-specific investors confident and happy. If they are not able to do this they either go out of business or behave as benefactors. For producers, distributors and exhibitors, films represent a flow of revenue to be set against costs – the greater the popularity of a film the greater is its revenue stream. Between them these agents make contracts that reflect their respective market power. For instance, from the sound period onwards distributors raised their

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1 Perhaps with the exception of the first decade in movie history, 1895 to 1905.

supply price (measured as a proportion of the box-office takings) when handling 'hit' movies, leaving the exhibitor with a smaller share of a larger revenue pot (see Hanssen 2005).

The purpose of this chapter is to discuss various ways of measuring film popularity and, in particular, to explain my approach to handling datasets where audience numbers and/or box-office takings are not known. The chapter is in three sections. Section 1 develops the link between the willingness-to-pay principle and film popularity; section 2 examines the methodological problem that emerges if attendance data are not available, and discusses the practice of using the POPSTAT index of film popularity; and section 3 develops an application of POPSTAT. In places the chapter may seem overly technical. However, if at the end of it the reader is persuaded that the methodology is capable of applications from which new insights into our knowledge of film reception and audience tastes may be gathered, it will have served its purpose.

## 1 Willingness-to-pay

Economists treat consumers as utility seekers who are rational, in that they prefer more to less utility, but who experience diminishing amounts of extra utility as they consume increasing amounts of a commodity. In the context of filmgoing, audiences prefer Film A to Film B if the former promises higher levels of cinematic utility, but the repeated viewing of the same film reduces dramatically the additional pleasure derived, leading to the result that, as a general rule, adult audiences do not watch the same film over and over again. Economists also apply the concept of opportunity cost to consumption, maintaining that in choosing Film A ahead of Film B filmgoers understand that the cost of making this choice is the loss of utility that occurs as a consequence of not viewing Film B. However, although Film A may be viewed in preference to Film B, it might well be the case that a first viewing of Film B is then preferred to a second viewing of Film A – in this case the opportunity cost of not seeing Film B is greater than the anticipated benefit of watching Film A for a second time.

With most commodities that are scarce in supply, relative to demand for them, consumers are willing to pay more for a good that yields higher levels of utility – of course, if it were a good that is scarce in supply, but nobody wanted it, then nobody would be willing to pay a price for it at all! As examples of scarcity sensitivity, one has only to think of the prices that some football supporters are willing to pay to watch their favourite football team play in the final of a major international competition, or the prices that ballet lovers are willing to pay to watch their favourite dancer in a ballet that they adore. Film lovers

would behave in exactly the same way, if they needed to, but of critical importance in understanding the nature of film as a commodity is the fact that they don't need to, and the reason for this is that the movie business is built around technological and organisational capabilities that allow it to meet the demand for a movie wherever it may emerge, with the proviso that a profit can be made by the agents involved in its supply.<sup>2</sup> Hence, unlike the hypothetical football match or ballet performance, although the utility promised by particular films may be extremely high for very many consumers, the industry ensures, through distribution and exhibition practices, that films that are popular with audiences are made less scarce in supply than films that are less popular. Arthur De Vany and David Walls (1996) have termed this phenomenon 'adaptive contracting'. The consequence of this is that, as a general rule, cinemas maintain a common admission price irrespective of the attractions being screened: film audiences are not required to pay a higher premium for film quality, no matter how compelling the promise of cinematic utility may be. It is interesting to note that this is not a new phenomenon. Kristin Thompson (1985) shows how well entrenched Hollywood distributors were from the late 1910s onwards, making the Hollywood product ubiquitous for audiences around the globe.

