17 Tipping the Scales of Film History

A Note on Scalability and Film Historiography

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Abstract
Research in film studies has a long history of productively borrowing theories and concepts from other fields. Today, film culture and moving image practice are mostly based on computational technologies, and computer science has emerged as an important new source for models, scripts, and concepts for film research. "Scalability" is increasingly used to describe a desired feature in computational research designs, but also to characterize the medium of film itself. In response to advances in format theory and the emergence of computational methods in film history this contribution proposes to discuss the meanings and uses, but also the potential side effects, of the concept of scalability for film research. The contribution asks four interrelated questions: How do historical facts become data? Is film a scalable medium? Are film histories scalable? And what, if anything, about film is non-scalable, i.e. which are the facts of film history which do not compute?

Keywords: film historiography, scalability, history of film studies, digital methods, format theory

A theory of nonscalability might begin in the work it takes to create scalability—
and the messes it makes.
—Anna Lowenhaupt Tsing[1]

1 Anna Lowenhaupt Tsing, *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins* (Princeton: Princeton University Press, 2015), 38.

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As film culture increasingly morphs and in some ways dissolves into a broader media culture evolving around the production and circulation of digital moving images, concepts from computer science gain currency in film and media theory, and in film historiography. One such concept is scalability, which describes the potential of a system, network, or process to change scale, and, more specifically, the ability to change its scale continuously and adapt to future changes without affecting its basic structure and operating conditions. Usually, scalability refers to growth through marginal input or, in economic terms, to a type of growth in which fixed costs remain stable or increase only marginally relative to growth. So far, the concept of scalability has two main applications in film-related research: It refers to a property of computational research designs relating to film and film history, and it refers to a property of film itself, one which the medium has always had, but which only recently has been described in those terms. For instance, in their recent work on early cinema-going in Amsterdam Julia Noordergraaf and Thunis van Oort combine spatial models and maps with demographic data to create inferences about actual behaviour and "detect audiences" at both the micro-level (neighbourhood) and the meso-level (city). This model can then be further scaled across spatial and temporal dimensions to create a plausible historical view of movie-going and its transformation even in the absence of fine-grained specific data.[2] Furthermore "scalability" has been used to describe film itself as "scalable across a variety of formats and standardized with a view to global circulation,"[3] and "scalability" has become an important concept in the emerging sub-field of format studies. In particular, the concepts of format and scalability offer a way of accounting for the digital transformation of film and film culture and of bracketing together the pre- and post-digital periods of film history. If analogue moving images had a gauge and an aspect ratio, digital image formats are defined through resolution and are embedded in systems and networks which are both scalable.[4] Format studies thus opens up an avenue to project the question of scalability back unto the entire history of film to date. Furthermore, picking up from format studies' retrospective projection, "scalability" can also be used for an assessment of current modes of film historiography in

2 See Julia Noordergraaf and Thunis van Oort, "A Digital Toolkit to Detect Audiences of the Silent Era: Scalable Perspectives on Film Exhibition and Consumption in Amsterdam Neighborhoods (1907–1928)," *Studies in European Cinema* 18, no. 2 (2021): 252–73.

3 https://meson.press/series-page/configurations-of-film/.

4 See Jonathan Sterne, *MP3: The Meaning of a Format* (Durham: Duke University Press, 2012); Marek Jancovic, Axel Volmar, and Alexandra Schneider, eds., *Format Matters: Standards, Practices and Politics in Media Culture* (Lüneburg: Meson Press 2020).

the transition to post-digital film culture: to evaluate not only the degree to which they have been accounting for the scalability of the medium itself, but also the degree to which film historiographies have always already conceived of film history as scalable across time and space, at the possible expense of the non-scalable dimensions of that history.

"Scalability" is, in other words, a concept which has been brought in from another field to solve specific problems in film-related research. In the process, it has opened up new possibilities for research but also created awareness for potential pitfalls associated with this very concept. In particular, when such a conceptual transfer happens in a moment of fundamental transformation of a field, of its objects and methods, as is the case of film studies right now, the new concept has the potential to radiate beyond the narrow problem which it was brought in to address, particularly if the application to the new field broadens the concept's original meaning. This carries a danger of over-promise. The two major incidents of over-promise in film theory so far have been the mind-film analogy and the language-film analogy. The mind-film analogy started with Hugo Münsterberg in 1916, who likened cinematic techniques like the flashback to mental operations like memory. It carried over into apparatus theory, which conceived of the cinematic apparatus in analogy to the psychic apparatus as described by Freud, and into cognitive film theory, which conceived of the mind of the spectator in analogy to an information processing device, i.e. a computer. The language-film analogy can be traced back at least to Bazin but became a powerful research paradigm with film semiotics and the confluence of structural linguistics and film studies in the work of Christian Metz. The mind-film analogy exerted a strong fascination on theorists, which was probably grounded in the persistence of what Phillipe Descola has called the ontology of analogism,[5] but it ultimately only yielded a limited set of resemblances and homologies between film and the respective models of the mind, with limited explanatory power.[6] The language-film analogy mainly produced evidence that the conventions of cinematic narration are much less robust and stable than the syntactics and semantics of natural languages, and the semiotics of film were saved by Roger Odin's turn to pragmatics and a rigorous modelling of various modes of reading rather

