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Reformatting Media Studies: Toward a Theoretical Framework for Format Studies

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From Medium to Format

Following Marshall McLuhan's dictum that the medium is the message, media theorists since the 1980s have conceptualized media not as mere mediators, or neutral conveyors of messages, but as formations that come in between processes of perception, expressions of knowledge, and uses of language that add something to the transmission without being consciously perceived or reflected upon by those involved. This insight brought mediality or a medium's supposedly intrinsic quality, obstinacy, or resistance (*Eigensinn*; see Hoffmann 2002, 153–54; Krämer 1998, 75; Anders 1956, 2) into the focus of media theory and has subsequently stimulated the writing of a plethora of media histories and ontologies of all kinds (see Engemann, Heilmann, and Sprenger 2019). And yet, in many of the media-theoretical works oriented toward the elaboration of a certain media specificity and the idea of media as being material or technical *in-betweens*, there often remains a certain uncertainty about whether mediality should be understood as ontologically determined by the nature, structure, or functioning of the medium itself or as socially constructed by particular decisions made in the course of the design, provision, or commodification of a media technology. Media-theoretical distinctions between analog and digital appear to be similarly precarious in this respect. Although work on analog–digital differentiation since the 1990s has provided media scholars with important points of reference, the broad oppositions that defined

this differentiation, such as continuous versus discreet (Schröter and Böhnke 2004), have lost a great deal of their significance for defining and elucidating media in view of a world increasingly saturated with digitally networked technologies, infrastructures, and services. On account of this growing ambiguity, media scholars have directed attention away from media as isolated research objects toward consideration of their surrounding environments, histories and cultures, such as, for instance, toward the infrastructures that connect media artifacts, people, and devices. In this regard, infrastructure studies has gained considerable currency in recent years (Parks and Starosielski 2015; Edwards et al. 2009); and yet, format studies has not received the same attention or been pursued in the same way until now.

Although formats are closely related and often intrinsic to specific media, they are, as we have shown in the introduction to this volume, not necessarily congruent with them. Both deeply connected to and independent from media, formats follow their own logics, which may result in formats being responsible for the particular characteristics of a medium rather than its overall qualities. The fact that some formats are able to migrate from one medium to another or spread across different media already suggests that formats point to other aspects of media formation, production, distribution, and reception than a focus on, for instance, a single medium would. The study of formats can thus, as media scholar Jonathan Sterne argues in his book *MP3: The Meaning of a Format*, contribute to seeing media history in a new light that illuminates more the interconnections between media rather than their individual evolution or histories:

Cross-media formats like MP3 operate like catacombs under the conceptual, practical, and institutional edifices of media. Formats do not set us free of constraints or literature from the histories that have already been written. They only offer a different route through the city of mediality. . . . If they have enough depth, breadth, and reach, some formats may offer completely different inroads into media history and may well show us subterranean connections among media that we previously thought separate. The study of formats does not mean forgetting what we've learned from the study of media or, more broadly, communication technologies. It is simply to consider the embedded ideas and routines that cut across them. (Sterne 2012, 16)¹

1 Sterne uses the term mediality “to evoke a quality of or pertaining to media and the complex ways in which communication technologies refer to one another in form or content” (2012, 9).

