

Shot length distributions in the early films of Charles Chaplin

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Abstract

The distribution of shot lengths in a motion picture is an indicator of film style, and is typically positively skewed with a number of outlying data points. Consequently, assumptions about the distribution of data for parametric statistics cannot be met and nonparametric tests are preferred for analysing quantifiable aspects of film style. This study uses nonparametric statistics as a method of comparing the distribution of shot lengths in motion pictures. Four films directed by Charles Chaplin from 1914 and 1915 were analysed to determine if the distribution of shot lengths was consistent in the works of a single director over time. Two sample Kolmogorov-Smirnov tests failed to identify a significant difference in films directed by Chaplin in the same year, but did identify significant differences in films directed by Chaplin in different years. These results may be accounted for by Chaplin's move from the Keystone Film Company to the Essanay Film Manufacturing Company, suggesting that studio is a determining factor in film style at this stage of Chaplin's career.

Keywords: Cinematics, Film style, Charles Chaplin, Keystone, Essanay, Shot length distributions

A key indicator of film style is the distribution of shot lengths in a motion picture, which may be used to identify similarities and differences in the style of individual filmmakers, historical periods, genres, and national cinemas. Shot length distributions are typically characterised by two features: (1) they are positively skewed, and (2) they have a number of outlying data points. Consequently, the assumption of a normal distribution for parametric statistical tests cannot be met; and while the positive skew of the data suggests that shot lengths may be lognormally distributed, this is not the case for all films (Salt 2006: 389-396). Nonparametric tests require fewer assumptions about the data and as they do not rely on the underlying distribution they are often referred to as *distribution-free* (see Gibbons 1993: 1-4). Nonparametric tests can be applied to all distributions (including lognormal) and rather than use parametric tests for some films and nonparametric tests for others, it is better to use nonparametric tests in all cases. This study uses the two-sample Kolmogorov-Smirnov (KS) test as a nonparametric method for the comparison of the distribution of shot lengths in four films directed by Charles Chaplin in 1914 and 1915 to determine if the director's style is consistent between films produced in the same year and between films produced in different years. Specifically, the KS-test is used to test the null hypothesis that there is no difference in the distribution of shot lengths in films directed by Chaplin in the same year against the alternative hypothesis that there is such a difference; and to test the null hypothesis that there is

no difference in the distribution of shot lengths in films directed by Chaplin in different years against the alternative hypothesis that these films do have different shot length distributions.

Methods

Films

The four films chosen for analysis are *The Masquerader* (1914), *The Rounders* (1914), *His New Job* (1915), and *In the Park* (1915). These films were chosen for consistency of genre (comedy) and form (short films), and for Chaplin's role as performer, writer, and director. Shot length data for these four films was collected from the Cinematics database (Leipa 2006a, 2006b, 2006c, 2006d). As all four films are shorts, the total number of shots for each film was used and the data was uncensored.

Statistical analyses

Shot length data was summarised using basic descriptive statistics (mean, standard deviation, skew, five number summary, interquartile range). The distribution of shot lengths in the films was analysed using the two-sample Kolmogorov-Smirnov test (see Sheskin 2004: 453-463). The KS-test statistic (D) is the maximum absolute difference between the cumulative distribution functions of two films with m and n shots,

$$D = \max |S_1(X) - S_2(X)|,$$

where $S_1(X)$ and $S_2(X)$ are step functions with steps $1/m$ and $1/n$ at each value of X , or multiple steps with tied values, respectively. A two-tailed p -value of less than 0.05 was considered statistically significant.

The KS-test is well suited to analysing film style, and possesses a number of advantages over other statistical tests for Cinematics. First, as a nonparametric test we are not required to make any assumptions about the distribution of the data when using the KS-test, and so it can be applied to all films. Second, the KS-test is an exact test that can be used to compare datasets of unequal size and so can be used to compare films of different lengths and different numbers of shots (although it is recommended that short films not be compared with features). Third, the KS-test does not require data to be binned, and so no information is lost, enabling a complete use of the data. Fourth, films tend to have a number of shots of equal length and in ranking the data the KS-test can cope with tied values. Fifth, the D -statistic is unaffected by the reparametrization of the x -axis, allowing the cumulative distribution function of a film's shot lengths to be graphed using a logarithmic scale (since no shot can have negative or zero duration). This makes it considerably easier to represent the distribution visually than when using a histogram.