Adaptive contracting requires the exhibition side of the industry to adjust supply, in the form of the number of seats and screens and the length of playing time made available to particular films, in order to meet levels of demand for product which, when it is first released, are not fully known. In the movie business, supply adjusts to demand, but admission prices remain unchanged. The explanation for invariant cinema prices is that audiences take risks when seeing films that are new to them, because they cannot have complete knowledge of what they are going to see, and hence they know, from their past experiences of filmgoing, that their about-to-happen experience is likely to fall within a range of expected pleasures. Now, if prices were variable, so that higher prices were charged for films promising higher levels of cinematic utility, the downside risk faced by audiences would increase – a disappointing experience at a higher price is more galling for the consumer than a disappointing experience at a lower price. Thus, higher price levels would turn some consumers away from seeing films they might otherwise have seen, leaving cinema seats empty. Variable prices might turn risk adverse sections of the potential audience away from filmgoing altogether. Thus, the strategy of relatively low invariant prices has served historically to maximise attendances, given the sup-

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2 See my discussion of the ontology of film as a commodity, in Sedgwick (2000: 7-16). A briefer exposition can be found in Sedgwick/Pokorny (2005b: 10-15).

ply of cinemas and seats and general level of cinematic demand that the strategy itself has, in part, created.

It may be objected that prior to the saturated release strategy of distributors, which emerged in the mid-1970s, considerable run-hierarchical differences in admission prices existed between first-run showcase cinemas situated in metropolitan centres and subsequent-run cinemas in the suburbs, provincial cities and small towns. In London during the mid 1930s, for instance, MGM's Empire, Leicester Square, had seating for 3,226 patrons and a top price of 72 pennies or six shillings (written 6/-).<sup>3</sup> Compare the revenue potential of this cinema with that of the 580-seat Belle cinema in Bolton, where the top price was just 9 pence (9d), or the 574-seat Empire in Portsmouth, whose top price was 15 pence or one shilling and threepence (1/3). Yet, all three cinemas screened the MGM society drama *Dinner At Eight* as a single feature. The film was premiered at the Empire, Leicester Square, on 17 November 1933, attracting audiences of 47,109 and 33,782, respectively, during the two weeks of its run (Eyles 1989). *Dinner At Eight* received six distinct bookings in both Bolton and Portsmouth, the final one of which in both cities was at the two above named cinemas, during the week commencing 23 July 1934. Different audiences, attending different cinemas, at different dates, paid different admission prices to see the same film. Had the patrons of the Belle, Bolton and the Empire, Portsmouth wanted to see the film earlier, they could have attended screenings of the film at its fifth-, fourth-, third-, second-, or first-run screenings in the two cities. Had they done, they would have paid higher admission prices and sat (probably) in more comfortable surroundings, thereby exercising a time and comfort preference for which they were prepared to pay a premium. However, the patrons of the Belle, Bolton and the Empire, Portsmouth were prepared to wait until *Dinner At Eight* filtered down the exhibition hierarchy; they paid less than they would have, had they seen the film earlier in its release, yet they paid no more to see it than they would have, had they seen much less popular films screened at the two cinemas. *Dinner At Eight* was not scarce in supply, and filmgoers who were content to wait, or were not willing or able to pay premium prices, could enjoy an evening's screening of *Dinner At Eight* for as little as 4 pence (4d) and 7 pence (7d) respectively.<sup>4</sup>

Thus, film is one of those commodities not rationed by price. Audiences do not have to pay higher prices to see the films of their choice, since the more popular they are, the greater is their availability. Further, because the relative prices of films do not vary with popularity, and audiences are willing to

3 See the annual Kinematograph Year Books for nationwide information about cinema addresses, ownership, seating capacity and admission prices.

4 Minimum prices given in the Kinematograph Year Books, 1932 to 1938.

pay these prices to watch the films of their choice, box-office data are an excellent measure of film popularity.