The study of formats thus promises to answer media-theoretical questions in new ways that reveal connections that previously went unnoticed. One could argue that, more generally speaking, format studies would then have the task of contextualizing, historicizing, and theorizing such connections that connect or “cut across” media. In light of the increasing conversion of analog media into the universal medium of binary code (see Linseisen and Fahle in this volume), histories of formats are likely to tell us more about the process of digitalization than do, for instance, general histories of *the* computer or *the* Internet. Let us take an often posed question as an example: Why did media studies not foresee the emergence of social media despite its being so close to the development of digital computing and networking? I think it is fair to say that one of the main reasons lies in the field’s wrong assumptions about the presumed specificity of digitally networked media. The cybertheories and associated artistic and technical projects of the 1980s and 1990s imagined the future of networked computing either in the form of primarily discursive, text-based spaces directed at the users’ communicative and imaginative capacities (see, for instance, Turkle 1995) or as immersive sensory environments based on generative computer graphics and technological interactivity. Both visions conceived of digitally networked media as a part of reality that was thought to be isolated and radically independent from the rest of the world, mostly because assumptions regarding the nature of cyberspace were based on supposedly intrinsic properties of digital computers and the medium of binary code. A consideration of new digital multimedia formats, such as JPEG, MPEG, and MP3, which emerged around 1990, might have painted a different picture and fostered the conviction that it would not be humanity’s destiny to migrate into unknown, immaterial cyberworlds but that, conversely, *the world*—captured and manifested in the manifold forms of digital audiovisual data—would sooner or later take over and ultimately oust both the idea and the technical reality of what was considered to be cyberspace. As I will show below, formats tend to shift scholarly attention from questions of mediation to those regarding the interoperability of technologies, media-related practices, labor chains, and exploitation chains as well as collective forms of technological innovation.

Starting from general distinctions between media and formats, I ask in this chapter why and how formats matter, what contemporary media studies may gain from the study of formats, and how format studies could be framed methodologically and theoretically. To answer these questions, I present some building blocks for a preliminary theoretical and methodological framework that can help to determine what can be

considered significant about formats and how to study them. In section two, I briefly survey the subject matter of format studies and develop a heuristic taxonomy of formats from which derive a couple of common functions and affordances of formats, which I elaborate on in section three. In section four, I discuss three methodological and theoretical entry points into the study of formats, namely, how formats originate from practices, how formats facilitate and enforce forms and conditions of cooperation, and how formats can be used for conceptualizing media-historical change by situating them within broader media-historical dynamics of specialization and generalization.

A Brief Taxonomy of Formats

What exactly do we mean when we talk of formats? Formats can obviously be as different as the size of stationery, the way of storing a sound on a recording medium, or the narrative structure of a television show. As I have elaborated elsewhere in greater detail (see Volmar 2017), we can, for the sake of simplicity, heuristically distinguish five types of formats, although this typology by no means claims to be exhaustive:

Size-and-Shape Formats

Originating from book, paper, and picture formats, size-and-shape formats frame and dimension the display and presentation of—usually visual—content by means of limitation, orientation, and alignment. This is probably the most common type of format. Two-dimensional size-and-shape formats determine standardized and unstandardized sizes of inscription and display surfaces and indicate the physical properties of the involved materials and storage media, most commonly in conjunction with forms of mass production and reproduction. Moreover, formats often also specify the orientation and aspect ratios of the presented information, such as in portrait and landscape orientations. Different denominations relative to size, such as small gauge, pocket book, or large size further suggest that formats are closely linked to use practices, in the realms of both media production and media consumption.

Diagrammatic and Structural Formats

By specifying dimensions and setting boundaries, formats provide a general framing of information or content. Apart from that, formats can also determine the spatial, temporal, or logical structures in which content

is stored, transmitted, and presented. In that sense, the notion bears relation to the evolutionary term “formation” and is further reminiscent of the fact that the word “information” literally refers to symbolic content, or data, that have been brought *in formation*, or arranged into a specific form. This entails, in particular, the spatial, diagrammatic division and ordering of information surfaces, e.g., in the form of lists, tables, and especially forms and other previously structured, preformatted documents (Gitelman 2014; Young 2017), all of which evoke saturated histories of bureaucratic practices, e.g., for registration, inventory, and bookkeeping. Moreover, inscription surfaces demand specific practices of preparation and care before they can be used as symbolic media. Such practices of formatting are among the oldest cultural techniques we know. Formatting practices are generally thought to have originated with the preparation of paper sheets and wood blocks in the early modern printing industry. Formatting is, of course, also one of the key concepts in typesetting and graphic design, used in conjunction with rules and practices of text and image layout (see Müller 2014). However, the emergence of formatting can be considered to have started much earlier. As Jacques Derrida (1997, 287) argues in *Of Grammatology*, we can already read the ploughing of land to prepare the soil for proper cultivation as a practice of formatting meant to enable a form of writing.