5 See Philippe Descola, *Beyond Nature and Culture* (Chicago: University of Chicago Press 2013).

6 Noël Carroll has offered a forceful critique of the limitations of the mind–film analogy in Münsterberg and apparatus theory, but failed to address the pitfalls of the mind-film analogy in cognitive film theory, with which he was associated. See Noël Carroll, "Film/Mind Analogies. The Case of Hugo Münsterberg," *Journal of Aesthetics and Art Criticism* 46, no. 4 (1988): 489–99.

than the study of the purported linguistic structures of film.[7] So, mindful of the dangers of over-promise in the transfer of concepts from one field of knowledge to another, what we propose to offer in this contribution and at this particular juncture of the growing efflorescence of the concept of scalability across a variety of fields, including film and media theory and film historiography, is a critical evaluation of the concept's uses, limitations, and—to use a pharmacological metaphor—its potential side effects.

To offer such a critical evaluation we want to ask four related questions. Our first question is whether historical facts, including the facts of film history, are scalable. Our answer will be that contrary to a belief which is the bedrock of historicism, facts cannot speak for themselves but depend on conceptual constructs and relations to become meaningful. Incidentally, the same goes for data in the broadest sense. This requires an inquiry into the process by which facts become data and data become historical facts, a metahistory of datafied historical facts. We then want to discuss the various layers of meaning of the concept of scalability and address whether film itself can indeed be seen as a scalable medium. To do so we discuss a strong claim that the emergence of machine learning marks the point at which film finally becomes scalable and weigh it against our own earlier claim that film, in a way, has always been scalable. The third question moves on from film as a potentially scalable medium to film historiographies as potentially scalable systems for processing film historical facts. Our point will be that particularly the founding paradigm of film historiography, the auteur/nation approach to cinema, can be described as a scalable system, with distinctive downsides for much of what belongs to film history but does not match the paradigms' definition of a historical fact. And finally, we want to turn to the question of non-scalability and address the messes and omissions created by ways of thinking about film historically in terms of scalability.

Are Historical Facts Scalable?

In a paper first delivered at the forty-first annual meeting of the American Historical Association in Rochester, New York, in 1926 but published only in 1955, historian Carl L. Becker asks a seemingly innocuous question: What are historical facts?[8] Becker's starting point is the observation that there

7 See Roger Odin, *Spaces of Communication: Elements of Semio-Pragmatics* (Amsterdam: Amsterdam University Press, 2021).

8 See Carl L. Becker, "What Are Historical Facts?" *Western Political Quarterly* 8, no. 3 (1955): 327–40.

is a broad, if unspecific consensus about what historical facts are, which includes the assumptions that facts provide a solid, reliable foundation for inquiry, and that they are largely self-evident, i.e. that they "speak for themselves." This consensus could be described as the dogma of historicism, a nineteenth-century approach to historiography which has survived well into the twentieth century in some quarters. To the self-evident facts according to this dogma the historian relates as a mere conduit, a transparent medium which will show "how things really were," to quote German historian Leopold von Ranke, "*wie es wirklich gewesen ist*." Becker unsettles the historicist consensus with three interrelated questions: What is a fact? Where is a fact? And when is a fact? His answers are: (1) A fact is an affirmation, a "statement about the event [...] which affirms the fact that something occurred"[9]; (2) as a consequence, facts are not in the records or sources, but in people's mental representation of that which they affirm to have occurred[10]—which also means that historical facts are inexorably linked to the present, in the sense that "it is the persisting historical fact, rather than the ephemeral actual event, which makes a difference to us now; and the historical fact makes a difference only because it is, and so far as it is, in human minds"[11]; and (3) a historical fact is when there is a mental image of an event in the past which is relevant in the present with a view to the future, i.e. a conscious mental representation with an element of retention (of the past) and protention (as openness to the future), to put it in phenomenological terms. Becker, in other words, connects historical facts to mental representation and to the acts of enunciation—speaking and writing as the basic operations of historiography—and to the specific concerns of those who write and speak history. Becker's approach to historical facts and his critique of the dogma of historicism thus prefigures Hayden White's *Metahistory*, an influential reading of the classics of nineteenth-century historiography in terms of their narrative structure, by almost fifty years.[12] Like White, who attracted the misplaced ire of some parts of the historical profession for his purported postmodernist relativism, Becker is no relativist. Rather, steeped in German philosophy and particularly in Nietzsche, who he quotes directly, he proposes a perspectivist view of historical facts. Most importantly for our concerns, however, Becker treats historical facts as what we could describe

9 Ibid., 330.

10 Ibid., 331.

11 Ibid., 332

12 See Hayden White, *Metahistory: The Historical Imagination in 19th-Century Europe* (Baltimore: Johns Hopkins University Press, 1973).

as *information* in the sense of Gregory Bateson, i.e. as a difference which makes a difference: "an ephemeral actual event which makes a difference to us now."[13]