## 2 Measuring Film Popularity

At the present time, details of weekly box-office takings and the number of screenings are readily available for the top ranking films in the world's largest markets.<sup>5</sup> Hence, analysts now have first-rate data sources for investigating current film popularity patterns, at least at the macro level in those markets, a fact that partly explains the burgeoning film business orientated literature emerging from Business Schools and Economics Departments over the last decade.<sup>6</sup> However, with the rather important exception of the U.S., where the trade journal *Variety* has kept its readers informed about weekly box-office takings of first-run cinemas from the 1920s onwards, the availability of historic data of this type elsewhere is comparatively recent. Hence, historical studies of popular film outside of the U.S. have little hard evidence to support claims often made that particular audiences enjoyed Film X greatly, while Film Y was not to their taste. Paradoxically, historians working in the field of popular film in the U.S. have made very little use of the evidential weekly box-office data recorded in *Variety*.<sup>7</sup>

But in the absence of hard data about cinema attendances how can historians proceed without relying completely on anecdotal evidence? My 2006 study of the weekly attendance and box-office figures of the Regent, the largest first-run cinema in Portsmouth, England, during the 1930s, is unusual in Film Studies literature, partly owing to the fact that such sources of information are rare, and partly because quantitative approaches to analyses are not widely practiced. The Regent dataset, in the form of a ledger, is particularly rich, containing not only attendances *and* takings (which seems to be unique in surviving UK records), but also separate records of matinee takings, as well as confectionery, tobacco and ice cream sales (Sedgwick 2006).<sup>8</sup>

One of the questions that interested me was the extent to which films that were popular with first-run Regent audiences were similarly attractive to

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5 See *Screen International*, and *Variety*.

6 See, for instance, the collections in De Vany (2004), and Moul and Shugan (2005).

7 See Street (2002), Sedgwick/Pokorny (2005a) and Glancy/Sedgwick (2007) as examples of work that has systematically used *Variety* box-office data.

8 My study was preceded by Sue Harper (2004). Professor Harper discovered the Regent ledger and kindly made her findings available to me. The ledger is archived at the Portsmouth City Museum and Records Office.

Portsmouth audiences in general, as those films passed through the exhibition hierarchy from box-office rich to box-office poor cinemas. The only information available about the films screened by other Portsmouth cinemas was the advertised programmes published daily in the Portsmouth *Evening News*. Clearly, an investigation of this kind required a methodology that allowed me to impute attendances/box-office revenues from those advertised programmes. Because of the onerous nature of recording these programmes in a database, data was collected for a single year (1934), during which time Portsmouth had 21 operating cinemas, screening films six days a week on weekly or twice-weekly change, single or (mostly) double-bill programmes.

Two closely related procedures were applied. The first linked the weekly box-office attendances of the Regent's 52 main film attractions screened in 1934 with the number of distinct bookings received by each of those films in the population of Portsmouth's cinemas. A correlation coefficient of 0.48 was found. So, while not a perfect fit, a positive association of some strength is evident. The fact that the correlation coefficient is not nearer in value to 1.0 might be the consequence of i) cinema exhibitors not always being able to access films of their choice, and ii) the tastes of audiences attracted to particular films screened at lower order cinemas not fully mirroring the tastes of audiences that had viewed the same films earlier, at the Regent.

Implicitly, the first procedure treats all cinemas equally. However, as is evident from the earlier discussion about the box-office potential of cinemas, it is clear that not all cinemas are of equal significance in the measurement of film popularity. The second procedure explicitly recognises this fact by assigning weights to cinemas in a population, based on their box-office potential (mid-price multiplied by seating capacity) expressed as a proportion of the mean box-office potential of all cinemas in that population. Accordingly, a cinema with a weight of 1 had a box-office potential equal to the mean box-office potential of the population of Portsmouth cinemas, a cinema with a weight of 2 had a box-office potential twice the mean and a cinema with a weight of 0.5 half the mean.

A value for each film booking is obtained by multiplying the cinema weight by the length of time (measured in a common unit such as days or weeks) that it was screened, and by its billing status (measured in this instance as 1 for a single billing, 0.8 as the leading film on a double bill programme, 0.5 as the joint attraction on a double bill programme, or 0.2 as the support film on a double bill programme). An aggregation of these values then generates a summary statistic for each film, which I call its POPSTAT score. Taken together, the POPSTAT scores of all films screened at least once in the cinemas of Portsmouth forms an index number series in which all films in the population stand in relation to one another in terms of their imputed popularity.

