

On the graphical comparison of cutting-rates across bodies of films: with applications to the films of Mack Sennett and Charlie Chaplin

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January 2014

ABSTRACT: The quantitative study of editing patterns in silent film, for the period 1908–1915, has often relied on the average shot length (ASL). It is, for example, clear that the rapidity of D.W Griffith’s cutting increased over the period 1908 to 1913 as measured by the ASL. Griffith was a mentor of Mack Sennett whose early directorial work at Biograph emulated Griffith in terms of cutting-rates. When Sennett moved to Keystone there was a marked increase in the cutting-rates employed in the films he directed - this paper suggests that it is possible to trace evolution in his cutting-rates over the period 1912-1914. Sennett was, in turn, a mentor of Charlie Chaplin whose directorial efforts at Keystone have been argued to represent a reaction against the fast cutting expected by that studio. A comparison of the ASLs of the films of Sennett and Chaplin supports this argument, but in certain respects the ASL is a blunt tool for comparative purposes, and more nuanced quantitative analysis is possible. This paper examines some graphical approaches based on the use of cumulative frequency distributions of shot-lengths (SLs) that can be more informative than the use of the ASL alone. Among the graphical techniques illustrated are the averaging of cumulative SLs across bodies of films, using a logarithmic scale to highlight differences, and correspondence analysis of the cumulative SLs to investigate patterns of difference between individual films. Apart from the suggestion of evolution in Sennett’s cutting-rates from late-1912 to 1914 there is greater complexity in Chaplin’s practices at Keystone than can be summarized using the ASL. His practice evolved away from the ‘style’ employed by other Keystone directors, in the direction of making greater use of shots of longer duration. However – and this cannot be inferred from the ASL – he also made greater use of shots of short duration. That is, to say that he ended his career at Keystone cutting more slowly than Sennett – based on analysis of ASLs – oversimplifies things; he was cutting with greater variety as well.

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1 Introduction

This paper is intended to illustrate ways of comparing cutting rates across different bodies of films. Films directed by Mack Sennett at Biograph (1911–1912) and Keystone (1912–1914) and by Charlie Chaplin at Keystone (1914), Essanay (mostly 1915) and Mutual (1916–1917) are used for illustration. There are 23 Sennett Biographs, 15 Keystones from late-1912 and 1913 and 10 from 1914; initial analyses use the Keystones from the Sennett corpus without distinguishing between years. It emerges that there are differences between the 1912–1913 and 1914 Sennett films and this distinction is made in some later analyses. Chaplin’s Keystone films that he directed are also compared with those where he acted under the direction of others than Sennett. Data are taken from the various *Cinematics* labs dealing with these films.

The data were compiled by Daria Khitrova and Yuri Tsivian. One end to which they have been put was to ‘test the time-honored historical legend about Chaplin’s struggle against Keystone editing formulae which used to hinge on the high frequency of cuts’. It was concluded that ‘the struggle did take place in 1914: the films which Chaplin directed at Keystone tend to be cut slower than the Keystone cutting style dictated’. Further, when Chaplin ‘was in full command of the cutting rates of his own films’, at Essanay and Mutual, ‘against what one might expect, the ASL values of Chaplin’s shorts made in those years are no higher than they were at Keystone’.

This might be construed, rather loosely, as an ‘hypothesis’ that Chaplin cut his films in this period more slowly than Sennett, and is taken as a motivating example for the methodology illustrated here. The initial idea is to compare cumulative percentages of shots less than a range of SLs to get a more precise idea of how cutting rates varied than is afforded by the ASL (or MSL). Cumulative distribution functions (CDFs) have been exploited in the cinematic literature, but mainly for the purpose of comparing a small number of individual films. There is more of a focus on comparing larger bodies of film in this paper.

The *Cinematics* sources for the data indicate that Chaplin’s Essanays were measured at 18 fps and the Mutuals at 20 fps. I have ‘corrected’ the Mutuals to 18 fps and have assumed the Chaplin Keystones were measured at this speed as well. Information on projection speeds for the Sennett Keystones is not always provided; those from the DVD that is the source of the Chaplin Keystones are 18 fps. For the purposes of analysis here all Sennett films have been assumed to be 18 fps. This assumption is unlikely to be true and the consequences of assuming faster projection for some films is explored in Appendix 1.

2 Data

The SL data for Chaplin’s Keystone film can be converted into the form shown in Table 1; data for the other bodies of films are shown in Appendix 2. For each film the count of the number of shots less than or equal to 1, 2, . . . , 10 seconds is shown and this can obviously be extended to whatever SL one wishes. The final column shows the total number of shots in a film and the final row the total number of shots less than or equal to each SL. The data can be converted to graphical displays in a variety of ways.

For comparing individual films an obvious thing to do is to standardize rows by converting to percentages of the total for a film. The outcome of doing this is shown in Table 2. The slow cutting of *The Face on the Bar Room Floor* stands out immediately (as does its ASL). Yuri Tsivian suggests the slowness may be because it is a parodic enactment of a melodrama in verse with intertitles in quatrain verses. It is arguable that outliers such as this, where there are identifiable reasons for their difference, should be excluded from global analysis, and this is done in some later analyses.

Film	1	2	3	4	5	6	7	8	9	10	n	
Twenty Minutes of Love	7	25	41	46	55	57	64	67	69	69	...	87
Caught in the Rain	16	32	40	50	54	61	64	65	67	68	...	87
Mabel's Married Life	0	6	16	26	34	42	45	47	50	53	...	80
Laughing Gas	7	40	58	72	77	87	94	95	98	99	...	121
Property Man, The	28	76	123	161	187	200	212	222	228	237	...	266
Face on the Bar Room Floor, The	0	0	3	3	4	6	11	17	18	19	...	33
Recreation	2	9	18	25	28	33	34	36	37	39	...	49
Masquerader, The	4	23	39	47	55	60	68	70	73	73	...	96
His New Profession	2	12	19	27	38	41	47	51	51	55	...	77
Rounders, The	6	20	31	38	44	50	54	54	56	59	...	82
New Janitor, The	9	19	43	54	63	69	73	76	81	85	...	103
Those Love Pangs	3	8	14	18	21	22	24	26	29	29	...	49
Dough and Dynamite	2	16	27	45	56	65	75	82	90	96	...	144
Gentlemen of Nerve	0	6	17	29	35	40	42	46	49	52	...	77
His Musical Career	1	2	10	10	14	18	20	22	23	26	...	45
His Trysting Place	7	20	28	41	56	66	72	78	82	85	...	123
Getting Acquainted	1	32	50	66	77	86	92	98	100	101	...	121
His Prehistoric Past	10	24	38	58	74	82	90	93	96	98	...	133
Total	105	370	615	816	972	1085	1181	1245	1297	1343	...	1773

Tab. 1: Numbers of shots less than or equal to given SLs in Keystone films directed by Chaplin.

Id	Film	1	2	3	4	5	6	7	8	9	10	
26	Twenty Minutes of Love	8	28.7	47.1	52.9	63.2	65.5	73.6	77.0	79.3	79.3	...
27	Caught in the Rain	18.4	36.8	46.0	57.5	62.1	70.1	73.6	74.7	77.0	78.2	...
28	Mabel's Married Life	0	7.5	20.0	32.5	42.5	52.5	56.2	58.8	62.5	66.2	...
29	Laughing Gas	5.8	33.1	47.9	59.5	63.6	71.9	77.7	78.5	81.0	81.8	...
30	Property Man, The	10.5	28.6	46.2	60.5	70.3	75.2	79.7	83.5	85.7	89.1	...
31	Face on the Bar Room Floor, The	0	0	9.1	9.1	12.1	18.2	33.3	51.5	54.5	57.6	...
32	Recreation	4.1	18.4	36.7	51.0	57.1	67.3	69.4	73.5	75.5	79.6	...
33	Masquerader, The	4.2	24	40.6	49.0	57.3	62.5	70.8	72.9	76.0	76.0	...
34	His New Profession	2.6	15.6	24.7	35.1	49.4	53.2	61.0	66.2	66.2	71.4	...
35	Rounders, The	7.3	24.4	37.8	46.3	53.7	61.0	65.9	65.9	68.3	72.0	...
36	New Janitor, The	8.7	18.4	41.7	52.4	61.2	67.0	70.9	73.8	78.6	82.5	...
37	Those Love Pangs	6.1	16.3	28.6	36.7	42.9	44.9	49.0	53.1	59.2	59.2	...
38	Dough and Dynamite	1.4	11.1	18.8	31.2	38.9	45.1	52.1	56.9	62.5	66.7	...
39	Gentlemen of Nerve	0	7.8	22.1	37.7	45.5	51.9	54.5	59.7	63.6	67.5	...
40	His Musical Career	2.2	4.4	22.2	22.2	31.1	40.0	44.4	48.9	51.1	57.8	...
41	His Trysting Places	5.7	16.3	22.8	33.3	45.5	53.7	58.5	63.4	66.7	69.1	...
42	Getting Acquainted	0.8	26.4	41.3	54.5	63.6	71.1	76.0	81.0	82.6	83.5	...
43	His Prehistoric Past	7.5	18.0	28.6	43.6	55.6	61.7	67.7	69.9	72.2	73.7	...
	Mean	5.2	18.7	32.3	42.5	50.9	57.4	63.0	67.2	70.2	72.8	...