Encoding and Data Formats

Another frequent type of format involves techniques of encoding information and data streams. This type entails formats used for displaying numbers, dates, and time as well as newer ones conceived to store and reproduce audio and video information, from musical recordings to digital file formats. Such formats are usually characterized by the introduction of additional data, or metadata, into the content or signal flow, such as information about how to render the content into a usable or consumable form. Tailored primarily but not exclusively to enable and coordinate automated forms of reading, writing, and processing, these metadata—such as the playback speeds of vinyl records, line and page breaks in analog TV signals, or information in the headers and structure of digital file formats—regulate how information and data flows are expected to be handled (e.g., stored, transmitted, displayed, or processed) by people and especially technological apparatuses. These formats not only *represent* but also *do* things, as they contain commands or control code and often demand action on behalf of the user.

Metaphorical Formats

In certain contexts, the term format has crossed over into other cultural uses, with metaphors deriving presumably from large book and image formats. Around 1900, for instance, the noun *Format* became fashionable in German-speaking countries, where it came to be used as a denomination to distinguish individuals of extraordinary capabilities, achievements, or character. A person may be, for instance, credited as having format (*Format haben*) if they are deemed capable—thanks to exceptional leadership, athletic talent, or financial success—of filling an imaginary frame of expectation. This frame of reference usually corresponded to the values of the bourgeois class and their attempts to secure moral superiority (see also Niehaus 2018, 18–24). In turn, individuals may also demonstrate format (*Format zeigen*) in situations that call for great courage or present difficult choices, such as between the individual and the greater good.

Narrative and Processual-Event Formats

Finally, in the second half of the 20th century, the notion of format has increasingly come to denote strongly structured events that follow predefined sequences, rules, or schemes, such as trading, sports, or auction formats. First and foremost, however, this group of formats pertains to mass media, as they entail the many event and narrative formats for news, music, talk, or game shows, which were conceived in the broadcasting industry. Knut Hackett calls such media formats “media-industrially optimizable genres,” a definition that emphasizes the often highly serialized, commodified, and industrial character of media formats (Hackett 2010, 152, my translation). In this signification, formats usually refer to the overall concept, trademarking, and branding of (generally copyrighted) media programs or even entire stations, as becomes apparent in the notion “format radio,” an industry term for commercial stations that are limited to a narrow range of content and tailored to cater to specific target audiences in order to maximize ad revenue. More broadly, processual formats can also be understood as the requirements used to govern the form of public discourses, for instance, by means of the peer-reviewed scientific journal or arbitrary decisions such as limiting Twitter posts to 140 characters (see also the chapter by Kalani Michell on academic podcasts in this volume).

Common Features and Functions of Formats

It merits questioning whether the distinct types of formats listed above share common characteristics. Presumably the most fundamental tasks of formats consist in framing, limiting, and confining physical media and their content. Formats set boundaries as they frame content and otherwise determine the spatial dimensions and aspect ratios of inscription and display surfaces; they regulate and limit the volume, length, and quality of technical media and artistic forms; and they structure the diagrammatical (spatial) or sequential (temporal) dimensions of content, information, or data. The British linguist Roy Harris emphasized this last point in crediting Valentin Haüy (1745–1822), the founder of the Royal Institution for Blind Youth in Paris, with discovering that “the underlying formal substratum of writing is not visual but spatial” (Harris 1995, 45; cf. Schmidt and Wagner 2018)—an insight that led Haüy’s student Louis Braille to invent the tactile writing system for the visually impaired that bears his name. The spatial quality of information becomes evident in documents, such as, for instance, forms or lists (see Young 2017), in which spatial layout is used to prescribe what kinds of information are expected in bureaucratic procedures, from filing tax reports to registering for an app or online site. In the temporal domain, formats are used to determine essential narrative or sequential elements on various scales, from the segmentation of a TV show to the microtemporal organization of information flows in technical media, such as television signals or digital transmission standards.