The major problem with the POPSTAT methodology is that it treats all films screened at each of the cinemas in the population equally: that is, it fails to reflect differences in box-office revenues generated by different films at a given cinema. Along with the two factors mentioned earlier, it is probable that this lack of sensitivity also contributes to a correlation coefficient of 0.45, describing the strength of association between the actual attendances of the 52 main weekly attractions screened at the Regent in 1934 and their subsequent POPSTAT scores, which is almost identical to that reported earlier for the association between Regent attendances and the number of separate Portsmouth bookings.<sup>9</sup>

### 3 An Application of the Methodology

A simple regression model using the ordinary least squares method suggests that attendances at the Regent explain only one fifth of subsequent POPSTAT scores.<sup>10</sup> Although this model is statistically significant at the 99.9 per cent confidence level, it clearly shows that other factors were at play. As mentioned earlier, one of these factors is likely to be differences in preferences among the two audience populations – the Regent audience and those attending all other cinemas in Portsmouth, captured by the POPSTAT methodology.<sup>11</sup> Through an analysis of the residual plot thrown up by the model, it is possible to identify those films in which tastes would appear to be distinctively different. This is depicted in Figure 1, and it represents, for each of the 52 films screened at the Regent, differences (termed ‘residuals’) between the predicted values of POPSTAT and actual values – values on the plot near to the horizontal axis represent films with values that are predicted closely by the model and those furthest away, films with values that are less well predicted. Two things to notice are: 1) most of the residual values are not clustered along the axis, although 36 of the 52 observations fall within a band bounded by one standard deviation above and below it, indicating the partial predictive capability of the model; and 2) expected values are equally distributed above and below actual values throughout the range.

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9 The actual and predicted POPSTAT scores exclude the Regent.

10 It is likely that other factors, such as the weather, and local events, may all have played a part in affecting attendances, and, if built into the model they would have improved its explanatory power.

11 Sue Harper has given a colourful description of the likely social make up of the Regent audience. From this it would be strange to think that their tastes had been identical to those of audiences elsewhere in the City.

The hypothesis implicit in the model is one that is derived from the logic of the system of distribution and exhibition in which films appear first in box-office rich cinemas and then diffuse outwards in time and space through a run of lower order cinemas, namely, that films that are highly popular with the Regent audience will prove to be similarly popular with audiences attending lower order cinemas. Clearly the films represented by points in Figure 1 furthest from the horizontal axis depart markedly from this rule.

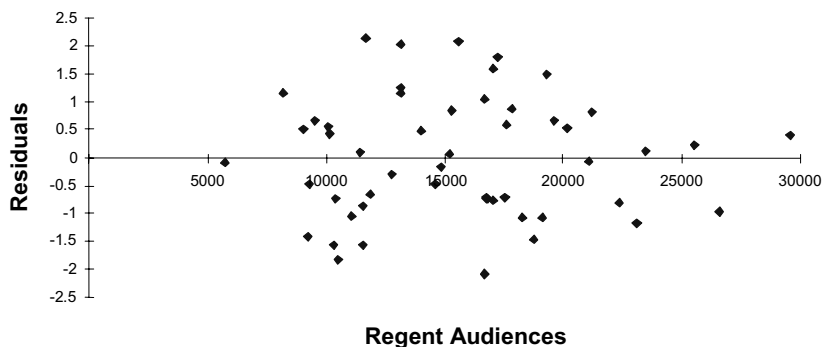


Figure 1. Plot of ‘residual’ values differentiating expected from actual POPSTAT values

The regression model can be used to identify those films that are at either end of the spectrum: films with high negative or positive residual values – films that the model predicts least well. These are films whose POPSTAT values are surprising, given the size of audience they attracted at the Regent. Table 1 lists them. It is divided into two sections, A and B, with Section A consisting of six films that significantly underperformed in Portsmouth cinemas, relative to their popularity at the Regent, and section B consisting of those films whose performance in the Portsmouth cinemas was surprisingly good, relative to the audience interest shown at the Regent. Organising the information in this manner makes possible a characteristics analysis (studios/genre/stars, etc.) of these films that might help to identify distinctive patterns of differences in film tastes between the two audience sets.