Tab. 2: Percentage of shots less than or equal to given SLs in Keystone films directed by Chaplin.

3 Data analysis

3.1 Initial graphical analysis

The cumulative distributions in Table 2 can be displayed in a single graph, as to the left of Figure 1 where SLs up to 20 seconds have been used. The film standing out most clearly as ‘different’ is *The Face on the Bar Room Floor*. The more slowly cut films are those occurring lower down the plot. With many films there will be considerable overlap of lines in the plot so, other than extremes, detail can be hard to pick out. It can be particularly difficult to pick out differences at the shortest SLs and there are advantages to using a logarithmic scale for the SL axis. This is explored later.

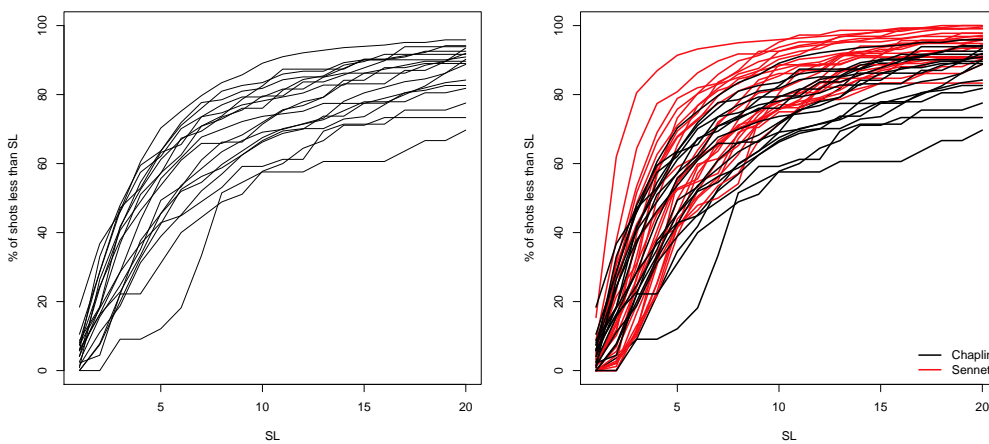


Fig. 1: *Cumulative percentages of SLs up to 20 seconds in Keystone films directed by Chaplin and Sennett, Chaplin to the left and compared with Sennett to the right.*

It is easy enough to plot different bodies of film on the same graph, using color-coding to distinguish between the bodies used. This is illustrated to the right of Figure 1 for the Chaplin and Sennett Keystones. The films cut most quickly – those in the upper part of the ‘envelope’ – tend to be Sennett’s. The lower part of the envelope suggests a more complex story. Beyond SLs of about 7–8 seconds Chaplin’s films stand out, but at the shorter SLs below about 5 seconds Sennett’s films are prominent. This implies that for a subset of his films Sennett made less use than Chaplin of the shorter shots; this is investigated more thoroughly later.

To get a more concise picture of differences, or their absence, between different bodies of film the obvious idea is to average within a body. This can be done in more than one way. Perhaps the simplest is to count shots across all films, the bottom line in Table 1; convert to percentages; and compare the resultant profiles for different bodies of films. This will be biased towards films with more shots and in Figure 2 averaging is over the column percentages using a log-scale for SLs up to 40 seconds².

The fairly clear conclusion to be drawn from this is that there is very little difference between the different bodies of Chaplin’s films and that these made greater use of the longer SLs than those of Sennett. This is shown by the fact that for any SL greater than about 4 seconds the lines for Chaplin’s films lie below those for Sennett. It should be remembered that these plots are based on averaged percentages across bodies of films and this conceals any individual variation that may

² A limitation of graphs such as Figure 1 is that the common origin means that plots are ‘scrunched-up’ at the smallest SL values, making any differences at these values difficult to see. This can be avoided by using a logarithmic scale for the SLs which has the effect of stretching the axis at the lower SLs, easing perception of any differences.

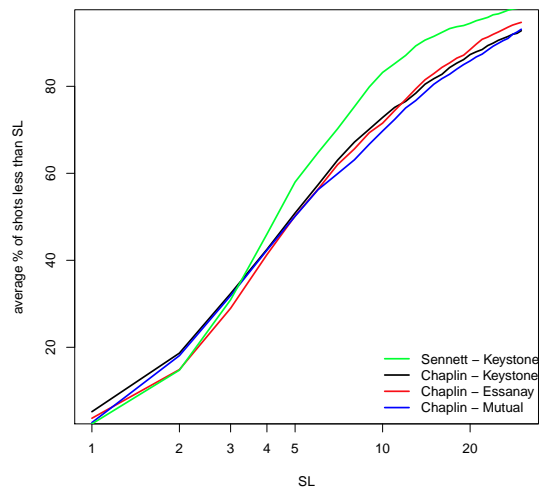


Fig. 2: Cumulative percentages of SLs in films directed by Chaplin and Sennett. The SLs are shown on a logarithmic scale.

exist. This might be explored in several ways and correspondence analysis is explored in the next section.

3.2 Correspondence analysis

Table 2 can be ‘stacked’ with those in Appendix 2 to get a $69 \times p$ table of data, rows consisting of the cumulative percentages for each film up to an SL of p . The value $p = 20$ is used in what follows. The resultant table consists of non-negative numbers. A standard multivariate technique for exploring patterns in such data is correspondence analysis³. It produces a map showing how similar films are in terms of their cumulative percentage profiles. Points on the map can be labeled to aid interpretation, as in Figure 3.

What is perhaps most striking is the separation out of a large number of Sennett films to the left. Labeling points by row number shows that a majority of these are films from 1912–13 and this is pursued shortly. The Chaplin Keystones are rather spread around; the Essanays are mostly rather more compactly clustered within the plot and sit within the envelope defined by the Keystones. A similar phenomenon has been observed by Khitrova and Tsivian (n.d.) based on analysis of ASLs.

Figure 4 shows the same graph with labeling now corresponding to row numbers of the table used for analysis⁴. Sennett’s films from 1912–13 and 1914 are distinguished and the Chaplin films are treated as ‘background’.

Numbers 1–15 are Sennett’s Keystones from 1912–13. Apart from number 12 (*Mabel’s New Hero*) these are mostly separate from the majority of his 1914 films and Chaplin’s films. Apart from the interloping 1914 Sennett, *A Busy Day* (19), it is also possible to separate out about 80% of the Chaplin films from Sennett’s. One use to which correspondence analysis is often put in archaeology is for the purposes of seriation. This involves ordering the data, usually on the basis of a ‘horseshoe pattern’ in the plot that reflects ordering for the first axis. The usual hope is that ordering can be equated with chronological variation in the seriated entities. It is interesting to note that the pattern for the 1912–13 films can be interpreted in this kind of light since a fairly

³ See Chapter 9 of my notes on *Cinemetrics Data Analysis* (<http://www.mikemetrics.com/>) for a discussion of the technique and references to cinemetrics application.

⁴ Tables 4, 2, 5 and 6 were stacked in that order. Within tables ordering is chronological, with the ‘Id’ providing the labeling used in some figures.

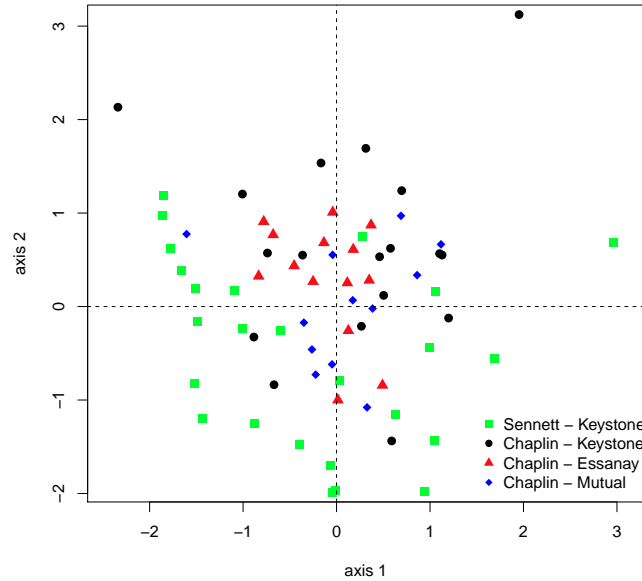


Fig. 3: A correspondence analysis of cumulative percentages of SLs in films directed by Chaplin and Sennett labeled by corpus.

unambiguous ordering can be read into the pattern as (1, 11, 3, 15, 4, 2, 5, 10, 8, 6, 7, 13, 9, 14, 12). A standard way of seeing what this means in terms of the raw data is simply to rearrange the rows of the original table in seriation order. If this is done here, for the 1912–13 films only, Table 3 is obtained.