In his recent book *Engines of Order*, philosopher and computational media theorist Bernhard Rieder offers a critique of another dogma, a dogma of data science which says that "data speak for themselves." Rieder writes:

> [F]or any sufficiently complex data set, the idea that "the data speak for themselves" is implausible; developers and analysts select from a wide variety of mathematical and visual methods to *make* the data speak, to filter, arrange, and summarize them from different angles, following questions that orient how they look at them. Rather than ideas of a natural order, there are guiding interests that drive how data are made meaningful.[14]

Once again, an analogy suggests itself: An analogy between the dogmas of historicism and of data science, the dogmas of facts and data which speak for themselves. To this, we can add a parallelism of the proposed remedies. If Becker introduces his three questions—what, where, and when a historical fact is—to demonstrate that facts do not speak for themselves, Rieder proposes what he calls, in the subtitle of his book, a "mecanology of algorithmic technics" to analyse how data are made meaningful. Drawing on Gilbert Simondon's philosophy of technology, he proposes to delineate "technical elements, individuals, and ensembles, to conceptualize algorithmic techniques as central carriers of technicity and technical knowledges in the domain of software."[15] But then, analogies only go so far. Data, of course, are usually defined as sets of measurable facts. Historical facts, by contrast, typically refer to ephemeral events which leave no traces which lend themselves to mathematical formalism. The history of cinema is a case in point. Pierre Sorlin once argued that the true object of film history would be the act of projection and the viewing of films. But since neither produces archivable traces which could serve as sources it is not possible to write the history of film.[16] A research design like that of Noordegraaf and van Oort proposes to close what we may call the "Sorlin gap" by substituting combinations of

13 Gregory Bateson, *Mind and Nature: A Necessary Unity* (New York: E. P. Dutton, 1979).

14 Bernhard Rieder, *Engines of Order: A Mecanology of Algorithimic Techniques* (Amsterdam: Amsterdam University Press, 2020), 32.

15 Ibid., 17.

16 See Pierre Sorlin, "Ist es möglich, eine Geschichte des Kinos zu schreiben?," *montage/av* 5, no. 1 (1996): 23–37.

relevant available data for missing historical facts. Thus, data and historical facts converge when algorithms create historical facts much in the same way that Becker's "affirmations" create relations between events to conjure a mental image of a historical fact, or rather the historical fact as cognitive operation. And at this juncture, when historiographical research designs turn into systems for processing data sets historical facts do in fact become scalable. At the same time, the resulting historiographies call for something like a mecanological metahistory which helps us understand where, when, and how facts become data, and when, where, and how data-processing algorithms produce historical facts. But if film history is understood not just as the history of projection, but as the history of the medium, which includes its form, and if the medium itself can indeed be described as scalable, as a scalable system for processing inputs and creating outputs, then what exactly are we to understand as the scalability of film, and how does it inform the historiography of the medium?

Is Film a Scalable Medium?

In Charles and Ray Eames' film *Powers of Ten*, a camera zooms away from a couple on a picnic blanket in a Chicago park to outer space and then back in and into the microscopic realm beneath the ground on which the couple is sitting. The film shows a continuous, or to use Nelson Goodman's terminology, an analogous movement, but breaks it down into discontinuous or digital steps, the "powers of ten," in which each power of ten marks a difference that makes a difference.[17] In his recent book *The Cosmic Zoom: Scale, Knowledge, and Mediation*, Zachary Horton uses the Eames film as a starting point to develop a theory of scale as mediated difference.[18] One could argue that film lends itself as a model for such a theory not just because of the appeal of a remarkable individual artistic success like the Eames film. Film can also be used to provide a model for scale as a measure of difference along a continuum precisely because it is both analogous and digital in Goodman's sense—because it creates a perception of continuous movement from discontinuous, but distinct and regular elements. In that sense film always already maintains a privileged relationship to scale which

17 See Scott Curtis, "Vergrößerung und das mikroskopische Erhabene," *Zeitschrift für Medienwissenschaft* 3, no. 5 (2011): 97–110.

18 See Zachary Horton, *The Cosmic Zoom: Scale, Knowledge, and Mediation* (Chicago: University of Chicago Press, 2021).

is embedded in the medium, and not just because frame and format provide a visual measure for objects in the visual realm (through framing, aspect ratio, and shot length), or because film is scalable across a variety of technical formats. This is important to keep in mind when we now turn to claims about the scalability of film which are informed by economic and computational understandings of scalability.

In a guest post in 2019 on OnlineMarketing.de, a trade portal, German digital marketing specialist Lars Reinartz writes: "2020 could be the year when the hitherto rather static medium of film will finally become scalable and dynamic."[19] Now, Reinartz is not an academic, let alone a media historian. He uses the term "film" in the broadest possible sense to include digital video. By implication his concept of film includes cell phone films, home movies, and any other type of moving image, which incidentally is how film studies over the last two decades has come to redefine its own object. But Reinartz is a practitioner working at one of the most significant intersections of contemporary media culture and the digital economy, namely video-based marketing, and he is trying to formulate a theory of his practice. Reconstructing theories of practice from statements of practitioners about their craft is an established method of film and media historiography, and it can also contribute something towards a mecanological metahistory of computational film historiography.[20]

Reinartz' projection that the medium film will finally become scalable in 2020 is significant for two reasons: because it involves a strong claim about film history, and it invokes and combines multiple meanings of the concept of scalability to make that claim. More specifically, Reinartz references the two contexts in which the concept first emerges, namely computer science and business management (or business intelligence), applies the concept to media theory ("medium of film"), and invokes a specific philosophy of history, namely a concept of history as a process of development and growth ("finally become scalable and dynamic"). It seems appropriate to address these layers of meaning in turn and provide an understanding, however limited, of the meaning(s) of the term in its original context of use.