Results

The summary statistics (see Table 1) indicate that the 1914 films are generally consistent in terms of their

overall shot length distributions, with almost identical mean and median shot lengths and similar spreads of values indicated by the standard deviation and interquartile range. The 1915 films are less similar to one another, with greater differences in mean and median shot lengths. There is a change in the distribution of shot lengths in Chaplin's films from 1914 to 1915, with a general increase from one year to the next. The greater interquartile ranges of the 1915 films reveal a broader spread of shot lengths than those of the 1914 films.

Table 2 shows the results of a two-sample KS-test comparing the distribution of shot lengths in films directed by Chaplin in the same year. The results show that there is no significant difference between films directed by Chaplin in the same year, and the null hypothesis cannot be rejected. These results indicate that although the summary statistics reveal a difference between the 1915 films in terms of their measures of central tendency, there is no significant difference in the overall distribution of shot lengths.

Table 3 shows the results of a two-sample KS-test comparing the distribution of shot lengths in films directed by Chaplin in different years. The results show that there is a significant difference between Chaplin's films from 1914 and those from 1915, and the null hypothesis is rejected.

Table 1 Statistical summary of four films directed by Charles Chaplin

	<i>The Masquerader</i> (1914)	<i>The Rounders</i> (1914)	<i>His New Job</i> (1915)	<i>In the Park</i> (1915)
Running Time (s)	539.0	558.7	1806.9	841.7
Shots	99	108	175	102
Mean Shot Length (s)	5.4	5.2	10.3	8.3
Standard Deviation (s)	6.3	7.6	12.0	7.6
Skew	3.1	5.1	3.7	1.9
Minimum Shot Length (s)	0.5	0.3	0.6	1.0
Lower Quartile (s)	1.9	1.6	3.3	2.8
Median Shot Length (s)	3.5	3.4	6.2	5.4
Upper Quartile (s)	6.2	5.2	12.7	11.5
Maximum Shot Length (s)	38.5	63.9	102.9	42.1
Interquartile range	4.4	3.7	9.5	8.7

Data has been rounded to one decimal place

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Table 2 D-statistic (with corresponding p -value) for four films directed by Charles Chaplin in the same year

	<i>The Rounders</i> (1914)	<i>In the Park</i> (1915)
<i>The Masquerader</i> (1914)	0.0951 (0.717)	-
<i>His New Job</i> (1915)	-	0.1014 (0.500)

Table 3 D-statistic (with corresponding p -value) for four films directed by Charles Chaplin in different years

	<i>His New Job</i> (1915)	<i>In the Park</i> (1915)
<i>The Masquerader</i> (1914)	0.2759 (<0.001)	0.2199 (0.013)
<i>The Rounders</i> (1914)	0.3549 (<0.001)	0.2778 (<0.001)

The trends in the distribution of shot lengths for these films can be clearly seen in Figure 1. The curves produced by the cumulative distribution functions are similar, suggesting that these films have similar properties with a small number of very small shots ($X < 1$ second) and a small number of very long shots ($X > 20$ seconds). The curves of the 1915 films are shifted to the

right of the graph, indicating that the change in shot length distributions is directional, with an overall increase in shot lengths from 1914 to 1915. The KS-test statistic confirms the general trends identified from the summary statistics, but are able to quantify more precisely how the films differ.

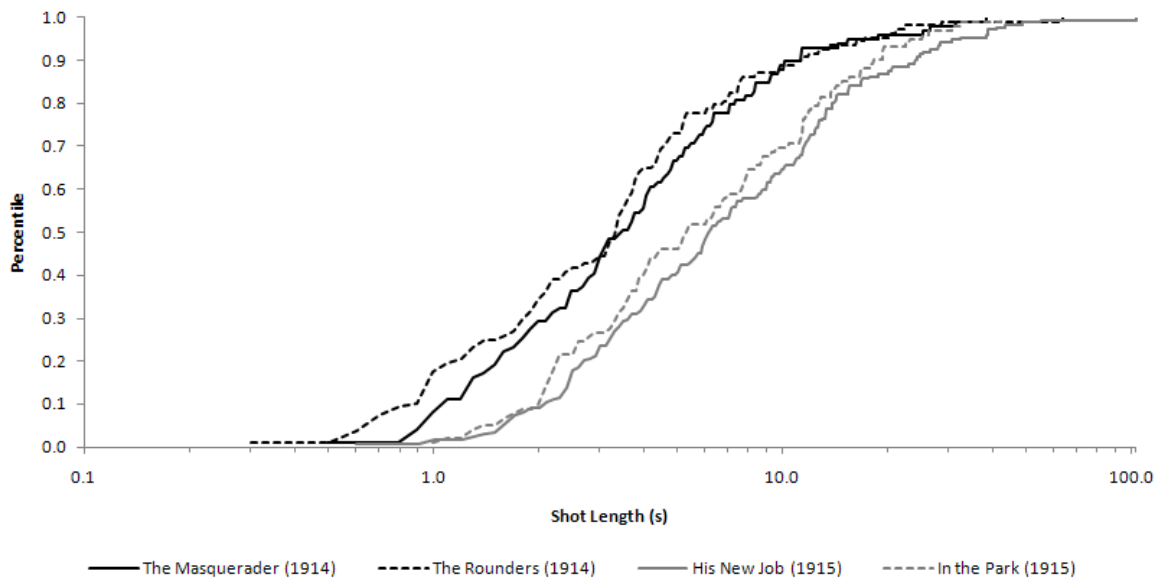


Figure 1 Comparison plot of shot length distributions for four films directed by Charles Chaplin

Discussion

The results support the conclusion that (1) Chaplin's films produced in the same year are consistent in terms of the distribution of their shot lengths; and (2) that there is a change in the distribution of shot lengths in Chaplin's films from 1914 to 1915. Specifically, there is

an increase in shot lengths from 1914 to 1915. In order to account for this change it is necessary to look at the point at which they occur in Chaplin's career. Although all four films were written and directed by Chaplin, they were produced for different studios. *The Masquerader* and *The Rounders* were produced for the Keystone Film Company; while *His New Job* and *In the Park* were

produced during Chaplin's brief period at The Essanay Film Manufacturing Company. The change in film style occurs with Chaplin's change of studio.

Mast describes the films of Mack Sennett's Keystone Film Company as *comic primitivism* – 'the characterless jest and the excitement of motion raised to the *n*th power' (1979: 43), and he cites speed as the fundamental element of the Keystone style.

The essence of the Keystones was movement – not thought, emotion, desire, need, or human reaction. The essential Keystone actions were dash, crash, smash, and splash. Figures ran after the things they wanted, ran away from the things they wanted to avoid, ran over mountains, over dangerous ledges, fields, beaches. If they didn't run they rode – in cars, in boats, on animals, on bikes. And they kept running from the start of the film until they smashed into something that stopped them, fell into something that soaked them, or simply fainted from exhaustion (Mast 1979: 49).

Chaplin's style in *The Masquerader* and *The Rounders* follows this pattern, with an emphasis on physical gags and an absence of characterisation. David Robinson writes that Chaplin's Keystone films, '[conform] to the studio norms of speed and slapstick, with a maximum use of knockabout, prat-falls, and kicking of rears and sometimes heads. The films remain in essence dramatised comic strips' (1983: 25). In *The Masquerader*, for example, Chaplin plays a film actor who bungles several scenes and, having returned dressed as a woman, is chased out of the studio by his fellow actors who throw bricks at him before ending up down a well; while *The Rounders* ends with Chaplin and Fatty Arbuckle as drunks being pursued by an angry mob, which they try to escape aboard a leaky boat. Chaplin, in 1914, is a Keystone filmmaker, and the summary statistics and the KS-test describe the fast pacing of these films.

The change in style at Essanay is typically attributed to Chaplin emerging from Sennett's dominance to assert his own comic sensibility based on the audience's sentimental and pathetic relationship with the character of the 'Little Tramp.'