Id	Film	1	2	3	4	5	6	7	8	9	10	
1	Water Nymph, The	0	3.6	9.1	21.8	34.5	41.8	52.7	60.0	63.6	69.1	...
11	Peeping Pete	0	2.1	10.4	22.9	41.7	47.9	50.0	54.2	72.9	77.1	...
3	Mabel's Stratagem	0	2.2	13.0	21.7	39.1	52.2	60.9	65.2	71.7	80.4	...
15	Gusher, The	0	2.8	11.2	25.2	43.9	50.5	56.1	62.6	72.0	75.7	...
4	A Strong Revenge	0	1.2	16.7	31.0	41.7	46.4	53.6	57.1	66.7	71.4	...
2	Grocery Clerk's Romance, A	0	6.9	24.1	37.9	41.4	50.0	55.2	67.2	74.1	79.3	...
5	Cohen Saves the Flag	0	4.4	9.9	25.3	41.8	57.1	64.8	70.3	72.5	75.8	...
10	Fishy Affair, A	0	0	11.4	34.1	45.5	59.1	63.6	72.7	81.8	88.6	...
8	Barney Oldfield's Race for a Life	0	0	12.0	30.6	54.6	63.9	71.3	77.8	84.3	86.1	...
6	On His Wedding Day	0	2.3	27.3	38.6	54.5	61.4	65.9	70.5	70.5	75.0	...
7	Life in the Balance, A	0.8	13.2	26.4	49.6	65.3	76.9	81.8	86.0	87.6	92.6	...
13	Mabel's Dramatic Career	1.4	14.1	30.3	57.7	67.6	72.5	79.6	84.5	85.9	87.3	...
9	Ragtime Band, The	1.5	11.2	39.6	59.0	69.4	74.6	83.6	86.6	89.6	91.0	...
14	Muddy Romance, A	2.4	11.8	33.1	56.7	73.2	80.3	85.8	89.8	91.3	93.7	...
12	Mabel's New Hero	8.9	37.7	64.4	77.4	80.8	86.3	89.7	91.8	91.8	95.2	...

Tab. 3: Percentage of shots less than or equal to given SLs in Sennett's 1912–1913 films. Row ordering is according to the seriation described in the text..

What's apparent once this is done is that the ordering is reflecting the pace of cutting within these films; for example, *Mabel's New Hero* (12) which stands apart on the plot has a substantially greater percentage of the shorter SLs than any other film, and at any SL value up to 10 has a greater percentage less than that value. If the rank ordering is correlated with the percentages at each SL the highest correlations, at about 0.95, are for SLs in the range 6–9 seconds⁵. The seriation can thus be interpreted in terms of the extent to which shorter shots were used in the

⁵ This is the case using either Pearson's product-moment correlation or Spearman's rank-correlation coefficient. The latter drops fairly sharply to 0.83 at an SL of 10.

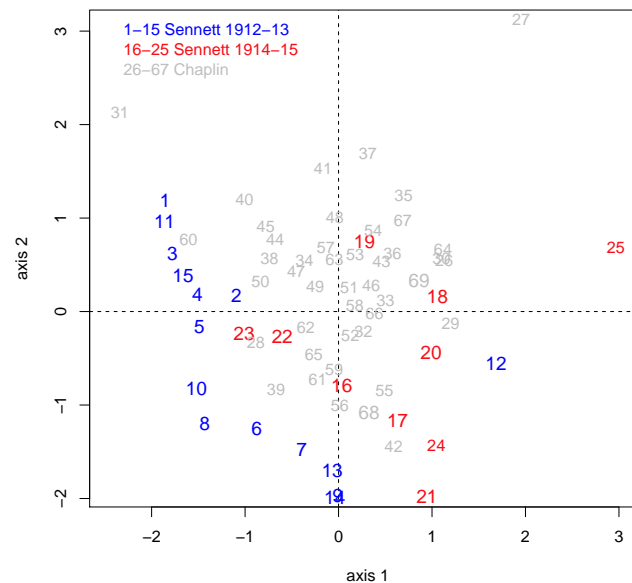


Fig. 4: A correspondence analysis of cumulative percentages of SLs in films directed by Chaplin and Sennett and distinguishing between years of production for Sennett.

films, defining shorter to be SLs less than some value between 6 and 9 seconds. Taking 6 seconds, for example, the films at the start of the sequence use less than 50% of such shots rising to over 80% at the end.

It is tempting to go beyond this and interpret the sequence chronologically, which would indicate a development, through late-1912 to the end of 1913, towards faster cutting in the sense that increasing use was made of shorter shots. Visually there are some ‘gaps’ in the horseshoe; five of the first seven in the sequence are the first five in chronological order, to January 1913; the next four cover the period February–March 1913; and the remaining four March–October. Some films are out of sequence, most notably *The Gusher* (15) from October which occurs in the ‘early’ part of the sequence and *Peeping Pete* (11) from late April, also in the ‘early’ part. Given these exceptions the interpretation of the fairly clear seriation as a chronological one should be treated with caution, but is possibly suggestive.

The emerging story is that with the exception of *Mabel’s New Hero* the 1913 and earlier Sennett films are different from the 1914 ones in the extent to which they make use of shorter shots. If this chronological distinction is made and earlier analyses repeated Figure 5 is obtained.

This shows, in a different fashion, that there are marked differences in cutting patterns for the 1912–13 films and 1914 films. The 1914 films are unequivocally cut more quickly on average than Chaplin’s films. The position of the curve for Sennett’s films above those for Chaplin’s is a stark illustration of this. For the 1912–13 films the Sennett curve crosses the Chaplin curves at about 4–5 seconds indicating that, on average, Chaplin was using both more shorter shots and more longer shots. This might be better expressed as showing that, for the periods in question, Chaplin exhibited more variety in his cutting, rather than summarizing it as faster cutting.

4 Other graphical analyses

Before attempting a summary of this, other ways of looking at the data that are informative about variation in individual films will be explored. Previous work (Khitrova and Tsivian, n.d.) has used

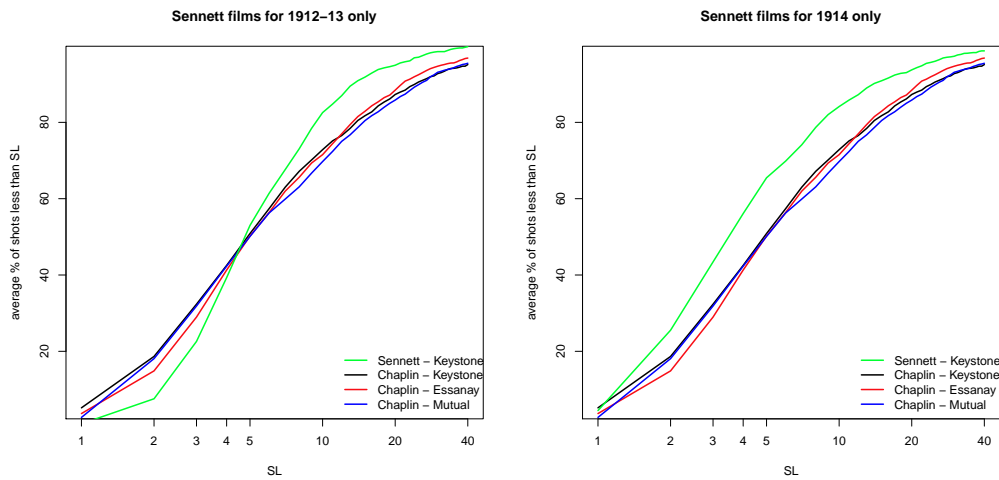


Fig. 5: Cumulative percentages of SLs in films directed by Chaplin and Sennett, separating out Sennett's 1912-13 and 1914 films.

the ASL to make the case about Chaplin's slower cutting⁶. Figure 6 shows a labeled plot of the MSL against MSL, with ASLs at 6 and 9 seconds highlighted by the vertical dashed lines.

With one exception all the films with ASLs above 9 seconds are Chaplin's, including half of his Keystones⁷. Most of the other Chaplin Keystones group reasonably tightly in the region of 6-7 seconds. The restricted range of the ASLs for the Essanay films compared to the Chaplin Keystones, previously noted, is also evident. At the lower ASLs 10/11 of these less than 6 seconds are Sennett's, five from 1914.