19 Lars Reinartz, "Smarte Video Strategien—Wie digitale Tools und skalierbare Konzepte das Video Marketing verändern" [guest post], *OnlineMarketing.de*, September 30, 2019, https://onlinemarketing.de/social-media-marketing/unfertigsmarte-videostrategien-wie-digitale-tools-und-skalierbare-konzepte-das-videomarketing-veraendern.

20 See, for instance, Vinzenz Hediger, *Verführung zum Film. Der amerikanische Kinotrailer seit 1912* (Marburg: Schüren, 2001); John Thornton Caldwell, *Production Culture: Industrial Reflexivity and Critical Practice* (Durham: Duke University Press, 2008).

Reinartz' argument goes as follows: Since 82 per cent of online traffic now consists of video content, more than half of all advertising executives consider personalized video marketing the most effective marketing tool. In this environment "scalable concepts" in video production and distribution have the potential of fundamentally transforming marketing. "Scalable concepts" in Reinartz' understanding of the term refers to three different things. First, one problem in video-based marketing is that there is no consensus whether short or long formats, properly produced, are more effective in attracting attention and eliciting viewer engagement. The solution is that one should always be able to deploy a wide variety of formats, making the content suitable to the context. "Scalability" thus refers to the ability to scale content up and down across formats. Second, to be able to adapt to changing contexts one should have the ability to develop and modify content and formats quickly and "automatically"—without input from human professionals. "Scalability" in this second sense of the term, then, refers to a kind of autonomy and self-sufficiency of resources and skills in content and format production and adaptation which allows one to respond to changing environments independently from third-party input. And thirdly, one should have the ability to quickly deploy contents and formats in their optimal environments independently of the input and interference of outside or third-party actors, such as advertising agencies and other booking agencies. "Scalability" thus refers to self-sufficiency of resources and skills not just in production but in distribution. All of this could finally become possible in 2020, Reinartz argues, because the requisite digital technologies and infrastructures, particularly machine learning devices, are now easily available at the click of a mouse and can be mastered without years of training even by content specialists, i.e. advertising "creatives." Such technologies include tools like the "bumper machine" developed by Google which scales down video content by extracting and condensing the six "most important seconds" into a new format.[21] Coupling personalized data extraction with AI, Reinartz further envisions such advances as customized videos in which cars are automatically made to change their finish to appear in the supposed favourite colour of the targeted viewer. "Simple and automatic" will be the motto of the new world of video-based marketing. In this world, "scalability" stands for a process of rationalization which increases the independence, agility, and overall capability of video-marketers by substituting automated digital tools for services previously provided by specialists and interlopers.

21 https://www.thinkwithgoogle.com/marketing-strategies/video/bumper-video-ads/.

As indicated earlier, both in computer science and business management, scalability is a measure of efficiency, and more specifically of the growth of a system, network, or process relative to input. In computer science, scalability refers to the growth of a system which consists of combinations of hardware and software. Growth of the system is achieved through the addition of resources like CPU, RAM, hard disks, or bandwidth. Vertical scalability, or scale-up, refers to an increase in performance through the addition of computing resources to a given computer or node in a network. Horizontal scalability, or scale-out, refers to an increase in performance through the addition of computers or nodes to a system. Typically, the added units have the same performance and capability as existing units or nodes. Scalability comes in four different, interrelated types. Load scalability refers to the ability of a system to perform steadily under varying data loads. Spatial scalability refers to the ability of a system to take on new elements without an "intolerable" increase in storage requirements, i.e. without the requirement of a significant expansion of storage infrastructure. Spatio-temporal scalability means that a system continues to hold its level of performance even as new elements are added, while structural scalability means that the system can add new elements in a clearly defined area even as it maintains its original structure. The measure of scalability for a system is the speed-up, i.e. the increase in speed and volume in data throughput. Superlinear scalability means that added resources increases speed-up, i.e. performance increases relative to input. Linear scalability refers to a speed-up in which performance increases per resource unit added to the system. Supralinear scalability refers to a system in which added resources lead to a decrease in speed-up. The scalability of a system can thus be defined as vertical or horizontal and through the four interrelated aspects of scalability, and measured in terms of speed-up.[22] Regardless of the specifications of a given system, network or process, however, scalability is a measure of increased efficiency and performance in terms of data throughput and speed relative to the addition of new resources. To the extent that his argument touches upon computing, Reinartz expects that film as a scalable and dynamic medium will achieve superlinear vertical and horizontal scalability, i.e. increase performance through operations of scaling formats up and down, based on a prior operation of scaling out, i.e. of delegating functions to an independent unit in the existing network,

22 See M. Michael and J. E. Moreira, D. Shiloach, and R. W. Wisniewski, "Scale-up x Scale-out: A Case Study Using Nutch/Lucene," in *2007 IEEE International Parallel and Distributed Processing Symposium* (Long Beach: IEEE, 2007), 1–8.

the marketing specialist operating a node independently of the operators of the pre-existing nodes.