Through limiting and structuring content, formats also shape—directly or indirectly—the ratio between the amount of information or content and the physical conditions, qualities, and capacities of a given medium or surrounding infrastructure, be it in terms of resolution, storage space, transmission bandwidth, or processing power of a technological system, network, or labor chain. With the introduction of optical sound on film in the late 1920s, for example, the image frames on 35mm film stock had to be slightly reduced in size (while preserving the aspect ratio) to make physical space for the soundtrack. Then with the introduction of digital sound in the 1990s, the analog film stock became even more crowded with information stemming from the Dolby Digital, DTS, or SDDS soundtracks and sync codes. The digital soundtracks nicely show how deeply data processing is rooted in material realities. Digital formats similarly depend on material conditions, such as the availability and cost of storage space or transmission bandwidth. Hence, another vital function of formats consists in reconciling differing demands regarding the conveyance and presentation

of content with the material and economic constraints of a given medium. Therefore, media formats often do not represent the technologically feasible but rather the economically reasonable.

Since cost factors play a major role in extending infrastructures and including more participants, techniques of compression represent a recurring feature of many formats. Sterne (2012, 4–6) describes the trade-off between the ideals of verisimilitude and compression as fundamentally defining a given medium. In this sense, formatting can be conceived as a specific cultural—and often collaborative—practice of reconciling abstract, semiotic content with material conditions and constraints. Once a new format becomes accepted as a tolerable trade-off between different demands, it sooner or later tends to fade out of sight into the invisible “background” of infrastructure (Star and Ruhleder 1996) and can prove to remain stable over relatively long periods of time. By virtue of their power to harmonize media artefacts with infrastructures and (labor) practices, formats assume fundamental logistic and economic functions within media systems. Or to put it differently, formats determine how easily and in which form media artifacts, or more generally, media content, can travel. The study of formats therefore demands a gradual shift in scholarly attention from the content of media—including their qualities and effects—to media artefacts and the associated logics and conditions of circulation. This in turn includes close consideration of the ecological and infrastructural configurations, such as transmission networks and hard- and software infrastructures, that make these circulations possible and profitable. To determine the significance of a format, it therefore makes sense to carve out its relationships to its direct and indirect environment, whether a physical medium, a physical location (for instance, a museum), a technological infrastructure, or a larger media ecology. In conjunction with which storage media and transmission channels can certain formats be found, and where are they not found? What intended and unintended kinds of circulation have emerged? How and why are some obsolete formats repurposed and in what contexts?

As many of the abovementioned examples make apparent, the majority of formats involve considerable degrees of standardization (see also Schueler, Fickers, and Hommels 2008). Although the terms standard and format can overlap their meanings and practical uses, the main difference between the two lies in the simple fact that formats most commonly standardize objects and processes that deal with and display symbolic or aesthetic content. As Sterne writes, “Without standards, content could not travel as well as it does and could not be as well controlled as it is” (Sterne 2012, 6).

Many formats can thus be thought of as media standards to the extent that they designate specific configurations of media artifacts and determine the processes and practices connected to them, enabling greater consistency, predictability, and accountability by way of regulating costs, promoting usability, and providing for legal protections such as copyrights and licenses.

Because formats specify media, they also differentiate them, for instance, by dividing the vast continuum of possible manifestations of media into a few set fixations. In this regard, it is worth noting that formats often come in predefined sets or families, such as the ISO A, B, and C series of paper sizes. In the case of paper, the fixed dimensions channel the sheer infinite possibilities of potential sizes and aspect ratios to a number of fixed choices or grids. Formats render media into concrete forms and can thus considerably reduce complexity. Ideally, this reduction of complexity facilitates compatibility and interoperability between media devices from different manufacturers or software applications on different operating systems, which, in turn, can render complex processes and workflows more flexible and predictable. In reality, as we likely experience all too often, a counterforce to this straightforward strategy is that rivalling formats or a general plurality of formats tend to cause friction, glitches, errors, and incompatibilities in everyday media use (see, for instance, Marek Jancovic's chapter on archival practices and cultural memory in this volume). Or to put it differently, wherever formats aim to provide compatibility, they also create the potential for exclusions and incompatibility.

Three Entry Points into Format Studies

Format matters are important for media studies because they determine not only the aesthetic conditions but also the practical affordances of media. Not coincidentally, Sterne (2012, 7) has argued: "If there is such a thing as media theory, there should also be format theory." In this section, I will take up some of Sterne's thoughts on format theory and add some of my own suggestions for how format studies could be conceptualized in more theoretical terms. Certainly not all formats are of equal importance and not all formats matter in the same way. Therefore, I would like to offer three basic entry points into the study of formats that might help us determine the significance of formats—both in contemporary media culture and the broader course of media history—by suggesting that format studies should acknowledge the relations of formats to practices, pay attention to how formats organize and govern forms of cooperation,

and consider formats within broader media-historical transformations by assessing strategies and dynamics of specialization and universalization.

Formats Reflect Practices

Many of the fundamental properties of technical media, such as the photosensitivity of chemical substances that became the foundation of photography, were not so much invented as discovered. On account of this, media scholars have repeatedly suggested that each medium possesses its own inherent specificity or intrinsic tendency that influences its general aesthetics and “affordances” (Gibson 1979). Formats are, quite to the contrary, of a radically decisionistic nature. Although some formats have grown historically and unintentionally, they are usually the materializations of contingent historical conditions and thus reflect economic and political strategies as well as decision and negotiation processes. As Sterne writes,

Format denotes a whole range of decisions that affect the look, feel, experience, and workings of a medium. It also names a set of rules according to which a technology can operate. . . . Most crucial dimensions of format are codified in some way—sometimes through policy, sometimes through the technology’s construction, and sometimes through sedimented habit. They have a contractual and conventional nature. (Sterne 2012, 7–8)

Due to their “contractual and conventional nature,” formats inform not only our understanding of the aesthetic and experiential dimensions of media technologies but also how—and on what terms—media are turned into commodities and how people create, work with, and consume them. In other words, since formats are usually designed with specific applications, workflows, and communities of practice in mind, format studies must pay close attention to how particular format specifications are linked to or originate from practices. Recently, Nick Couldry (2012) has prominently advocated for an approach to media and communication studies that he calls *media practice theory*. Couldry’s approach encourages media and audience research scholars not to limit themselves to the philology of media texts or the political economy of media institutions but to direct their focus toward “what people . . . are doing with media” (ix) and specifically toward how they integrate media, and especially digital media, into the routines of their everyday lives.

The growing experiences with digitally networked media have indeed revealed the diverse ways people consume, alter, and redistribute media

objects in active and participative ways. Format studies can profit from such a practice-focused perspective because formats shape and are shaped by practices. However, upon taking such a perspective, it seems wise to zoom out from the objects of audience research, such as end-user practices, to acknowledge the wide range of professional and amateur cultures that revolve around formats in not only the reception but also the conception, production, and distribution of media. Moreover, infrastructure studies has drawn attention to the quotidian practices of “infra-structuring” (Star and Bowker 2002) that comprise media practices in people’s daily work and personal lives. Practice-centered studies of *format cultures* can thus supplement traditional media approaches by accounting for diverse actors groups, their politics, and their sanctioned as well as clandestine use practices situated along the operational chains that run through the—often separated—domains of media production, distribution, and reception. Formats live in the realms of practice and media use, in the fields of economics, law, and other profane domains and thus point to arguably less obvious but nevertheless equally ubiquitous practices that involve media, such as bureaucratic, juridical, and infrastructural practices.

Formats as Media of Cooperation

According to Sterne, “format is what specifies the protocols by which a medium will operate” (2012, 8). Formats, however, determine the protocols of not only technologies but also people. This can be seen, for instance, when an academic journal allows for only a limited range of file formats to be uploaded or when a new media format prevents users from doing the things they used to do with a prior format. Another frequent example would be the limitation of characters in online forms, not least for complaints. In this way, formats function as means to regulate the relations between and, to a certain extent, the behaviors of different stakeholders or actors groups and can thus be understood as what German media scholar Erhard Schüttpelz (2017, 24) has recently termed “media of cooperation.” Conceiving of media in terms of cooperation, rather than merely in terms of communication or mass entertainment, shifts attention from the storage, transmission, and processing of information or the production, distribution, and reception of content toward the relations between different users or user groups, their goals, and their practices. Guided by a praxeological understanding of media that prioritizes practices over artifacts or technologies, Schüttpelz argues that “all media are cooperatively developed conditions of cooperation and have evolved as such” (14). Formats enable, shape, and sustain diverse forms of cooperation, both on and beyond the

local scale. Many formats originated historically from temporary and non-public “work media” or “media of work” (Schüttpelz 2017, 25), such as paper documents, scientific instruments, dictaphone recordings, or production prints in film production, that were conceived to support labor practices in contexts of media production and distribution rather than exhibition and reception. Book formats, for instance, emerged in the 16th century as practical means to facilitate the manufacturing of books in the printing industry (Gaskell 1972; see also the chapter by Marek Jancovic in this volume). Formats thus invite us to rethink media not just as technologies and systems that provide informational and aesthetic content but as “logistical media” (Peters 2015, 37) conceived to create and organize conditions of cooperation.

As media of cooperation, formats can both facilitate or impose cooperative behaviors and transactions. For instance, to ensure the smooth operation of a bureaucratic procedure or a hand-over, say between departments in the process of film postproduction, formats represent landmarks in the middle of practice by prompting the corresponding parties to prepare or rather format an object or a piece of information in a specific way. Media work is formatting work. At the same time, formats serve as means also to nudge or force people to comply with certain procedures or prevent them from doing things (see, for example, Florian Hoof’s chapter on media piracy in this volume). Failure to comply with the requirements of format, in turn, might cause a standstill or termination of an ongoing process and may even entail penalties, as, for instance, when the approval of a wrongly formatted media artifact is denied.

In exercising this sort of appeal function, which routinely prompts media users to compare between actual states and target states, formats ensure the creation of stable media objects and artefacts that are able to travel within technical infrastructures as well as along the lines of complex production and value chains. Moreover, preassigned formats facilitate the manifestation of collective and collaborative work practices and thus play a vital role in establishing and sustaining finely grained divisions of labor. Formats, which in such a way forge people together in specific “conditions of cooperation,” as Schüttpelz (2017, 14) calls them, are importantly also an expression of uneven power relations, as can be observed in the commodification of early portrait photography (see Roland Meyer’s chapter in this volume) or in microwork platforms such as Amazon Mechanical Turk or CrowdFlower (see Ekbia and Nardi 2017). Therefore, formats can act as important interfaces or “boundary objects” for encounters between “heterogeneous social worlds” (Star and Griesemer 1989), involving both

humans and nonhuman actors, and should be considered and approached as such.

Formats represent affordances that are less intrinsic to the medium in question than the result of conscious design meant to show people how to use technologies and how not to use them. In other words, formats crystallize the often-cooperative efforts that went into shaping a medium to yield specific affordances. The study of formats can thus reveal these efforts and their underlying intentions. Because the features of formats are always set by someone and often mutually made or, as Schüttpelz (2017, 14) frames it, “cooperatively developed,” studies of format direct our attention to the politics of format making and the people who are involved in such processes (see also Sterne 2012, 128–47). Formats render media in tamed or domesticated form. At the same time, however, excavating the intended uses of a medium by studying the biography of a format, possibly also in relation to other competitive formats, may serve as a reference to contextualize unintended, critical, or even illicit forms of media use and appropriation.