Viewing the MSLs separately the films with the largest and smallest values are Chaplin's and Sennett's respectively but there are relatively few of these before 'mixing' between the two directors occurs as the definitions of 'large' and 'small' are decreased or increased. Figure 7 shows a plot of the MSL against ASL for Chaplin's Keystones only, partitioned into quadrants using an MSL of 4.5 seconds and ASL of 9.5 seconds. The south-west quadrant mostly contains the films from Table 2 up to *The New Janitor* (36) filmed in mid-August. The earlier films not in this quadrant are *His New Profession* (34) which has a higher MSL than fits the pattern, *Mabel's Married Life* (28) and *The Face on the Bar Room Floor* (31), previously noted as something of an outlier. *Getting Acquainted* (42) is the only later film in the south-east quadrant. Other than this the films from *Those Love Pangs* (37) on, filmed in mid-September and later, feature in the north-east quadrant. This might be interpreted as evidence of a development from faster to slower cutting that crystallized in Chaplin's final months at Keystone though, given the exceptions to the general pattern, would have to be surrounded with caveats.

Some of the patterns that jointly involve the MSL vs. ASL patterns in Figure 6 are also striking, most noticeably the fact that Sennett's 1912-13 films plot above the dominant scatter. This reflects the fact that the MSL/ASL ratio tends to be greater for these films, which can be seen even more graphically in the boxplots of Figure 8. What is also evident is that the ratio tends to be larger for Sennett's 1914 films than Chaplin's Keystones.

This can be interpreted in terms of 'structural' properties of the film different from the pace of cutting. Theoretically the MSL/ASL ratio can be expected to be related to the coefficient of variation (CV) with large MSL/ASL ratios associated with smaller CVs⁸. Interpreting the CV as

⁶ The contrast there was between Keystones directed by Chaplin and Keystones directed by others in which he appeared. This is not directly comparable with the analyses here; a more comparable analysis is undertaken in the next section.

⁷ The exception is *Mabel's Busy Day*, in which Chaplin featured as an actor. The ASL is 11.2 seconds; there are two very long SLs of 78 and 135 seconds whose removal produces an ASL of 8.3 seconds.

⁸ This is the case; the relevant plot is not shown but is as striking as that for the MSL/ASL ratio.

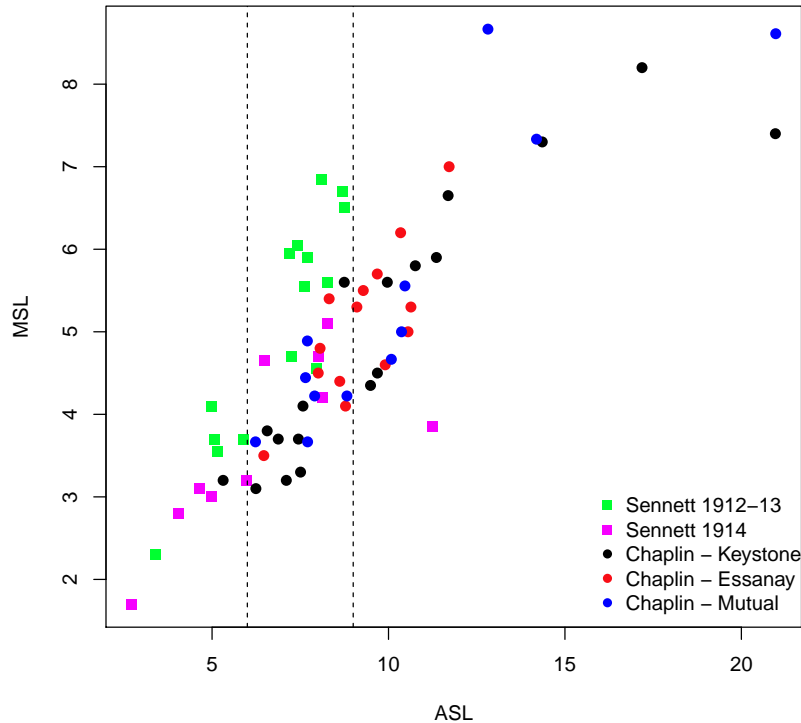


Fig. 6: A plot of MSL against ASL, labelled by corpus.

(relative) ‘swing’, in turn indicative of the variety in SLs used, implies that Chaplin’s Keystones exhibit more variety in their SLs than Sennett’s films from the same year which, in turn, show more variety than Sennett’s earlier work at Keystone.

From Figure 5 it was inferred that Chaplin’s Keystones used both more shorter and more longer shots, on average, than Sennett in 1912–13. This would lead to the expectation that Chaplin’s films had greater ‘swing’ as measured by the CV. This appears to be the case in a comparison with 1914 Sennett as well but is less obvious from Figure 5.

One final way of comparing structure in data sets, that goes beyond the comparison of ASLs or MSLs, will be illustrated. The p th percentile of a data set is that value that has $p\%$ of the ordered data below it and $(1 - p)\%$ above it. The MSL, for example, is the 50th percentile; the interquartile range (IQR), sometimes associated with the MSL as a measure of spread or (absolute) swing analogous to the standard deviation, is the difference between the 75th and 25th percentile. Figure 9 shows a plot, for the Sennett films and Chaplin Keystones only, of the 90th percentile against the 10th percentile.

As in other plots the Sennett 1912–13 films stand out; their positioning essentially shows what can be deduced from other plots, that comparatively less use was made of both longer and shorter shots. The greater variety of Chaplin’s Keystones, particularly in relation to the Essanays is also once again in evidence, as is the separation of a slight majority of Sennett’s 1914 films from Chaplin’s. The plot is not showing anything that has not already been seen, but illustrates an alternative way in which the data might be inspected.

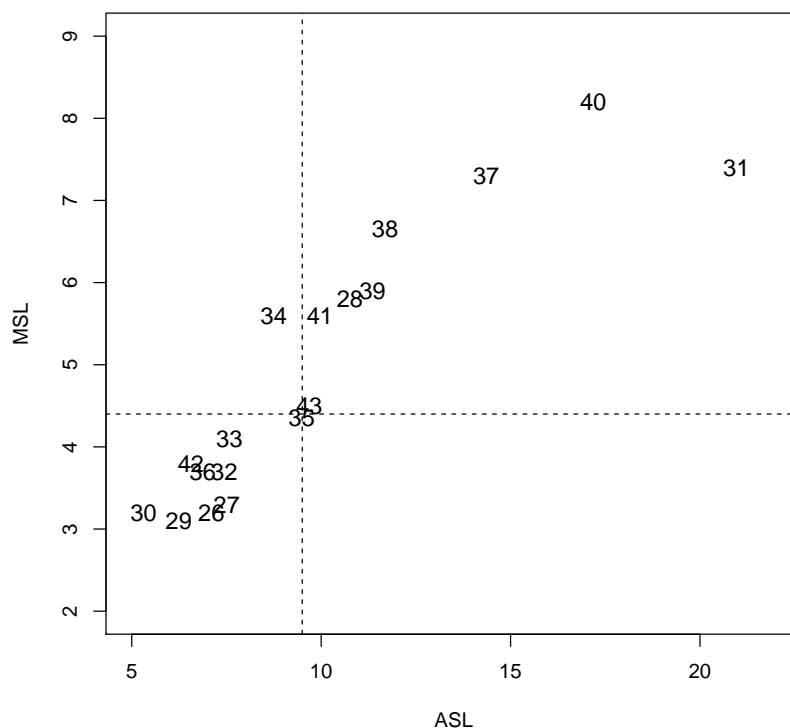


Fig. 7: A plot of MSL against ASL for Chaplin's Keystones, labeled with the 'Id' from Table 2.

5 Additional analyses

For completeness Sennett's films as director at Biograph were compared with his Keystone productions from 1912–13 and 1914 in Figure 10 (data in Table 7). Chaplin's Keystones are included for reference as are eight other 1914 films from the *Chaplin at Keystone* DVD collection that were directed by Keystone personnel other than Sennett or Chaplin.

The contrast between Sennett's different periods needs little comment. It is obvious that, on average, the Biograph films were slower than the 1912–13 ones, which in turn were slower than in 1914. A little more will be said about Sennett's transition from Biograph to Keystone in connection with Figure 12, but a brief comment on the contrast between Chaplin's cutting and those of other Keystone directors is merited, partly to make a methodological point.

Of the 34 films on the BFI *Chaplin at Keystone* DVDs, 18 are directed by Chaplin, 7 by Sennett, and 9 by other Keystone directors (2 from Mabel Normand, 3 from Henry Lehrman and 4 from George Nichols – see Table 8). Sennett's feature-length *Tillie's Punctured Romance* has been excluded from analysis. In *Mack Sennett's Fun Factory* (1910, p.30) Brent Walker suggests that Sennett's pupils and imitators – Lehrman being specifically mentioned – amplified the slapstick to a level that often exceeded that of Sennett. Given this and the fact that Sennett's 1914 films are, on average, cut faster than Chaplin's it might be expected that this would also be true of other Keystone directors.

This initially appeared not to be the case as the curve for their films was very similar to that for Chaplin's. This was checked using a plot of the MSL vs. ASL (not shown). Six of the films sit comfortably within the space defined by Chaplin's film's with the lower ASL and MSL values in Figure 6; one has a similar MSL but larger ASL compared with films in this group; two have somewhat larger ASLs and MSLs. *Kid Auto Races at Venice, Cal.*, one of Lehrman's films, is cut

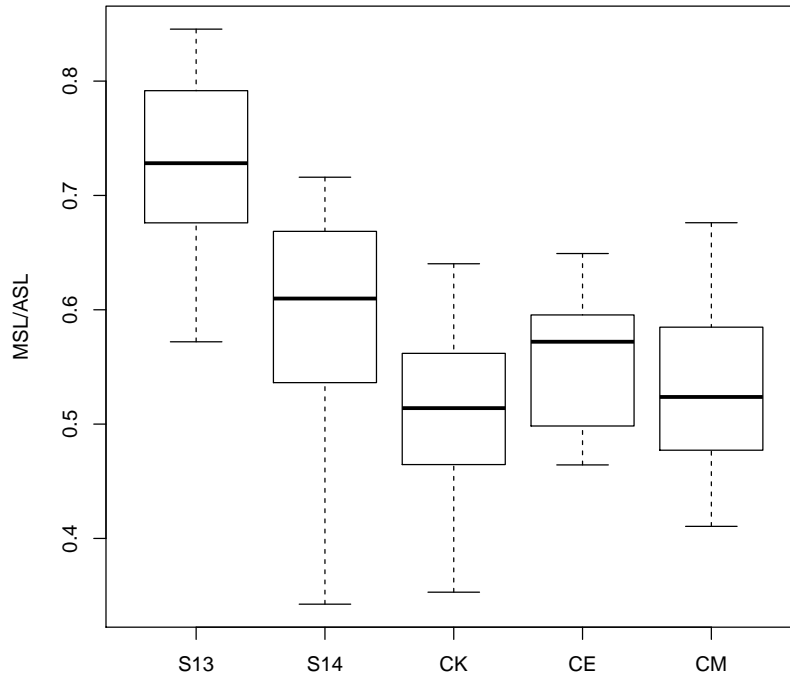


Fig. 8: Boxplots of MSL/ASL for different bodies of films. In the labels ‘S’ and ‘C’ are Sennett and Chaplin, ‘13’ and ‘14’ indicate films from 1912–13 and 1914, ‘K’, ‘E’ and ‘M’ are Keystone, Essanay and Mutual.

very slowly with an ASL of 18.7 seconds. It also has few shots (20) and might be excluded from analysis on these grounds alone. Excluding it results in Figure 10 where it would appear that the films by these other directors were more quickly cut than Chaplin’s.

This raises at least two points. One is that in dealing with fairly small bodies of data individual films can have a strong influence on the average curve obtained. On statistical grounds alone I’d be inclined to omit films from analysis if they had few shots (and would regard 20 as ‘few’) but, more generally, this suggests that the influence of any film with a clearly unusual structure on any generalizations to be made should be investigated. The use of plots based on statistics for individual films in tandem with plots based on averaged statistics provides a useful check. If, as another example, the rather unusual *The Face on the Bar Room Floor* is omitted from analysis it does not much affect the graphs based on cumulative percentages and conclusions drawn from them.

The other point raised is that of comparing like with like. Chaplin did make films with ‘fast’ cutting and his earlier films as director were among his more quickly cut. Divide Chaplin’s films as director into two groups, those filmed up to mid-August (1–11 in Table 2, excluding the atypical *The Face on the Bar Room Floor*) and those from mid-September on (12–18). The cumulative percentages for these are plotted along with those for films where Chaplin was directed by Sennett and by other directors (excluding *Kid Auto Races at Venice, Cal.*) in Figure 11. There is overlap between the early period when Chaplin was directing films and being directed by others, but not with the later period.

There is little difference between ‘early’ Chaplin and the other directors; Sennett’s cutting is generally a little faster, but not outstandingly so. By contrast, and most obviously, ‘late’ Chaplin

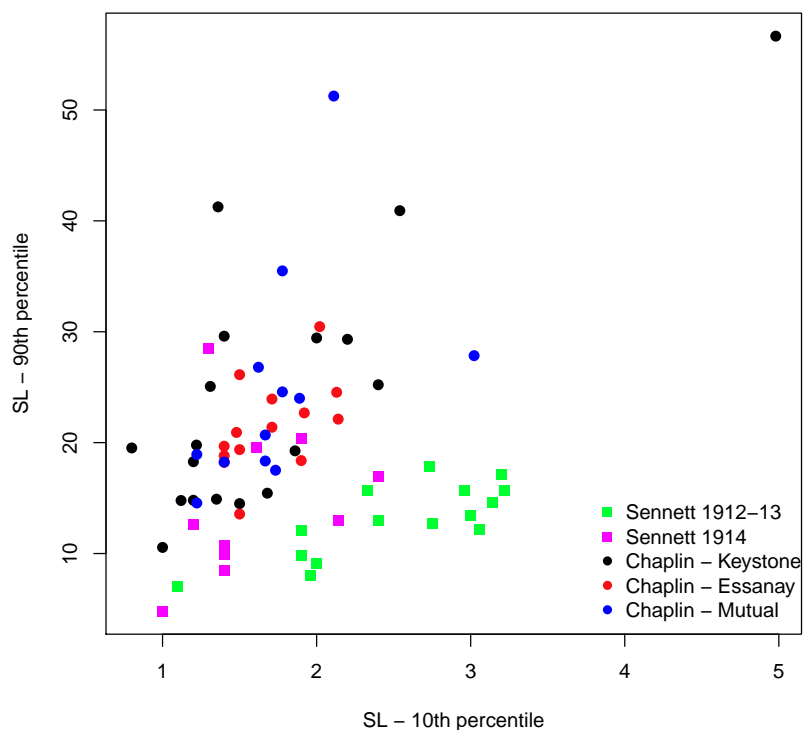


Fig. 9: A plot of the 90th against 10th percentile for all films.

is clearly cut more slowly, on average, than the other bodies of work including his own ‘early’ productions. Chronological divisions of the kind used here are inevitably a little arbitrary and that used is suggested by purely statistical criteria. On other grounds – ‘a massive leap forward both in approach to film narrative and in appreciation of the character that was developing within the tramp make-up and costume’ – Robinson (on p.126 of the 1992 revision of *Chaplin: His Life and Art*) places the ‘break’ between the release of ‘Rounders’ and ‘The New Janitor’, a difference of 13 days in terms of when the films were ‘finished’ according to the dates in Walker (2010). This differs by one film from the ‘break’ suggested by our statistical analysis, with ‘The New Janitor’ in our earlier group. Using the ‘break’ suggested by Robinson’s remarks makes no visible difference to the statistical analysis.

Returning to earlier Sennett (Biograph and Keystone 1912–1913), that the Keystones were clearly cut more rapidly than the Biographs has already been noted. Earlier analyses showed that the 1912–13 Keystones could be successfully seriated in terms of the similarity of their cumulative frequency profiles, and this can be interpreted as an ordering in terms of cutting speed. It was tentatively suggested that this could also be interpreted as a chronological ordering which, if accepted, is evidence of evolution from late-1912 through 1913 from slower to faster cutting and the even faster cutting of 1914. It is of interest to ask if there is any similar evidence of evolution within the Biograph period towards the cutting speeds that initiated Sennett’s Keystone career.

An initial correspondence analysis (not shown) suggested not. The eight earliest films to March 1912 plot all over the place with four films overlapping the Keystones on the plot. Otherwise the Biographs plot comparatively tightly, with little overlap with the Keystones, and no evidence of a chronological seriation. The same kind of story emerges looking at a plot of the MSL vs. ASL in Figure 12 where labeling, A-W and 1-15, is chronological by date of filming within the Biographs and Keystones.