In economics and business management questions of scale are not exactly new. Economies of scale, i.e. the proportionate saving of costs achieved by an increased level of production, have been a major concern of business management throughout industrial modernity.[23] However, the concept of "scalability" has gained currency in this field, primarily in the context of the digital economy and online retailing and marketing.[24] In an admittedly pointed fashion we could argue that scalability in business management refers to two things: It describes the one thing that is really new about the new, i.e. digital economy, and it exemplifies the ultimate capitalist fantasy of boundless growth with no or almost no input, and thus without cost—economies of scale on steroids, so to speak. With a view to the broader digital economy, it is important to note that the new economy is a lot more old-fashioned than its proponents would have you believe. Most Silicon Valley business models can be broken down according to the formula "nineteenth- or twentieth-century template x + networked computing + the customers are invited to do most of the work," with large, hierarchically structured, and publicly traded corporations resembling the industrial giants of the second half of the nineteenth century dominating the tech industry.[25] Thus, for instance, Amazon is a mail-order company modelled on the nineteenth century retail-by-mail pioneers Montgomery Ward and Sears Roebuck, but with a very large catalogue and a website with a recommendation algorithm which uses collaborative filtering of consumer preference data to guide the decisions of subsequent buyers.[26] Having first grafted a mail-order system onto the video-rental market, Netflix then adapted the mid-twentieth-century direct-mail book club subscription model to video streaming.[27] What is new is the degree to which these companies, thanks to networked computing, can achieve growth without significantly increasing basic operating costs in comparison with their traditional, bricks-and-mortar retail business competitors, such as supermarkets, publishers, cinemas, or

23 See George J. Stigler, "The Economies of Scale," *Journal of Law and Economics* 1 (1958): 54–71.

24 See, for instance, Marko Juntunen et al., "Business Model Scalability in the Cloud Business Context," *Journal of Business Models* 6, no. 1 (2018): 19–39

25 See Jason Potts and Vinzenz Hediger, "Die vierte Regierungstechnologie. Über Blockchain," *Zeitschrift für Medienwissenschaft* 18: Medienökonomien, 10, no. 1 (2018): 73–86.

26 See Greg Linden, Brent Smith, and Jeremy York, "Amazon.com Recommendations: Item-to-Item Collaborative Filtering," *IEEE Internet Computing* 7, no. 1 (2003): 76–80.

27 On the history and economics of mail-order book clubs, see Caroline Norrick-Rühl, *Book Clubs and Book Commerce* (Cambridge: Cambridge University Press, 2019).

the now almost entirely defunct video stores. When Reinartz talks about the scalability of the medium of film, he similarly envisions combinations of existing software to create economies of scale through the basic operations of scaling up formats and scaling out operations at the level of computing, and by targeting consumers with customized messages.

But for Reinartz, achieving full scalability marks a turning point in the history of film, a qualitative change which alters the very structure of the medium—a revolution. There is a tension between this view and a concept like Bruno Latour's notion of the "immutable mobile," which refers to the scalable media devices like maps drawn to scale, which enabled European expansion and colonial domination long before digital media were even a concept.[28] There is also a tension with notions of scalability in the study of small gauge film formats, which recognize scalability as a feature of the medium well before the advent of digital compression and machine learning.[29] To resolve this tension and to determine whether scalability is a new state of the film medium or a historical feature of media techniques is, indeed, a task for historians. But if we consider the analogy, or rather affinity, between historical facts in the sense of Becker and data and algorithmic techniques in the sense of Rieder, a good working hypothesis will be that a media history of scalability will err on the side of format theory and bracket the pre-digital with the digital, not least by pointing out that film has always already been digital, or rather both analogue and digital in the sense of Goodman.

But this in turn raises a question about historiography itself. It would seem to suggest that we did not have to wait for computational approaches for film historiography to make events, facts, and traces scalable, i.e. readable as elements of coherent systems, networks, and processes which historians doing historiography can scale up and out across time and space. The question, then, is: Are film histories—even non-computational ones—scalable?

Are Film Histories Scalable?

Looking back on Reinartz' 2019 vision for the full scalability of film in 2020 from 2022, two questions immediately come to mind: How new is all of this,

28 See Erhard Schüttpelz, "Die medientechnische Überlegenheit des Westens. Zur Geschichte und Geographie der *immutable mobiles* Bruno Latours," in *Mediengeographie: Theorie–Analyse–Diskussion*, ed. Jörg Döring and Tristan Thielmann (Bielefeld: transcript, 2009), 67–110.