Formats Embody Dynamics Between Specialization and Generalization

Sterne (2012, 16) argues that one of the main characteristics of formats is their ability to “cut across” different media. Notably, however, not all formats are fully amenable to translating to other media. They can do so only if they share a certain universality or openness. Paper formats, for instance, generally specify the geometric dimensions of paper sheets but not their material qualities, hence they can be applied to different media, such as office paper, books, photographic prints, or digital pages, as on word processors. Likewise, to use Sterne’s own example, the MP3 digital audio format can serve to encode the soundtrack of a movie on a digital storage device like a DVD or in digital broadcasting but it can be used equally well to store music on personal computers and to share it over the internet, not least after the code of the original MP3 codec was hacked and rereleased for free in 1995 (see Sterne 2012, 201–202). The implications of special and general purpose along with strategies of opening up or limiting the presumed scope of formats (by facilitating or preventing compatibility and interoperability, for instance) can be considered constitutive of the evolution of media. If formats equipped with more universal properties and designed to facilitate connectivity thus bear a higher potential of migrating into new contexts and application areas, format studies may benefit from

tracing dynamics of specialization and generalization to rethink and reconceptualize media-historical change.

The history of video telephony is a fitting example in this context. As a technology, visual telephony is basically as old as television itself, and yet, almost nobody was using it on a regular basis before the era of Skype. When television emerged in the 1920s, it remained unclear whether the new medium would become a visual extension of the telephone service or a new form of radio broadcasting with an image component. The latter won out for the obvious reason that it is easier to distribute a low number of high-bandwidth signals to many receivers than to route a multitude of signals from end-user to end-user individually. Nonetheless, the 20th century saw many attempts to establish video telephony (after all, the name television was modeled after the term telephone). As early as 1936, the German postal service introduced the *Fernsehsprechdienst* (literally “televisionphone service”) between the central post offices of some of the major German cities. However, the service was discontinued in 1940 in response to the outbreak of the Second World War.

In 1970, AT&T marketed a similar service called Picturephone, this time packaged in the form of sleek desktop devices for home and office use. Due to high equipment and calling costs, as well as a considerable lack of consumer demand, however, it reputedly became AT&T’s biggest economic failure (see Noll 1992). Kenneth Lipartito (2003) has sought to rehabilitate AT&T’s investment in Picturephone by arguing that although the service failed as a product, its vision of video telephony nevertheless represented a trailblazing innovation in the second half of the 20th century, ensuing from and fueling the widespread cultural narrative of a technological future based on information and communication technology. In a prescient conclusion, unaware of how near the future really was, Lipartito writes that “perhaps in the end we shall have videophones after all” (80–81). And indeed, in August of the same year, the tech start-up company Skype Technologies was founded. Initially conceived and installed as an IP-telephony service that enabled computer users to place voice calls, Skype added video chat functionality to its software client only two years later (see LeClaire 2005). Today, users place billions of video calls and video conference calls per month.

What transformed failure into an everyday media experience was not a special-purpose device but a new format on a general-purpose medium. Skype was able to innovate on the grounds of readily available personal computers, publicly available research on data compression, and new

broadband access to the internet. The developers benefitted intensely from the multimedia transmission standards developed by the Moving Picture Experts Group, best known for its MPEG family of standards, including the MPEG video and MP3 audio formats. Originally conceived for applications such as digital television, digital video storage, and video conferencing, the audio and video coding schemes opened up possibilities for the creation of new specialized applications and services as well. Skype, for its part, applied these already-available compression techniques to the already-established digital information infrastructure of the internet, with its TCP/IP and HTTP protocols, and was thus able to set up IP-telephony with comparatively low investments in hardware, software, and infrastructure. So what finally led videophones to catch on was not the invention of yet another expensive special-purpose device but the simple coupling of digital general-purpose hardware, network infrastructure, and compression formats for digital video.