At Essanay Chaplin discovered who the little tramp figure was and how he related to the world of respectability and propriety that both surrounded and excluded him. To the tramp's pluck and toughness developed at Keystone, Chaplin added a greater sensitivity to those beings ... who deserved his sympathy. ... Charlie's tramp character, lucky, human, sensitive, warm, alternately generous and tough, down an out in society's eyes, was in sharp contrast to the mean, ornery, often dishonest, usually

ungrateful, smug, and insensitive bullies who persecuted him... (Mast 1979: 72).

It is Chaplin's sixth film for Essanay, *The Tramp* (1915), which is often seen to mark the birth of the his individual comic film style (e.g. Carroll 1998: 38; Flom 1997: 19); although Neibaur (2000, 2008) and Vanneman (2004) identify the prior film, *A Jitney Elopement* (1915), as the moment of Chaplin's creative blossoming. It is in these two films that Chaplin historians locate the shift away from pure slapstick to the emotional and socially aware comedy of the 'mature' Chaplin, while the early Essanay early films are considered to be similar to those he was directing at Keystone (see Mast 1979: 73; Robinson 1983: 28). In terms of their comic content this may well be true, but the results of this study indicate that this is not the case for Chaplin's directorial style: the change in style is immediate with the filmmaker's change of employer, as *His New Job* was the first film Chaplin made for Essanay (while *In the Park* was the fourth).

A further reason for this change is the change in working practices Chaplin encountered at Essanay. The Keystone films were one-reel in length and were produced at a rate of approximately one a week. In just one year with Sennett, Chaplin appeared in 35 films (of which he directed 20). At Essanay Chaplin was making two-reel films, and so he was able to keep in the Keystone antics (such as the chaotic ending of *His New Job* or the chase at the end of *A Jitney Elopement*) while still devoting time to character and emotion. Chaplin's output at Essanay comprises only 14 films over the course of thirteen months (plus parts of others that were compiled and released by Essanay), with two weeks or more devoted to the production of a single film. There is no relationship between production schedules and the distribution of shot lengths, but results of the KS-test lend weight to the argument that has been put forward by film historians that the pressure of Sennett's release programme did not allow Chaplin to distinguish his style from that of Keystone.

Gene D. Phillips writes,

In more than half a century of filmmaking Chaplin produced an impressive body of work that is uniquely his own personal achievement. He not only wrote, produced, directed, and acted in his films but composed musical scores for them and supervised the editing as well. Therefore Chaplin's films are surely the expression of his personal vision, a vision developed throughout the years as he continued making films. Hence Chaplin is a classic *auteur*... (1999: 23, original emphasis).

However, the results of this analysis indicates that studio style is the determining factor in the distribution of shot lengths in Chaplin's films in 1914, and that the many

varied roles taken on by a filmmaker in production do not automatically lead to the realisation of an 'auteurist' vision. Rather, the ability of a filmmaker to realise their 'vision' is dependent upon the context in which they operate, and it is with Chaplin's changing context that his style develops. In the KS-test, we have identified an empirical means of determining the size of this change.

Conclusion

As the distribution of shot lengths in a motion picture is typically positively skewed with a number of outlying data points, nonparametric tests that make no assumptions about the distribution of the data are preferred to parametric tests. The two-sample Kolmogorov-Smirnov test is an appropriate nonparametric method for comparing the distribution of shot lengths in motion pictures, capable of detecting and representing stylistic similarities and differences between films.

This study has focussed exclusively on films directed by Chaplin, and has identified a stylistic change that occurs with Chaplin's change of studio at the end of 1914. A means of extending the study would be to compare films featuring Chaplin but directed by other filmmakers. For the Keystone era, there are a number of films directed by others (e.g. Henry Lehrman, Mack Sennett, Mabel Normand). However, in the absence of non-Chaplin directed Essanay films against which Chaplin's works for the studio could be compared it is not possible to make a direct comparison with other Essanay films due to variations in personnel (e.g. director, writer, etc) and genre (e.g. westerns, etc). Chaplin's subsequent films for Mutual, First National, and his own production company can be analysed using the KS-test to develop an overall profile of the filmmaker's developing style.

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