29 See Alexandra Schneider, "Viewer's Digest: Small-Gauge and Reduction Prints as Liminal Compression Formats," in *Format Matters: Standards, Practices, and Politics in Media Culture*, ed. Marek Jancovic, Axel Volmar, and Alexandra Schneider (Lüneburg: meson press, 2020), 129–46.

really? And has the medium of film, which is supposedly now dynamic and scalable, ever been as static and stable as Reinartz implies? We want to answer the second, apparently subsidiary question first. As early as 1956, in an article on the impact of television on cinema, French film and media scholar Henri Dieuzeide wrote:

> In truth all filmic forms have always been provisional: The history of cinema consists of their successive upheavals: from the destruction of the silent film drama through sound, to the destruction of the black-and-white universe by color, to the destruction of the frame by cinemascope.[30]

In other words, the insight that film has never been static and stable is as old as film studies itself—if we take the Filmology movement in France, to which Dieuzeide belonged, to be the first attempt to establish the study of film as an interdisciplinary field at the university level. As early as 1967 and under the influence of the film screenings at the Expo 67, a world's fair held in Montreal, Canada, German film historian Enno Patalas wrote: "After this, film as we know it merely appears as one of many varieties which only in their totality define the phenomenon of film."[31] In the wake of the New Film History of the 1970s and 1980s the turn to new approaches like media archaeology refined film historiography's grasp of the discontinuities and the instability of the medium of film. First broached in film theory by Roger Odin in his semio-pragmatics in the 1980s and 1990s,[32] the study of amateur films, home movies, industrial films, science films, and educational films over the last two decades has shown that fluid and ephemeral settings of projection and viewing have always been part of film practice and thus of film history, even as the dispositive of cinema itself has undergone significant transformations over the century and a quarter of the medium's history.

As for the second question, "How new is all of this, really?," we believe that—as a matter of methodological caution—novelty claims, whether in marketing or media theory, should always be treated with scepticism, particularly when they concern the blessings of digital technology. But

30 Henri Dieuzeide, "Some Problems Raised by the Use of Films on Television," trans. Vinzenz Hediger, in *Filmology and the Invention of Film Studies: Selected Writings from the* Revue internationale de filmologie*, 1946–1961*, ed. Vinzenz Hediger and Guido Kirsten (Amsterdam: Amsterdam University Press, forthcoming). Originally published as Henri Dieuzeide, "Quelques problèmes posés par l'utilisation des films à la télévision," *Revue internationale de filmologie* 7, no. 26 (1956): 111–28.

31 "Danach erscheint der Film, wie wir ihn kennen, nur als eine von vielen Varianten, deren Summe erst die Erscheinung Film definiert." We thank Malte Hagener for the reference.

32 See Odin, *Spaces of Communication*.

in Reinartz' case the scepticism is further warranted by the fact that his definition of the medium of film aligns with the guiding assumptions of approaches to the study of film which concern the pre-digital period. As a thought experiment, we can hark back to our earlier suggestion that we should always look for the nineteenth- and early-twentieth-century templates of contemporary tech business models and propose a similar exercise for Reinartz' vision of film as a fully scalable and dynamic medium. For instance, we can take Reinartz' vision and substitute marketing with radical politics and digital marketing videos with activist video and small-gauge film. We thus find that the idea of a fully scalable medium of film is remarkably, and in fact structurally, similar to the promise for political action through film derived from and associated with the new technology of video in the early 1970s, a promise which has been renewed and enhanced at the confluence of digital video with social networks in social and political movements.[33]

But then, this substitution reveals something not just about Reinartz' visions. It also points to what we may describe as a tacit assumption, and maybe even a blind spot, of academic film historiography. This thought experiment, which serves to reveal a structural analogy of the promise of different self-sufficient modes of film production and distribution for the uses of social action and persuasion, can itself be described as an exercise in scalability. Once we get over the cheeky provocation of substituting revolutionary politics for marketing, the operation may feel oddly familiar to someone trained in established modes of film historiography and the teaching of film history.

The film historiography which helped establish film studies as an academic field, and which we will refer to as the "auteur/nation film history," is one of styles, schools, and modes of production. It is not an approach which stresses the successive upheavals which pattern film history according to Henri Dieuzeide, but one which is broadly derived from the history of art and literary criticisms. In this history the central actors are artists, who are connected through spatial and temporal contiguity, intellectual and cultural frameworks, and relations of influence. More specifically, this mode of historiography first emerges as a narrative of privileged national cinematographies and auteur-directors in the 1930.[34] It continues to have

33 See Michael Z. Newman, *Video Revolutions: On the History of a Medium* (New York: Columbia University Press, 2014); Sweta Kisher, "The Promise of Portability: CENDIT and the Infrastructure, Politics, and Practice of Video as Little Media in India 1972–1990," *BioScope* 8, no. 1 (2017): 124–45.