Although it is not the purpose of this paper to develop an analysis of these differences, some basic observations are: 1. Section A consists of films that achieved average or less than average attendances at the Regent – the mean weekly attendance for 1934 was 15,452.<sup>12</sup> The films came from three of the

12 These films had not been especially popular in London’s West End and provincial city first-run cinemas either, the highest rank of which was *My Weakness*, ranked 60th in 1933. See Sedgwick (2000: 266, Appendix 3).

major Hollywood studios but did not boast “A” category stars and with the exception of *Midnight Club* were very much concerned with detailed aspects of American life that did not appear to be particularly interesting for Portsmouth audiences. 2. Section B is made up of films that were on average a little more popular than those in Section A. Remarkably, Gaumont British films dominate, three of which had operetta-type musical qualities. A possible explanation for the significantly better performance of these Gaumont British films in the other cinemas of Portsmouth is connected with the quota provisions of the 1927 Cinematograph Films Act, which, in 1934, required all exhibitors to screen a not insignificant minimum of 15 per cent British films. It seems reasonable to suppose that to meet this requirement with a chance of making a profit, exhibitors preferred to screen those British films that were at least not unpopular with audiences. A more intractable problem lies with *It Happened One Night*. Given its success elsewhere in Britain – it was a national Top 10 film, and had Top 10 berths in the cinemas of Bolton and Brighton – it is not surprising that it was similarly popular with Portsmouth audiences; indeed, it was the most popular film of the year: what is surprising is its merely average performance at the Regent.<sup>13</sup>

## Conclusion

Audience taste, its formation, and the manner in which it changes over time are important subjects in film studies and are key to understanding the reception of films at the time of their initial release. Film popularity is the most obvious manifestation of audience taste, and it is based upon the ‘willingness-to-pay’ principle, measured through attendance and/or box-office data. It is a concept that has both absolute and relative dimensions, in that knowing how films were received by certain sections of the audience, defined by, say, age, gender, socio-economic status and/or geography is essential in providing an evidence-based account of reception.

In the absence of attendance/box-office data, the POPSTAT methodology has been developed to give estimates of film popularity. The application of this methodology here builds upon a recent study of mine, published in *Cinema Journal*, dealing with filmgoing in Portsmouth in the 1930s. Based on a discussion of the assumptions implicit in the methodology, a simple model has been created to predict the values of the POPSTAT scores achieved by each of the 52

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13 See Sedgwick (2000): Appendix 3 for the national charts for 1934; Table 5.7 for Bolton; and Table 6.4 for Brighton. The Portsmouth chart listings can be found in Sedgwick (2006: Appendix 1).

| <i>Film Title</i>               | <i>Studio</i>      | <i>Genre</i>                    | <i>Stars</i>                      | <i>Portsmouth<br/>billings</i> | <i>Regent<br/>attendances</i> | <i>Actual<br/>POPSTAT<sup>a</sup></i> | <i>Predicted<br/>POPSTAT</i> | <i>Residuals<br/>col.7-col.8</i> |
|---------------------------------|--------------------|---------------------------------|-----------------------------------|--------------------------------|-------------------------------|---------------------------------------|------------------------------|----------------------------------|
| (1)                             | (2)                | (3)                             | (4)                               | (5)                            | (6)                           | (7)                                   | (8)                          | (9)                              |
| <b>Section A</b>                |                    |                                 |                                   |                                |                               |                                       |                              |                                  |
| <i>Midnight Club</i>            | Paramount          | crime                           | Clive Brooks,<br>George Raft      | 3                              | 16,704                        | 0.68                                  | 2.77                         | -2.09                            |
| <i>No More Women</i>            | Paramount          | drama                           | Edmund Lowe,<br>Victor McLaglen   | 3                              | 10,537                        | 0.29                                  | 2.12                         | -1.83                            |
| <i>Wharf Angel</i>              | Paramount          | drama/<br>romance               | Victor McLaglen,<br>Dorothy Dell  | 3                              | 11,565                        | 0.66                                  | 2.23                         | -1.57                            |
| <i>My Weakness</i>              | Fox                | musical                         | Lillian Harvey,<br>Lew Ayres      | 2                              | 10,338                        | 0.54                                  | 2.10                         | -1.55                            |
| <i>Change Of Heart</i>          | Fox                | drama/<br>romance               | Janet Gaynor,<br>Charles Farrell  | 3                              | 18,783                        | 1.52                                  | 2.99                         | -1.47                            |
| <i>Turn Back the Clock</i>      | MGM                | comedy<br>drama                 | Lee Tracy,<br>Mae Clarke          | 3                              | 9,209                         | 0.56                                  | 1.98                         | -1.42                            |
| <b>Section B</b>                |                    |                                 |                                   |                                |                               |                                       |                              |                                  |
| <i>Evensong</i>                 | Gaumont<br>British | Drama/<br>musical/<br>romance   | Evelyn Laye,<br>Fritz Kortner     | 7                              | 11,698                        | 4.39                                  | 2.24                         | 2.15                             |
| <i>It Happened One Night</i>    | Columbia           | Romance/<br>comedy              | Clark Gable,<br>Claudette Colbert | 8                              | 15,599                        | 4.74                                  | 2.66                         | 2.08                             |
| <i>Unfinished Symphony, The</i> | Gaumont<br>British | biography/<br>drama/<br>musical | Mártha Eggerth,<br>Hans Jaray     | 7                              | 13,162                        | 4.44                                  | 2.40                         | 2.04                             |
| <i>Jew Süss</i>                 | Gaumont<br>British | Historical<br>drama             | Conrad Veidt,<br>Benita Hume      | 6                              | 17,260                        | 4.63                                  | 2.83                         | 1.80                             |
| <i>Turkey Time</i>              | Gaumont<br>British | comedy                          | Tom Walls,<br>Ralph Lynn          | 8                              | 17,050                        | 4.41                                  | 2.81                         | 1.60                             |
| <i>Chu Chin Chow</i>            | Gaumont<br>British | comedy/<br>musical/<br>romance  | George Robey,<br>Fritz Kortner    | 7                              | 19,284                        | 4.52                                  | 3.05                         | 1.48                             |

Table 1.

Sources: The Regent Ledger; Portsmouth Evening News.

Note: a. Exhibition at the Regent is not included in the POPSTAT score.

main attractions screened at the first-run Regent cinema in 1934. The model has a low coefficient of determination, in that Regent attendance explain only one-fifth of subsequent POPSTAT scores, although it is possible to be very confident statistically about this. It suggests that, among other things, the tastes of the two audience sets (the Regent audience and the audiences of the other Portsmouth cinemas), in relation to the 52 films shown at the Regent, were far from identical. By then conducting an analysis of the differences between predicted and actual POPSTAT values it was possible to identify a series of films at either end of the range where these differences were greatest and draw some tentative conclusions.

One purpose of the chapter has been to show that economic reasoning and statistical methods have a part to play in presenting knowledge about filmgoing that is not otherwise discoverable or even expressible. They force the researcher to be explicit about assumptions behind the form of analysis conducted and to acknowledge that the methods adopted might be improved upon. Furthermore, such an approach can throw up new problems that require new scholarship, among which, in the context of this chapter, is the puzzle of the relatively poor (in relation to expectations) performance of *It Happened One Night* in Portsmouth's premier picture house.

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