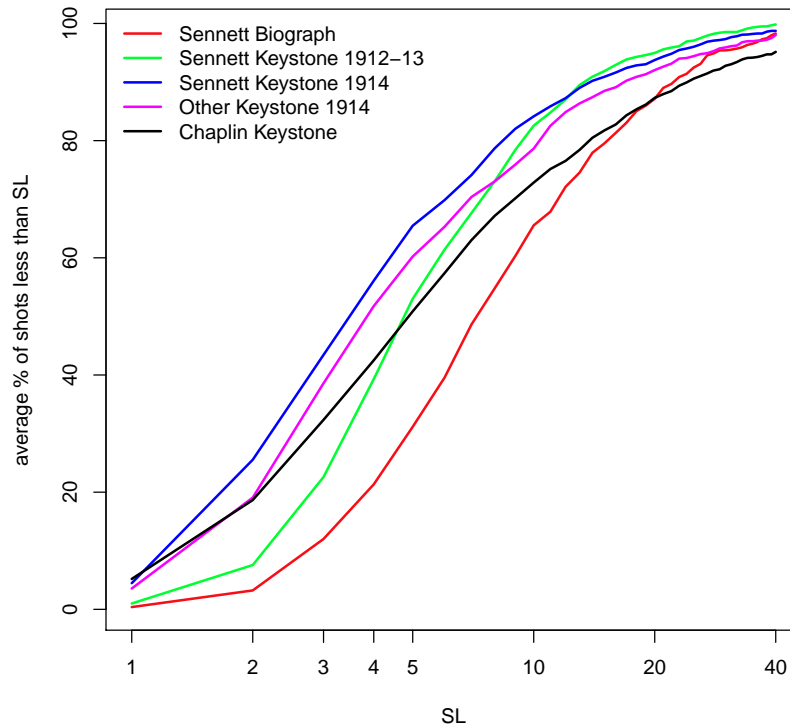


Fig. 10: Cumulative percentages of SLs in films directed by Sennett at Biograph and Keystone, Chaplin at Keystone and films from Keystone in 1914 not directed by Sennett or Chaplin.

It can be seen that there is little overlap between the two bodies of data, the Biograph films being cut more slowly. Such limited overlap as there is does not much involve films from the later Biograph period, which might be expected were there evolution towards the faster cutting of the Keystone period. In fact the three latest Biographs, U, V and W, are among the most slowly cut films. There is no evidence of chronological ordering, even imperfect, in the form of ‘alphabetical sequencing’. The evidence is thus more of a fairly abrupt change to consistently faster cutting with the transition to Keystone than any kind of evolution in this direction in the Biograph period.

6 Summary and discussion

Given the generally skewed nature of SL distributions the ASL will be more influenced by a ‘typical’ long SL than by a ‘typical’ short SL. The implication of this is that if large ASLs are associated with slow cutting this, in effect, equates such cutting with the prevalence of longer SLs. The term ‘longer’ is open to definition, necessarily somewhat arbitrary. For comparative purposes it might be defined either as an SL beyond some fixed value which would be the same for all films, or as the p th percentile of the SLs which would vary from film to film.

In the former case the percentage of shots longer than the chosen SL can be compared for films and, for a sensible choice of SL, a reasonable correlation with the ASL would be expected. For example, for all of Chaplin’s films and the Sennett Keystones, the (rank) correlation between the ASL and percentages greater than SLs in the range 11–16 seconds is 0.95 or greater⁹. In the latter case, for a sensible choice of p , one would expect a high correlation between the percentiles and

⁹ The correlations are negative.

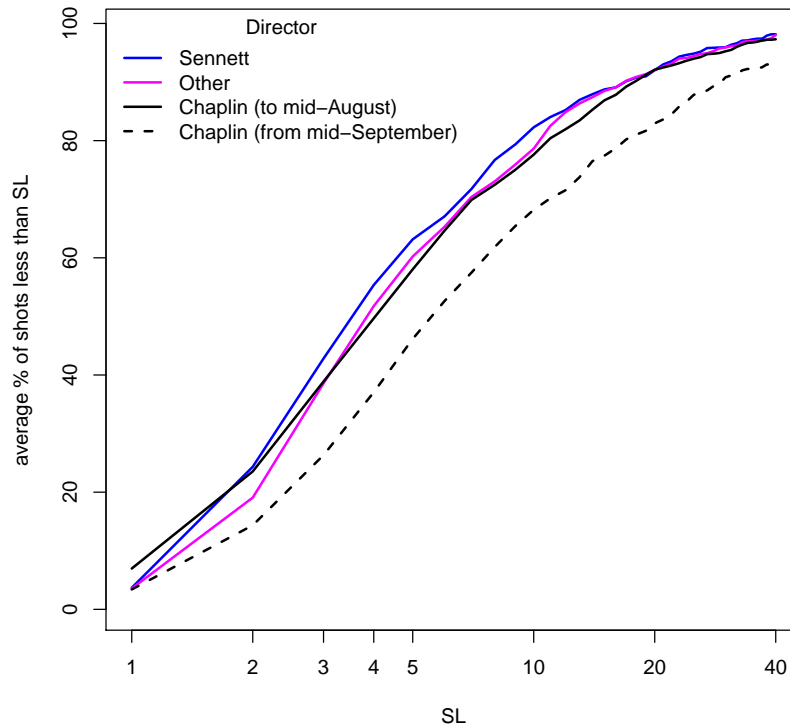


Fig. 11: *Cumulative percentages of SLs in Keystone films in which Chaplin appeared. See the text for an explanation of film selection.*

the ASL. For example, the correlation of the 80th percentile with the ASL is 0.97.

The MSL has been proposed as a preferable alternative to the ASL, sometimes on the grounds that it represents a more ‘typical’ SL than the ASL. It might be argued that in attempting to make comparisons about speeds of cutting it is the preponderance of the shortest and longest SLs that is of interest; by design the MSL is unaffected by extremes and ‘typicality’ need not necessarily be equated with speed of cutting. The median amounts to a choice of $p = 50$ and has nothing to say about the preponderance of shots at any distance from the MSL. The ASL is related to the preponderance of longer shots but is uninformative about the proportion of shorter shots. Judgments about relative speeds of cutting should, arguably, take into account the balance between ‘shorter’ and longer’ shots and both the MSL and ASL fail to do this¹⁰.

The comparison of cumulative percentages may be proposed as an alternative way of comparing films that takes account of variation across the full range of SLs. This idea is not new but has, to the best of my knowledge, been taken further here than elsewhere in the cinemetric literature in terms of the number of films investigated and averaging across a body of films. If individual films are compared then if one curve lies completely above another it can unambiguously be said to be cut more quickly. If curves cross over, and there are visible gaps between them at either end, then one film is making more use of both shorter and longer shots than the other. This is a more nuanced statement about ‘speed’ of cutting than is possible with a single statistic such as the ASL or MSL.

The same technique can usefully be applied to averaged percentages to compare bodies of films

¹⁰ The deployment of such shots within a film is also an issue. Hypothetically the first half of a film might consist mainly of long SLs and the second half of short SLs and is clearly cut differently from films where such shots are more interspersed. This is a separate subject for study.

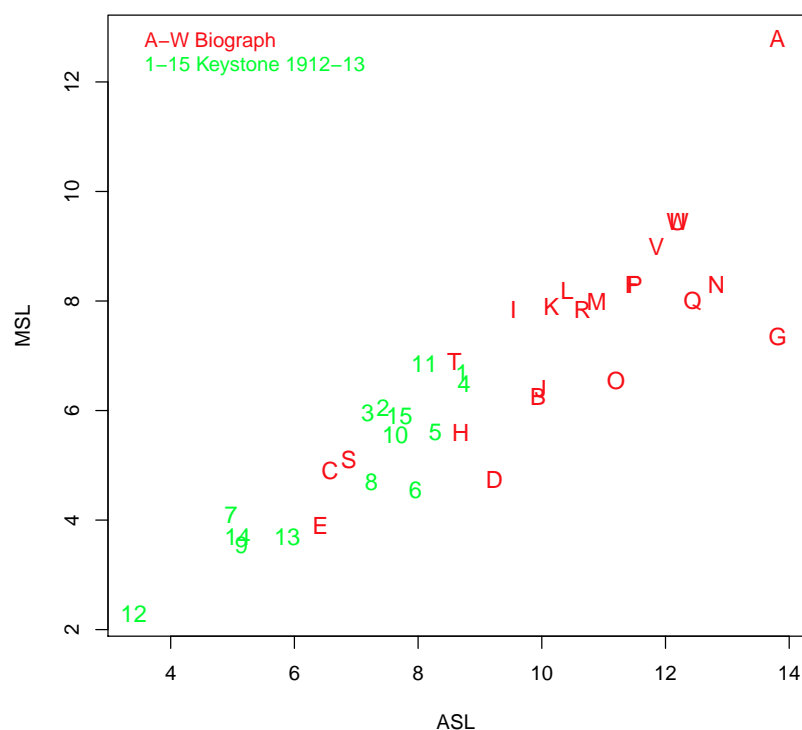


Fig. 12: A plot of MSL against ASL for Sennett's Biograph and 1912–13 Keystone films.

but, as some of the examples show, may conceal important variation within a body. It is therefore essential to supplement any analysis of averages with other analyses that allow aspects of the relationship between individual films to be explored. Plots of the MSL vs. ASL, lower vs. upper percentiles and correspondence analysis have been illustrated. The first of these is more useful than separate analysis of the ASL or MSL and should reveal anything that can be gleaned from separate analysis. I have observed, usually with films of a later date than those studied here, that the MSL and ASL are often highly correlated and tell the same story. This is not the case here. Sennett's 1912–13 Keystones, in particular, stand out and this can be interpreted in terms of their smaller relative variation (or 'swing')¹¹.