34 See Vinzenz Hediger and Alexandra Schneider, "Wie Zorro den Nationalismus erfand. Film, Kino und das Konzept der Nation," in *Medien und nationale Kulturen*, ed. Vincent Kaufmann (Bern: Haupt, 2004), 203–30.

a persistent afterlife in the teaching of film history, even in film studies programmes, but also in a now canonical work of poetic film historiography like Godard's *Historie(s) du cinema*, which focus almost exclusively on Russian, German, Italian, French, and American cinema, and its canonical auteurs.[35] Specifically, such an approach implies that history can be broken down into chunks along a temporal and a spatial axis. The temporal chunks can be ordered in years or decades, or they can be ordered to align with social and political history. The spatial chunks can be organized according to scenes (underground film), cities (New York, Los Angeles, Paris), countries and national states (US, France, Russia, India) or continents (Americas, Europe, Asia, Africa). In that sense, auteur/nation film historiography can be described as a scalable system, a system which can be scaled up, down, and sideways. With its temporal and spatial axes and its basic conceptual operations—style, school, etc.—this system has considerable generative power in terms of research and teaching agendas. It is, in other words, a system which has linear scalability: adding elements increases its performance without changing its structure or mode of operation.

The problem with this mode of historiography has always been that some moving images compute, and others don't. Not only do facts and data not speak for themselves; for the algorithms which make the data speak not all facts are data. Apart from such idiosyncrasies as Godard's claim in the *Historie(s)* that because they never developed film into a truly popular art form Spain and England really have no cinema, industrial films are a case in point. For a long time industrial films would only compute if they were the work of established auteurs, like Alain Resnais' *Le Chant du Styrène* (considered a mature work) or Godard's *Opération Béton* (an unremarkable early effort which only found consideration because it marks the earliest point of Godard's work as a director). For industrial films to become a serious object of study it was necessary to dismantle, or at least suspend and bracket, the auteur/nation historiography and replace it with one in which the question of the pragmatic purpose and operative performance of the moving image takes precedence over the question of artistic creation and value (a system, it should be noted, is equally scalable and can be scaled out across the globe and up across the temporal axis). Nigerian video films, which Alessandro Jedlowski has aptly termed "small screen cinema," are another case in point.[36]

35 See Michael Witt, *Jean-Luc Godard, Cinema Historian* (Bloomington: Indiana University Press, 2013), ch. 5.

36 See Alessandro Jedlowski, "Small Screen Cinema: Informality and Remediation in Nollywood," *Television & New Media* 13, no. 5 (2012): 431–46.

The transition to computational film historiography along with an increasingly digital native film culture adds a new layer to this conundrum. Apart from the inherent perspectivism of algorithmic techniques analysed by Bernhard Rieder, racial bias in algorithms and machine learning applications in the digital economy and the US health system, for instance, is an ongoing problem.[37] With a more specific focus on film, the new technical standards of production, distribution, and projection in cinemas, which were developed and established under the leadership of the American film industry, are designed in such a way as to largely exclude the more informal digital native industries and the "small screen cinema" of sub-Saharan Africa from the lucrative global markets for digital cinema.[38] Here, it becomes all the more apparent that we need a critical historiography, which we proposed earlier under the heading of a mecanological metahistory, and which in addition to a critical dissection of actual operations includes a critique of narratives of inherent growth and progress associated with scalable systems, networks, and processes.

In addition to understanding film and media historiography's own systemic biases and the effects and side effects of what we have described as the scalability of these approaches, it important to explore and develop a historiographical attention to the facts which do not become data and ultimately do not compute. One way of doing so is to think about, and develop, histories of non-scalability and non-scalable histories of film in both research and pedagogy.

What Is Not Scalable about Film?

In her work on diversity and the ecology of the Matsutake mushroom, anthropologist Anna Lowenhaupt Tsing argues that "scalability banishes meaningful diversity, that is, diversity that might change things."[39] But if film as a medium is inherently scalable, if the founding paradigm of film

37 See Safiya Umoja Noble, *Algorithms of Oppression: How Search Engines Reinforce Racism* (New York: New York University Press, 2018), and Nicol Tuner Lee, "Detecting Racial Bias in Algorithms and Machine Learning," *Journal of Information, Communications and Ethics in Society* 16, no. 3 (2018): 252–60; Ziad Obermeyer, Brian Powers, Christine Vogeli, and Sendhil Mullainathan, "Dissecting Racial Bias in an Algorithm Used to Manage the Health of Populations," *Science* 366, no. 6464 (October 2019): 447–53.

38 See Benoît Turquety, *Format, Medium, Configuration: The Displacements of Film* (Lüneburg: meson press, 2019), https://meson.press/books/medium-format-configuration/.

39 Lowenhaupt Tsing, *The Mushroom at the End of the World*, 38.

historiography, the auteur/nation approach is scalable, and if even new types of local cinema-going historiographies turn facts into data, or rather use algorithms to produce facts from available data, then how can we think of film historiography for that which is not scalable, the singular, resistant, incomputable, the facts that do not count?

