Statistical Analysis of Television Style: What Can Numbers Tell Us about TV Editing?

by JEREMY BUTLER

Abstract: This article assays the value of splicing together humanities-based analysis of television style with digitally generated statistical data. The editing style of the situation comedy *Happy Days* (1974–1984) provides an intriguing test case for the utility of such analyses, as the show made a radical shift in its mode of production after its second season—switching from single camera to multiple camera (with a studio audience). Using data collected on Shot Logger (http://www.shotlogger.org), this article measures the cutting rates correlated with each mode of production and finds a statistically significant difference between the two. Additionally, the article examines the general acceleration of cutting rates on American television since 1951 and comes to a perhaps surprising conclusion about the impact of individual editors on television style.

In extending our critical methodologies, we must have at least a passing familiarity with code languages, operating systems, algorithmic thinking, and systems design. We need database literacies, algorithmic literacies, computational literacies, interface literacies. We need new hybrid practitioners: artist-theorists, programming humanists, activist-scholars; theoretical archivists, critical race coders.

—Tara McPherson

*Happy Days* was my artistic period. I wanted to make a little film each week, all one-camera shoots like a little film. Pretty! Nice! And they said, “Too soft, and too expensive.”

—Garry Marshall


Tara McPherson’s clarion call for mixed-methods practitioners asks those of us in media studies to radically extend and rethink our methodological boundaries. She is not alone. Scholars within the burgeoning, amorphously defined, hybridized field of digital humanities are beginning to make significant inroads into the sometimes recalcitrant discipline of media studies. McPherson herself presented her notion of programming humanists at the 2011 SCMS conference, during a workshop tellingly titled “New Media Futures: The Digital (the Academy).” Miriam Posner and Jason Mittell subsequently carried the digital humanities torch further with a 2013 SCMS workshop that “staged an encounter” between the digital humanities and film and media studies. Academia of the 2010s may well be defined by digital humanities encounters, as discussion (argument?) about it has already generated a 516-page anthology on “debates in the digital humanities,” in which McPherson’s essay is reprinted. Moreover, the New York Times has announced the arrival of “Humanities 2.0” in a series of articles. Even the august National Endowment for the Humanities has opened the Office of Digital Humanities to fund start-up grants “for projects designed to explore and develop innovative uses of technology in humanities education, scholarship, and public programming.” Inevitably, such projects require a blending of expertise from previously antipathetic disciplines. Many in media studies have been heretofore resistant to developing the literacies that McPherson articulates and that digital humanities demands. In our desire to distinguish humanities-based media studies from social science–based mass-communication studies, this antagonism toward digits, toward numbers, has commonly expressed itself in a specific resistance to statistical literacy. For decades, the border between statistical method and critical theory has been heavily barricaded. Researchers on opposite sides of this particular border collaborate very infrequently. Journals and conferences seldom accept papers outside their own research bailiwicks. There are tiresome historical reasons for these divisions and practical challenges for researchers attempting to hyphenate themselves—artist-theorists, activist-scholars, theorist-statisticians—but there are few genuine epistemological barriers to academic border crossing.

In media studies, this border crossing is not utterly unknown, as is illustrated by the infiltration of the social-scientific, ethnographic work within the British cultural studies model—research involving actual, human television viewers—into humanities strongholds such as Screen, the British Film Institute, and the Society for Cinema and

4 Miriam Posner, Jason Mittell, Hannah Goodwin, Jasmijn Van Gorp, Jason Rhody (in absentia), and Eric Faden, “Digital Humanities and Film and Media Studies: Staging an Encounter” (workshop, Annual Meeting of the Society for Cinema and Media Studies, Chicago, March 8, 2013).
Media Studies during the 1970s and 1980s. Media ethnographers and their reliance on Geertzian cultural anthropology have thus paved the way for media studies to incorporate social-scientific methods. Moreover, the field of anthropology itself provides an intriguing precedent for such border crossing: the research tradition known as mixed-methods research, which blends qualitative and quantitative methods. Taking a page from such mixed-methods research and aspiring to become one of McPherson’s digital humanities hyphenates, the present study assesses the feasibility and usefulness of importing computer-based, quantitative, statistical methods into television critical studies.