Correspondence analysis is a more 'sophisticated' technique than is commonly applied in the cinematics literature but, as used here as an exploratory tool, very easily applied once a suitable table of numbers has been constructed. In contrast to plots of the MSL vs. ASL, for example, the idea as implemented here is to compare films across the full range of their SL structure as 'coded' by the cumulative percentages. Although these different kinds of plot will often convey similar messages correspondence analysis can reveal features not (or less) evident elsewhere. That the bulk of Chaplin's films are structurally distinct from the bulk of Sennett's is perhaps clearer from the correspondence analysis than from other plots. Separating Sennett's 1912–13 films from his 1914 output is perhaps an obvious thing to do on non-statistical grounds, but the correspondence analysis suggests that this is not merely a chronological convenience and that there is some evidence of evolution towards ever faster cutting from late-1912 through 1913.

The conclusions from the various analyses may be summarized as follows, no novelty being

¹¹ To reiterate what was stated earlier, the MSL vs. ASL plot contains information about the MSL/ASL ratio and large values of these are, theoretically, associated with small values of the CV which has been used in cinematic studies to measure 'swing'.

claimed for those that are obvious or tenable.

1. In broad terms the average cutting structure for the three bodies of Chaplin's films seems very similar. At the level of detail, and as has been noted elsewhere, the Essanay films are less extreme in their use of fast and of slow cutting than the Keystones. Further comparisons with Sennett below are restricted to the Keystones.
2. There is, on average, a very obvious progression to ever faster cutting from Sennett's Biograph period, through 1912–13 at Keystone and on to 1914.
3. The 1912–13 Sennett Keystones separate out reasonably well from other bodies of films, including his 1914 films, in various ways so there is a case for making this division for other than chronological convenience. Their relative variation, as indicated by the MSL/ASL ratio and measured more conventionally by the CV is typically somewhat smaller than other films. The correspondence analysis shows that they can be seriated in a fashion that can be interpreted in terms of cutting speed and there is the tentative suggestion that this can also be interpreted chronologically. That is, the evolution of faster cutting can be traced within the 1912–13 period as well as between periods. There is little evidence, from the correspondence analysis at least, of a similar evolution in 1914.
4. There is no evidence of evolution within Sennett's Biograph period towards the cutting speeds with which he started at Keystone.
5. Sennett's 1914 films are, on average, clearly cut faster than Chaplin's Keystones considered as a whole. In comparison to the 1912–13 Sennett output Chaplin's Keystone films make greater use of both the shorter shots and the longer shots, so concluding that he cut with greater variety rather than simply 'slower' or 'faster' seems more appropriate (but see the next point).
6. Chaplin's Keystones can be fairly 'naturally' divided into those with faster cutting and those with slower cutting, with his earliest directorial efforts falling into the former category. If a purely chronological division is made between films to mid-August and those from mid-September these may be compared with the films where Chaplin appeared as an actor directed by either Sennett or by other Keystone directors. Chaplin's later films are clearly cut more slowly than any of the other groups. The comparison of his earlier films with those where he was directed by others shows little difference, Sennett possibly cutting a bit faster. The generally slower cutting in Chaplin's later directorial efforts is fairly obvious from the ASLs and MSLs alone, but the use of cumulative percentages perhaps emphasizes the structural similarities of his earlier films with those directed by others much more emphatically than does the use of ASLs alone.

Appendix 1 – Projection speeds

Chaplin's Keystone and Essanay films were measured at a projection speed of 18 fps, as were six of the 1914 Sennett films and those from other Keystone directors films from the *Chaplin at Keystone* DVDs. The Mutual films, at 20 fps, were 'corrected' to 18 fps for the purposes of analysis. Information for most of the other Sennett films that would allow correction was not available; approaches to 'correcting' these were investigated, as explained below, but not pursued in detail. The consequences of not correcting are discussed.

Paolo Cherchi Usai (2000, in *Silent Cinema*, pp.170–173) provides a table that relates footage to approximate duration at different fps values for both 35mm and 16mm film. Walker (2010, in *Mack Sennett's Fun Factory*) provides information on the footage of Sennett films. In principle, given footage and duration, this allows an estimate of the fps to be obtained; in practice results are highly variable. For example, for films where the fps is given as 18 fps the predicted fps tends to be both variable and faster. One obvious problem is that even if the footages used are

correct, and a film perfectly preserved, credit/end titles are omitted in the measurement process. Presumably, also, because of the vicissitudes of survival, conservation and restoration the original footage may not survive. This ignores intangibles such as the speed at which a film was shot, the speed at which it was intended to be projected and the possibility of intentional variation in projection speeds within a film (e.g., Usai, 2000, pp. 9–10). Ignoring this, and other issues, of the 19 Sennett Keystone films where the fps is not given, nine have a ratio with the range exhibited by the known 18 fps films, two are compatible with projection at 16 fps and the remaining eight are compatible with projection at 22–24 fps.

If films are ‘corrected’ to 18 fps using these ‘guesses’ it does not affect the main conclusions. If a ‘worst case scenario’ is used whereby *all* the Sennett films with unknown fps are treated as if projected at 24 fps and corrected to 18 fps the main effect is that the distinctive nature of the Sennett 1912–13 films stands out even more, so conclusions concerning these are secure. In particular, Chaplin’s greater use of shorter shots is particularly emphasized. This approach to correction is fraught with problems and further investigation, using a sample of 128 D.W. Griffith Biograph films, is currently being undertaken to explore it further.

Appendix 2 – Data

Id	Film	1	2	3	4	5	6	7	8	9	10	
1	Water Nymph, The	0	3.6	9.1	21.8	34.5	41.8	52.7	60.0	63.6	69.1	...
2	Grocery Clerk’s Romance, A	0	6.9	24.1	37.9	41.4	50.0	55.2	67.2	74.1	79.3	...
3	Mabel’s Stratagem	0	2.2	13.0	21.7	39.1	52.2	60.9	65.2	71.7	80.4	...
4	A Strong Revenge	0	1.2	16.7	31.0	41.7	46.4	53.6	57.1	66.7	71.4	...
5	Cohen Saves the Flag	0	4.4	9.9	25.3	41.8	57.1	64.8	70.3	72.5	75.8	...
6	On His Wedding Day	0	2.3	27.3	38.6	54.5	61.4	65.9	70.5	70.5	75.0	...
7	Life in the Balance, A	0.8	13.2	26.4	49.6	65.3	76.9	81.8	86.0	87.6	92.6	...
8	Barney Oldfield’s Race for a Life	0	0	12.0	30.6	54.6	63.9	71.3	77.8	84.3	86.1	...
9	That Ragtime Band	1.5	11.2	39.6	59.0	69.4	74.6	83.6	86.6	89.6	91.0	...
10	Fishy Affair, A	0	0	11.4	34.1	45.5	59.1	63.6	72.7	81.8	88.6	...
11	Peeping Pete	0	2.1	10.4	22.9	41.7	47.9	50.0	54.2	72.9	77.1	...
12	Mabel’s New Hero	8.9	37.7	64.4	77.4	80.8	86.3	89.7	91.8	91.8	95.2	...
13	Mabel’s Dramatic Career	1.4	14.1	30.3	57.7	67.6	72.5	79.6	84.5	85.9	87.3	...
14	Muddy Romance, A	2.4	11.8	33.1	56.7	73.2	80.3	85.8	89.8	91.3	93.7	...
15	Gusher, The	0	2.8	11.2	25.2	43.9	50.5	56.1	62.6	72.0	75.7	...
16	Tango Tangles	1.4	15.3	37.5	45.8	52.8	55.6	66.7	70.8	75.0	77.8	...
17	Mabel at the Wheel	3.4	23.2	48.5	62.6	71.0	76.8	81.1	83.2	86.9	90.2	...
18	Mabel’s Busy Day	6.1	27.3	42.4	53.0	59.1	62.1	65.2	71.2	72.7	75.8	...
19	Busy Day, A	4.8	21.4	31.0	45.2	52.4	54.8	57.1	69.0	71.4	76.2	...
20	Fatal Mallett, The	5.1	30.7	46.0	59.1	67.9	73.0	77.4	81.0	83.2	85.4	...
21	Knockout, The	1.4	28.1	51.5	66.3	75.8	80.2	83.0	85.0	86.9	88.3	...
22	Mabel’s Blunder	2.5	10.2	24.6	40.7	55.9	61.0	72.0	76.3	80.5	81.4	...
23	Hello Mabel	1.6	5.5	18.9	32.3	49.6	59.8	61.4	68.5	75.6	78.0	...
24	Noise of Bombs, The	3.1	31.7	53.4	68.9	78.9	82.0	83.2	87.0	92.5	92.5	...
25	Love, Speed and Thrills	15.4	62.0	80.5	86.9	91.4	93.2	94.1	95.0	95.5	95.9	...
	Mean	2.4	14.8	30.9	46.0	58.0	64.8	70.2	75.3	79.9	83.2	...

Tab. 4: *Percentage of shots less than or equal to given SLs in Keystone films directed by Sennett. Films 1–4 are 1912, 5–15 are 1913, 16–25 are 1914.*

Id	Film	1	2	3	4	5	6	7	8	9	10	
44	His New Job	2.3	9.2	24.1	35.1	41.4	48.3	54.0	57.5	61.5	64.4	...
45	Night Out, A	1.7	10.4	19.1	29.5	37.6	45.1	50.3	54.3	59.0	62.4	...
46	Champion, The	4.0	20.7	33.9	44.8	50.0	56.9	63.2	67.2	70.1	72.4	...
47	In the Park	2.0	13.0	26.0	40.0	47.0	51.0	57.0	64.0	67.0	69.0	...
48	Jitney Elopement, A	4.7	17.4	29.7	40.1	47.1	54.1	58.1	63.4	72.7	72.7	...
49	Tramp, The	2.5	13.6	25.9	37.7	45.7	53.7	58.6	61.1	63.6	66.0	...
50	By the Sea	2.2	10.1	15.7	31.5	44.9	55.1	59.6	65.2	68.5	70.8	...
51	Work	4.1	16.0	31.4	42.6	52.7	56.2	62.1	63.9	68.0	71.0	...
52	A Woman	3.6	15.9	33.8	44.6	56.9	62.1	68.2	69.7	71.8	73.8	...
53	Bank, The	6.0	16.4	32.2	44.3	51.9	61.2	65.0	69.9	73.2	74.3	...
54	Shanghai'd	6.3	21.7	33.3	43.4	56.1	60.8	66.1	68.8	74.6	76.7	...
55	Night in the Show, A	4.8	19.1	41.5	56.9	67.0	72.3	78.2	81.9	84.6	85.6	...
56	Burlesque on Carmen	2.3	12.7	32.9	48.4	56.8	61.0	69.5	70.4	72.8	74.6	...
57	Police	4.9	12.0	26.1	39.4	47.9	51.4	57.7	61.3	63.4	67.6	...
	Mean	3.7	14.9	29.0	41.3	50.2	56.4	62.0	65.6	69.3	71.5	...

Tab. 5: Percentage of shots less than or equal to given SLs in Essanay films directed by Chaplin.

Id	Film	1	2	3	4	5	6	7	8	9	10	
58	Floorwalker, The	2.6	18.3	31.4	41.2	50.3	56.2	59.5	60.1	63.4	66.7	...
59	Fireman, The	1.9	16.9	30.9	48.3	54.6	61.4	67.6	74.4	76.8	80.7	...
60	Vagabond, The	0	3.0	10.5	23.3	32.3	42.9	45.1	48.9	52.6	55.6	...
61	One A.M.	0	9.4	26.6	29.7	39.1	40.6	43.8	43.8	51.6	53.1	...
62	Count, The	0.7	13.9	25.2	37.1	45.7	53.6	57.0	59.6	60.9	64.9	...
63	Pawnshop, the	1.7	17.4	25.2	36.5	41.7	47.0	48.7	52.2	57.4	60.0	...
64	Behind the Screen	7.6	28.8	44.9	55.1	61.1	65.7	68.7	69.7	73.2	76.8	...
65	Rink, The	1.0	16.5	28.0	40.5	52.0	62.0	65.0	71.0	75.0	77.0	...
66	Easy Street	4.0	18.9	37.1	48.6	55.4	59.4	64.0	68.0	69.7	73.7	...
67	Cure, The	5.6	27.4	40.6	48.2	54.3	57.9	62.4	69.0	71.6	76.6	...
68	Immigrant, The	0.6	17.8	38.2	45.9	52.9	59.2	61.8	63.7	67.5	69.4	...
69	Adventurer, The	6.5	28.7	43.7	53.4	61.9	69.2	75.3	76.9	80.6	82.2	...
	Mean	2.7	18.1	31.9	42.3	50.1	56.3	59.9	63.1	66.7	69.7	...

Tab. 6: Percentage of shots less than or equal to given SLs in Mutual films directed by Chaplin.

Id	Film	1	2	3	4	5	6	7	8	9	10	...
A	Comrades, The	0	4.8	9.5	11.9	11.9	16.7	28.6	42.9	42.9	45.2	...
B	Manicure Lady, The	0	1.5	16.7	30.3	36.4	47.0	59.1	65.2	71.2	77.3	...
C	Diving Girl	0	9.1	31.8	45.5	50.0	61.4	70.5	75.0	79.5	79.5	...
D	Baron, The	5.3	13.2	36.8	42.1	55.3	55.3	63.2	63.2	68.4	71.1	...
E	With a Kodak	0	3.4	35.6	57.6	62.7	66.1	67.8	76.3	76.3	83.1	...
F	Engagement Ring, The	0	0	2.4	17.1	24.4	26.8	39.0	48.8	53.7	58.5	...
G	Spanish Dilemma, Thr	0	8.8	17.6	29.4	35.3	41.2	41.2	52.9	55.9	58.8	...
H	Hot Stuff	0	0	7.4	24.1	44.4	53.7	53.7	61.1	64.8	70.4	...
I	Oh, Those Eyes!	0	5.8	7.7	23.1	26.9	40.4	48.1	50.0	57.7	65.4	...
J	Help! Help!	0	2.1	10.6	19.1	31.9	44.7	55.3	59.6	66.0	70.2	...
K	Brave Hunter, The	2.3	9.3	16.3	18.6	23.3	34.9	46.5	51.2	55.8	62.8	...
L	Won by a Fish	0	0	3.7	18.5	25.9	27.8	42.6	48.1	57.4	61.1	...
M	Fickle Spaniard, The	0	0	7.3	14.6	29.3	39.0	43.9	51.2	61.0	73.2	...
N	Furs, The	0	0	0	5.9	26.5	38.2	44.1	47.1	55.9	58.8	...
O	Helen's Marriage	0	2.8	11.1	22.2	36.1	41.7	52.8	55.6	55.6	58.3	...
P	Tomboy Bessie	0	0	9.3	14.0	20.9	27.9	41.9	48.8	58.1	62.8	...
Q	Neighbors	0	0	0	3.7	7.4	29.6	40.7	51.9	51.9	59.3	...
R	Katchem Kate	0	1.7	13.3	15.0	25.0	35.0	45.0	51.7	65.0	73.3	...
S	Dash Through The Clouds, A	1.4	5.5	20.5	28.8	49.3	58.9	71.2	75.3	82.2	82.2	...
T	What the Doctor Ordered	0	1.4	11	19.2	28.8	38.4	50.7	57.5	63.0	71.2	...
U	Tourists, The	0	2.5	2.5	12.5	25.0	32.5	40.0	42.5	47.5	52.5	...
V	Interrupted Elopement, An	0	0	2.5	5.0	15.0	20.0	32.5	42.5	50.0	60.0	...
W	Tragedy of a Dress Suit, The	0	2.5	2.5	12.5	25.0	32.5	40.0	42.5	47.5	52.5	...
	Mean	0.4	3.2	12	21.3	31.2	39.5	48.6	54.8	60.3	65.5	...

Tab. 7: Percentage of shots less than or equal to given SLs in Biograph films directed by Sennett. Films A–D are 1911, E–W are 1912.

Id	Film Johnie	1	2	3	4	5	6	7	8	9	10	...
a	Making a Living	0.8	21.1	42.3	58.5	68.3	72.4	76.4	80.5	83.7	86.2	...
b	Kid Auto Races	0	0	10.0	10.0	20.0	25.0	40.0	40.0	40.0	50	...
c	Mabel's Strange Predicament	1.1	19.4	44.1	63.4	68.8	69.9	73.1	75.3	77.4	78.5	...
d	Between Showers	3.6	10.8	21.7	27.7	39.8	48.2	53.0	56.6	61.4	68.7	...
e	Film Johnie, A	4.9	14.6	34.0	44.7	57.3	66.0	72.8	73.8	76.7	78.6	...
f	His Favorite Pastime	4.1	27.0	47.3	54.1	60.8	64.9	70.3	70.3	71.6	73	...
g	Cruel, Cruel Love	3.3	18.3	42.5	61.7	70.8	76.7	83.3	88.3	90.0	93.3	...
h	The Star Boarder	4.7	14.1	38.8	52.9	60.0	63.5	69.4	70.6	74.1	75.3	...
i	Caught in a Cabaret	6.0	27.2	38.0	51.1	56.0	60.9	64.7	69.0	72.3	75.5	...
	Mean	3.2	17.0	35.4	47.1	55.8	60.8	67.0	69.4	71.9	75.5	...

Tab. 8: Percentage of shots less than or equal to given SLs in Keystone films with Chaplin as an actor directed by Henry Lehrman (a, b, d), Mabel Normand (c, i) and George Nichols (e-h).