As we pointed out before, many film history syllabi are designed to be scalable: it is possible to scale up and out their scope without affecting their basic conditions and guiding assumptions. A different model would be to engage with competing historiographies, with frameworks which go beyond the established conceptual operations. The pioneering work of scholars like Mariann Lewinsky, Martin Loiperdinger, Gregory Waller, and others[40] on local film histories, including that of Annette Kuhn and others on cinema-going and memory,[41] which paved the way for the new sub-field of "New Cinema History,"[42] could be said to have first raised the issue of non-computable facts in film historiography a quarter of a century ago. More recent advances in such non-scalable film historiographies include Janice Nadua Trice's study of alternative film cultures in Manila,[43] Kim K. Fahlstedt's *Chinatown Film Culture: The Appearance of Cinema in San Francisco's Chinese Neighborhood*, which draws on "New Cinema History" to argue against the homogenizing effects of the "historical shorthand" of the concept of modernity in film studies to stress "the heterogeneity of historical audiences,"[44] and Debashree Mukherjee's *Bombay Hustle: Making Movies in a Colonial City*, in which the author suggests engaging with the concept of "ciné-ecology" as a "terrain of film production" in order to better study the "history of film practice" in the colonial city of Bombay even as she points out, in an echo of Miriam Hansen's argument of cinema as "vernacular modernity," that cinema, although a "transnational" force, came "to mean very different things [...] in Istanbul or Sydney."[45] In a similar vein the recent work on the material culture of film

40 See Gregory Waller, *Main Street Amusements: Movies and Commercial Entertainment in a Southern City* (Washington, DC: Smithsonian Institution Press, 1995), and the contributions by Mariann Lewinsky and Martin Loiperdinger in Frank Kessler, Sabine Lenk, and Martin Loiperdinger, eds., *KINtop Jahrbuch 9: Lokale Kinogeschichten* (Frankfurt am Main: Stroemfeld, 2000).

41 https://www.lancaster.ac.uk/fass/projects/cmda/index.php/history/.

42 See Daniel Biltereyst, Richard Maltby, and Philippe Meers, *The Routledge Companion to New Cinema History* (London and New York: Routledge, 2019).

43 See Janice Nadua Trice, *City of Screens: Imagining Audiences in Manila's Alternative Film Cultures* (Durham: Duke University Press, 2021).

44 Kim K. Fahlstedt, *Chinatown Film Culture: The Appearance of Cinema in San Francisco's Chinese Neighborhood* (New Brunswick: Rutgers University Press, 2020), 7.

45 Debashree Mukherjee, *Bombay Hustle: Making Movies in a Colonial City* (New York: Columbia University Press, 2021).

studios by Brian R. Jacobson and others offers a non-scalable alternative, so to speak, to the linear materiality of neo-formalist historical poetics,[46] while Haidee Wasson's work on portable film devices opens up another field of research which is impossible to scale up, for reasons beginning with the ephemerality of the practices in question and the scarcity of sources.[47] In this debate, a concept like Mukherjee's "ciné-ecology" has the potential to reframe the categorical operations of the established film historiography by creating new connections between the local, the regional, and the transnational levels of film practice. What connects these studies, in addition to their attention to cinema as localized practice, is a focus on the institutional frameworks and infrastructures of cinematic practice. They share this focus with Ravi Sundaram's groundbreaking study *Pirate Modernity: Delhi's Media Urbanity* from 2012. Sundaram's book is a meticulous study of how the fantasies of transparency and scalability of urban space which sustained the Nehruvian modern Delhi break down and are progressively replaced with a new form of urbanity in which media, from print to film and digital media, serve as infrastructures and interact with urban migration to create new types of urban space. Sundaram's work provides a model for the challenge which this contribution addresses in particular, namely the need for new modes of film historiography in research and teaching which account for non-scalable processes in a post-digital film culture.[48] In a similar vein, Meredith A. Bak reminds us that, in the words of Tom Gunning, to "explore historical change as 'a jagged rhythm of competing practices'" we need to turn to new archives and approaches. For Bak, optical toys are "ways of thinking about vision that surfaced in advertising, play culture, the school, the psychology laboratory."[49] Her work is a productive contribution to the field of material media culture analysis and history, as are Caetlin Benson-Allott's work on the material cultures of film and television and Mark Steinberg's work on media retail.[50]

46 See Brian R. Jacobson, ed., *In the Studio: Visual Creation and Its Material Environments* (Cambridge, MA: MIT Press, 2020).

47 See Haidee Wasson, *Everyday Movies: Portable Film Projectors and the Transformation of American Culture* (Berkeley: University of California Press, 2020).

48 See Ravi Sundaram, *Pirate Modernity: Delhi's Media Urbanity* (New York and London: Routledge, 2012).

49 Meredith A. Bak, *Playful Visions: Optical Toys and the Emergence of Children's Media Culture* (Cambridge, MA: MIT Press, 2020), 4 and 33.

50 See Caetlin Benson-Allott, *The Stuff of Spectatorship: Material Cultures of Film and Television* (Berkeley: University of California Press, 2021); Marc Steinberg, "Delivering Media: The Convenience Store as Media Mix Hub," in *Point of Sale: Analyzing Media Retail*, ed. Derek Johnson and Daniel Herbert (New Brunswick: Rutgers University Press, 2019), 239–55.

What this brief survey shows is that the groundwork has been laid and the tools are in place. If 2020 may or may not have been the year when the medium of film has become fully scalable at last, 2022 may be the year in which film historiography, both in research and teaching, finally embraces the non-scalability of facts that don't count.

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