To test statistics’ applicability to television studies I have chosen to examine editing rhythms in American narrative programs. Editing analysis readily lends itself to statistical computation because it is relatively simple to measure the lengths of shots and thus convert a qualitative, stylistic component into quantitative data. Once in numeric form, data can be easily stored in a database, and any number of computations and manipulations can be carried out with them. In specific terms, I’ve collected shot-length data for all eighty-seven episodes from the first four seasons of the television program Happy Days (ABC, 1974–1984) and have made this data set available online for other researchers to examine. Happy Days provides a unique test case for the impact of production mode on editing pace and rhythm. Its first two seasons were shot using the single-camera mode of production, but according to producer Garry Marshall, that mode’s comic impact was considered too subtle, too “soft,” to garner a large audience. Consequently, the third and subsequent seasons changed to a broader comedic style and a different, less expensive mode of production: multiple-camera shooting in front of a studio audience. The division between single-camera and multiple-camera episodes does not precisely align with the program’s seasons, however, as the second season has one experimental multiple-camera episode, and some of the third and fourth seasons have significant single-camera scenes within the multiple-camera episodes. Nonetheless, the shooting styles of the two modes are distinct enough that a researcher can easily detect which episodes—and which scenes within individual episodes—used each mode of production.

My main hypothesis, thus, is that the mode of production used in Happy Days correlates with the speed of cutting rates. Statistics provides a way to test for the difference

8 One notable early practitioner of the cultural studies model was David Morley. In 1992, he chronicled the evolution of this approach with regard to TV studies in Television, Audiences, and Cultural Studies (London: Routledge, 1992).
13 Also, the multiple-camera episodes with audiences are identified at the start by Tom Bosley announcing, “Tonight’s Happy Days was filmed before a live audience” or “Happy Days is filmed before a live audience.”
between the two rates and to quantify both the degree and the significance of the difference. Further, digital technology—when employed by McPherson’s programming humanists—provides new tools for calculating stylistic statistics and understanding the vagaries of moving-image style. And yet for scholars such as myself, trained in 1970s humanities-based film studies programs, this is a rather unnerving prospect. Does all this digital manipulation offer us anything that we could not discover while watching a movie in the dark and scratching cuneiform notes with a stylus into a clay tablet?

**Statistical Analysis in Media Studies.** Well before the rise of the digital humanities, there have been occasional attempts at numbers-based analyses of film. Yuri Tsivian traces these efforts all the way back to Hugo Münsterberg’s 1916 consideration of the psychological impact of editing in the silent cinema. Similarly, Kristin Thompson uncovered a 1926 analysis of silent-cinema editing metrics in a German technical film magazine. And silent filmmakers themselves were well aware of the power of shot lengths. Sergei Eisenstein’s 1929 essay “Methods of Montage” explains that the “fundamental criterion” for what he called metric montage “is the absolute lengths of the pieces. The pieces are joined together according to their lengths, in a formulascheme corresponding to a measure of music. . . . Tension is obtained by the effect of mechanical acceleration by shortening the pieces while preserving the original proportions of the formula.” Decades after the silent-film era, Barry Salt issued a functional manifesto for the application of statistics to film style in a 1974 *Film Quarterly* essay. Although cinema style has remained his main preoccupation, he also offered some exploratory comments on the statistical analysis of television style in 2001.

Despite these early efforts and Salt’s continuing advocacy, most of twentieth-century, humanities-based media studies evidenced little interest in the statistical analysis of film or television style—with no scholarly monographs (aside from Salt’s efforts) and very few journal articles devoted to the topic. At the same time that film and the later-developing television studies were shunning statistical analysis, a significant strain

---


17 This can be observed in Eisenstein’s own work, such as *October* (1927). Sergei Eisenstein, “Methods of Montage,” in *Film Form: Essays in Film Theory*, ed. and trans. Jay Leyda (New York: Harcourt, Brace & World, 1949), 72.