The same is true for the still-picture standard JPEG. The main reason why JPEG is by far the most ubiquitous file format for digital photographic images is that JPEG was conceived, according to one of its key engineers, as a publicly available “general-purpose compression standard” meant to

meet the needs of almost all continuous-tone still-image applications. If this goal proves attainable, not only will individual applications flourish, but exchange of images across application boundaries will be facilitated. This latter feature will become increasingly important as more image applications are implemented on general-purpose computing systems, which are themselves becoming increasingly interoperable and internetworked. (Wallace 1991, 2)

To be fair, the original JPEG standard from 1988 was kept even so general that no particular algorithmic implementation of the compression method was recommended, which meant that, technically, different and ultimately incompatible individual formats could have accrued from the standard. Only after `libjpeg`, a free software library built to handle the JPEG image standard, had been developed and distributed by the co-called Independent JPEG Group (IJG), did the JPEG standard actually come into use as a concrete format (for instance, in internet browsers). Nevertheless, it is the degree of designed universality as an affordance that enables general-purpose formats such as the JPEG to “cut across” media and communication technologies. If we want to estimate the impact of formats, then, it makes sense to analyze them over longer historical trajectories,

with an eye to their tendencies toward specialization (special purpose) and generalization (general purpose).

Conclusion

In this paper, I have presented some elements that might serve as a foundation for a theoretical and methodological framework for format studies. I started out by identifying basic types of formats and distilled from those a number of common features that indicate the relevance of formats as research objects for media studies. Formats frame, limit, and confine both physical media and their content and thereby produce both standards and artifacts that can be handled in and applied to different contexts of media use. They also structure data spatially and temporally and thereby affect how these data will be stored on inscription surfaces or transmitted over transmission channels. Formats thus represent reflections of the relation between a medium's content and its material conditions, infrastructural surroundings, and economic constraints. Moreover, formats assume fundamental logistic and economic functions within media systems, as they render use and labor practices more consistent, predictable, and accountable. While material media such as photographic paper, shellac, celluloid, magnetic tape, or digital representation gained considerable traction and diffusion, it was their respective formats that determined their range of use, mainly by governing compatibility and interoperability between devices.

More specifically, I have argued that formats invite us to study or reconstruct the practices that both evolved around formats and led to their formation. Therefore, format studies seems particularly suitable for praxeological approaches to media studies (see Schüttpelz 2017; Bergemann et al. 2020). Due to the specific possibilities and affordances of formats to facilitate connections, relations, and labor chains, formats not only determine the aesthetic and individual experience of media content but also provide the terms and conditions for both desired and enforced forms of cooperation and collaboration. Formats therefore need to be considered as fundamental elements of governmental technologies and as important expressions or materializations of the microphysics of power within media. Formats can also serve as means to amplify or hamper the affordances of a medium or to extend or limit the reach or scope of a media system, business model, or value chain. Instead of speaking of the affordances of certain media in general, such as the digital binary code (analog vs. digital), one should therefore look at or consider more closely the formations

and formatting of media, such as tendencies toward specialization and universalization.

To define the role of format studies, I would claim that the medium is still the message of media studies but that this message needs to be acknowledged as being fundamentally determined by its format. Digital photography on the basis of JPEG image files, for instance, still generates pictorial representations by projecting light through a system of lenses on a light-sensitive recording medium in a camera. However, the infrastructures and publics of photography, which affect both the practices of circulation and exhibition as well as the media industries and economies involved, have radically changed—and this transformation cannot be accounted for by the replacement of an analog film by a digital sensor inside a camera but rather occurs according to the cooperative reformatting of digital images in a general-purpose and publicly available digital network infrastructure. The more media scholars shift their attention from the general formations we have habitually called “media” to the concrete practices, forms of cooperation, and materialized politics of specialization and universalization, the more format will emerge as a relevant object of study. In the end, format studies will surely not—and is not supposed to—substitute for media studies, but in prompting us to ask different questions, follow different routes, and write different histories, it definitely has the potential to reformat contemporary media studies.

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