20 Still, there have been persistent efforts in this area. David Bordwell and Kristin Thompson, the two most influential stylisticians in film studies, often refer to average shot lengths in their analyses of editing. One anthology has appeared which collates work in this area: Michael Ross, Manfred Grauer, and Bernd Freisleben, eds., *Digital Tools in Media Studies: Analysis and Research, An Overview* (Bielefeld, Germany: Transcript Verlag, 2009).
of media analysis was embracing it. Within the US “mass communication” research tradition, statistics became the dominant method for measuring media effects in post–World War II academe.\(^\text{21}\) To this day, mass-communication researchers rely on surveys and physiological measuring devices (tracking heart rate, eye movement, and so on) to gather data on media’s impact on their users. Yet another mass-communication application of statistics is “content analysis,” an approach that counts the number of incidences of certain elements within a media text. Those counts may be put to descriptive use or may have statistical calculations run on them to test hypotheses about differences among texts—across genres or over time, for example.\(^\text{22}\) Furthermore, academic researchers are not the only ones employing the statistical analysis of media. Outside academe, media industries generate vast mountains of statistical data based on film box-office results and Nielsen television ratings. And before films, commercials, and TV programs are aired, they go through rigorous, statistically based market research. Thus, digitally grounded statistical methods are embraced in both academic mass-communication research and media industries but not in humanities-based film or television studies.

As the twenty-first century began, however, fresh interest in the statistical analysis of film and television began to evolve within critical studies. These new scholarly enterprises were not rooted in box-office numbers, TV ratings, effects measurement, or content analysis. Rather, they directly addressed the significance of film and television style, emphasizing form rather than content or effect, and they blossomed from a fertile digital humanities mixture of easily accessible digital video, applications for manipulating that video, and do-it-yourself software coding. In recent years, several of McPherson’s programming humanists have been drawn to the statistical analysis of visual and sound style. The Institute for Research and Innovation of the Centre Pompidou created Lignes de Temps (Time Lines), software that facilitates shot-by-shot analysis of films (Figure 1).\(^\text{23}\) Luminaries of French film scholarship such as Raymond Bellour and Jean-Louis Comolli have participated in the project. Similarly, the Cinemetrics project, developed by Yuri Tsivian and Gunärs Civjäns, has attracted an international cadre of film and TV scholars and statisticians—including Salt (Figure 2).\(^\text{24}\) And EDIT2000 software calculates statistics and draws graphs based on the edit decision lists generated by digital video-editing software (Figure 3).\(^\text{25}\) Looking beyond these programming humanists, we might well find researchers in information science who also work on video


The latter are often obsessed with identifying stylistic video elements to support the archiving and indexing of moving images. To index video and attach metadata to it for search applications, for example, researchers must detect “shot boundaries” to situate the location of those metadata.

Lignes de Temps has been part of the research center Media Upheavals, which was funded by the German Research Foundation. In this context, Ralph Ewerth and his colleagues have developed the software tool kit Videana (Figure 4) for automatic video content analysis. Fully automatic shot-boundary detection (SBD) has become the holy grail of...
video indexing—resulting in numerous competitions and well-funded, proprietary systems. So far, no one has created SBD software with a 100 percent accuracy rate, which is why all the projects mentioned here still rely on human input to identify shot changes.

These projects within film studies and information sciences inspired my own entry into software-aided statistical-style analysis—leading me to create Shot Logger, an online digital humanities application for measuring shot lengths (located at ShotLogger.org; see Figure 5). As of this writing, Shot Logger contains shot-length data for 910 instances drawn from 232 films and television programs. Its software, which I coded in PHP and MySQL, relies on video-frame captures created as JPEG files by the VLC Media Player.

Each of the approximately 250,000 frames entered into Shot Logger has time-code data embedded in its file name, indicating the starting times of every shot in the analyzed films and TV episodes. Using these starting-time data, we can easily calculate both the length of each shot and identify where it occurs in the video text, thereby detecting shot boundaries. The frames must be captured manually, while watching the video, but Shot Logger can then use them to automatically generate descriptive statistics for a video


Whether researchers code their own software or take a number clicker to a film screening and count shots, the first step of any statistical analysis is a descriptive one, as we can see in Table 1. However, descriptive statistics are just an unhelpful jumble of numbers until they correlate one variable with another. Figure 6 illustrates how statistical correlation functions in television analysis, although the same principles apply in the cinema. This rudimentary diagram presents the basic processes of television production and reception horizontally across the top. The “TV production apparatus” refers to everything and everyone that contributes to the construction or “encoding” of that text: financial institutions, the Federal Communications Commission, networks, production companies, scriptwriters, directors, cinematographers, actors—even the technology used to distribute, transmit, and display the television text. And “reception by viewer” refers to the activity of human viewers, the audience, as they respond to the text and cognitively process or “decode” it. For purposes of illustration, I have greatly simplified Stuart Hall’s frequently invoked encoding and decoding process, but doing so allows me to cluster statistical variables in three locations: