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New media: A history of convergence

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ABSTRACT

This article traces the history of media convergence, arguing that it is best understood as a long-term, processual evolution rather than a recent technological rupture. It establishes that convergence has a deep prehistory rooted in earlier media novelties and rests on a technical foundation in the digital conversion of diverse media forms, and it emphasises that convergence is equally a cultural, economic and political process, shaped continuously by social and commercial forces rather than by technology alone. The article organises this history into eight phases, each with its own object of convergence and its own characteristic tension, and sets them out in a periodisation that runs from the reception of nineteenth-century electrical communication through the conceptual origin of the convergence idea in 1983, the digitisation of media in the 1990s, the networked and cultural phases of the 2000s, the platform phase inaugurated by datafication, and the automated phase now emerging as media production and circulation are integrated with machine learning. Attention is given throughout to the counter-currents of divergence and fragmentation that have accompanied convergence at every stage, to the unevenness of convergence across the world, and to the persistent gap between what each technology made possible and what societies actually did with it. By examining past media revolutions, the article corrects the tendency to view the present as unprecedented, revealing that the rhetoric of epochal transformation is itself a recurring historical feature.

INTRODUCTION

Few concepts have been as central to the study of new media as convergence, and few have been as loosely or as variously used. In everyday and journalistic usage the word tends to denote a technological event — the merging of the telephone, the television and the computer into a single device, or the migration of all media onto the internet — and to carry an air of sudden and recent arrival, as though the coming together of formerly separate media were a development of the past decade or two. Yet the scholarship on media and communication tells a different and more interesting story. In that literature, convergence names not a single event but a long, uneven and socially shaped historical process by which media forms, industries, practices and audiences that were once separate have come together: a process with deep precedents in the nineteenth century, a decisive technical pivot in the digitisation of information, an indispensable cultural

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and economic dimension, and a contemporary culmination in networked platforms and the systematic harvesting of data. To write the history of convergence is therefore also to write a history of how each era's new media became old, and of the persistent gap between what convergence made technologically possible and what societies actually did with it.

This article offers such a history. Its central argument is that convergence is best understood historically and processually rather than as a recent technological rupture: that it has a long prehistory in earlier moments of media novelty, that it rests on a technical foundation laid by the conversion of diverse media into a common digital form, that it is as much a cultural and economic process as a technological one, and that its trajectory has been shaped at every point by social, political and commercial forces rather than determined by technology alone. Told this way, the history of convergence is also a corrective to the recurring tendency to treat the media of one's own moment as unprecedented, for the study of earlier media reveals that the sense of living through an epochal convergence is itself a recurrent feature of media history.

A history should be organised historically, and this one is. The article proceeds through eight phases, each distinguished by what converged in it, by the principal statements through which the phase was understood, and by the tension characteristic of it; Section 3 sets out this periodisation and Table 1 summarises it. The phases are the prehistory of media novelty; the conceptual origin of convergence in the recognition that digital electronics would dissolve the boundaries between modes of communication; the technical foundation of a common digital substrate; the theorisation of new media as refashionings of old; the networked phase in which the network became the organising form of social life; the cultural phase in which convergence was reframed as a process driven from below as well as above; the platform phase in which the converged environment was consolidated into a few data-driven intermediaries; and the automated phase now emerging as media are integrated with machine learning. The periodisation is a device rather than a discovery, and the phases overlap, but the chronology matters to the argument: a history that presented its material thematically while claiming to be processual would undercut its own thesis.

Two further commitments shape the account. The first is that convergence has been accompanied at every stage by counter-currents of divergence, fragmentation and specialisation, and that an account which traced only the coming together of media would mistake one half of the story for the whole. Section 9 addresses these directly, and they appear throughout. The second is that the history of convergence as it has been written is substantially a history of convergence in the wealthy societies where the dominant accounts were produced; Section 11 considers what is lost by that framing and what a fuller account would require.

A clarification of terms is in order at the outset. Convergence, as the word is used here, refers in the first instance to the coming together of things that were previously separate — media forms, technologies, industries, regulatory regimes and communicative practices — and the term is capacious because the phenomenon it names operates simultaneously at several levels which do not move in lockstep. Capaciousness carries a risk that should be named rather than absorbed: a concept broad enough to accommodate any development is a concept that explains nothing, and a history of convergence must be able to say what would count as convergence failing to occur. This article takes the counter-currents of Section 9 to supply that test. Where media forms multiply rather than merge, where industries de-consolidate, where regulatory regimes remain separate despite a common technical substrate, or where the integration a technology permits is not realised, convergence has been checked, and the history records these as outcomes to be explained rather than as noise. New media, likewise, is treated not as a fixed set of technologies but as a relational and historical category, since what counts as new is always relative to what came before and is always destined to become old.

2. METHOD, SOURCES, AND LIMITS

This study employs a library-based, critical-interpretive method, synthesising and analysing the existing scholarly literature rather than generating new empirical data. The approach suits its subject and aims, which are historical and conceptual: to reconstruct the development of the idea and the reality of media convergence, to trace the intellectual lineage of the concept across several decades of scholarship, and to situate technological developments within their social, economic and cultural contexts. A question of this kind is properly addressed not by measurement but by the critical reading, comparison and synthesis of the texts in which the concept was developed and contested.

Sources were identified through structured searches of Communication and Mass Media Complete, Scopus, JSTOR and library catalogues, using terms such as “media convergence,” “new media,” “digitisation,” “remediation,” “network society,” “convergence culture,” “platformisation” and “datafication,” supplemented by citation tracing from foundational works. Priority was given to the canonical literature of media and communication studies and to works that have shaped the field’s understanding of the relationship between media technology and society. Because much of the foundational literature in this area takes the form of scholarly books rather than journal articles, the analysis relies heavily on monographs, and identifiers are supplied where applicable. Where interpretations of convergence differ, or where the claims of one period have been revised by later scholarship, the analysis notes the development and situates each contribution in its historical moment.

Three limitations follow. The first is inherent to the method: a library-based synthesis cannot test empirical claims about media use or media effects, and it depends on the scope and quality of the existing literature. The second is that this literature is heavily weighted toward the United States and Western Europe. This is not merely a caveat about coverage but a constraint on the argument, because a history claiming to describe a general process while drawing almost entirely on one region’s scholarship risks presenting a particular trajectory as a universal one; Section 11 addresses the problem directly rather than deferring it to a note.

The third is that the account offered here is an interpretation. Any periodisation involves choices about emphasis and boundary that others would make differently, and the eight phases proposed in Section 3 are an organising device rather than a natural division in the material. They are offered because a history needs a structure and because the alternative — a thematic exposition presented as a chronology — is worse; but they should be read as a defensible reconstruction rather than as the only possible one.

3. A PERIODISATION OF CONVERGENCE

Before tracing the history it is worth setting out its shape, both because the phases that follow are easier to follow when the whole is in view and because stating the periodisation exposes it to disagreement. Table 1 gives each phase a period, an object — what actually came together in it — the principal statements through which the phase was understood, and the tension characteristic of it.

Two features of the table carry argumentative weight. The first is the third column, which changes from row to row: what converged in 1983 was not what converged in 2013, and an account that treats convergence as a single process operating continuously on a single object obscures this. The second is the final column. Each phase has been marked by a tension between what the technology permitted and what social, commercial and political arrangements allowed, and the recurrence of this tension across eight phases is the strongest evidence for the anti-determinist thesis that runs through the article. If technology determined outcomes, the gap between possibility and realisation would not appear so regularly, and in such similar form, across two centuries.

Table 1. Eight phases in the history of media convergence

Phase	Period	What converged	Principal statements	Characteristic tension
Prehistory	c. 1840–1970	Nothing yet; but each new medium was received as epochal, establishing the pattern the later history repeats	Marvin (1988); Standage (1998); Gitelman (2006)	Experienced novelty against historical recurrence
Conceptual origin	1983	Recognition that a digital substrate would dissolve the technical basis of separate modes — and of the separate legal regimes built on them	de Sola Pool (1983)	Technological possibility against regulatory categories built for the old divisions
Technical foundation	c. 1990–2001	Text, image, sound and moving image, as common programmable data	Negroponte (1995); Manovich (2001)	The promise of a single substrate against the persistence of distinct forms
Remediation	1997–2001	New media with the forms and conventions of the old they refashion	Fidler (1997); Bolter & Grusin (1999)	Novelty against inheritance
Networked	c. 1996–2010	Social organisation around information flows; mass with interpersonal communication; market with non-market production	Castells (1996, 2009); Benkler (2006); Jensen (2010)	Decentralised architecture against concentrating ownership
Cultural	c. 2004–2012	Industries with audiences; production with consumption; content across platforms	Jenkins (2004, 2006); Meikle & Young (2012)	Participation from below against corporate strategy from above
Platform	c. 2013–	Communication with data collection and algorithmic ranking; services with infrastructure	van Dijck (2013, 2014); Helmond (2015); van Dijck, Poell & de Waal (2018); Gillespie (2018)	Participatory promise against commercial enclosure
Automated	c. 2020–	Media production and circulation with machine learning; human with machine authorship	Andrejevic (2020)	Augmented capacity against opacity and loss of agency

4. NEWNESS RECURS: THE PREHISTORY OF CONVERGENCE, C. 1840–1970

Any history of convergence must begin by unsettling the assumption that the convergence of media is a uniquely contemporary phenomenon, for one of the most durable findings of media history is that the media now regarded as old were each, in their time, experienced as startlingly new, and were the occasion for the same sense of epochal transformation that digital media provoke. The point is not merely antiquarian. To recognise that newness is a transient and relational condition is to gain critical distance from the rhetoric of one's own moment, and to see that the breathless announcements of unprecedented media revolution that accompany each new technology belong to a recurrent pattern. The study of earlier media at the moment of their introduction reveals that they were, in a meaningful sense, always already new, and that the experience of novelty is a stage through which all media pass before they are naturalised into the taken-for-granted infrastructure of everyday life (Gitelman, 2006).

The electrical communication technologies of the late nineteenth century — the telegraph, the telephone, and the systems of electric light and power around which they grew — were the objects, when new, of the same utopian hopes and anxious forebodings that later attached to broadcasting and later still to the internet, and the negotiations through which societies absorbed them, defined their uses and fitted them into existing social arrangements prefigured the negotiations that would attend every subsequent media technology (Marvin,

1988). The telegraph in particular has been read as a nineteenth-century precursor to the networked present, a technology that compressed time and space, created new forms of near-instantaneous communication at a distance, and provoked both extravagant expectations of universal understanding and fears of overload and deception that strikingly anticipate the discourse surrounding the internet (Standage, 1998). The rhetoric of revolution is older than any of the technologies it has been used to describe.

This historical perspective supplies the most important methodological caution in the study of media technology: the warning against technological determinism, the tendency to treat technologies as autonomous forces that arrive from outside society and remake it according to their own logic. The classic critique insisted that technologies do not fall from the sky as finished causes but are developed, selected and shaped by the social, economic and political forces of the societies that produce them, so that the effects attributed to a technology are in large part the effects of the social choices embodied in its design and deployment (Williams, 1974). On this view, the convergence of media is not a destiny inscribed in the technologies themselves but an outcome shaped by decisions about investment, regulation, ownership and use. The same insight was developed in a historical account that traced the passage of communication technologies from prototype to widespread use and identified the social mechanisms governing this passage, including what was termed the suppression of the radical potential of new technologies — the tendency of established institutions and interests to brake and channel the disruptive possibilities of a new medium so as to protect existing arrangements (Winston, 1998). This concept is especially valuable here, because it names the recurring feature that the final column of Table 1 records: the gap between the convergence each technology made possible and the more limited convergence societies actually realised.

One complication in this inheritance should be acknowledged rather than passed over, because it bears on a source the article uses later. Williams developed his account in significant part against Marshall McLuhan, whose work is among the purest expressions of the determinism Williams was attacking. The present article nonetheless draws on McLuhan's observation that the content of any new medium is always an older medium (McLuhan, 1964), which anticipates the theory of remediation discussed in Section 6. There is no inconsistency in this so long as the borrowing is precise: the observation concerns the formal relation between media, which is a claim about how media take one another as material, and it can be detached from the causal thesis about media as autonomous agents of social change that Williams rightly rejected. Later theorists of remediation have in effect performed that detachment, and this article follows them in it.

5. THE CONCEPT ARRIVES: DIGITAL ELECTRONICS AND THE REGULATORY QUESTION, 1983

The conceptual history of convergence proper begins with the recognition that digital electronics would dissolve the boundaries between media that had long been kept separate. The decisive early statement came in an analysis of communication technology and policy that foresaw, before the internet had entered general awareness, that the historically separate modes of communication — print and publishing, telephony and the carriage of messages, broadcasting and the distribution of images and sound — would be drawn together by digital electronics into what its author anticipated would eventually become a single integrated system (de Sola Pool, 1983). This was the origin of convergence as an analytical concept in media and communication studies, and what made the insight prescient was its grasp that the separateness of these modes had been a contingent feature of the particular technologies that carried them, and that a common digital substrate would erode that separateness from beneath.

The force of the analysis is clearer when one recalls how sharply the modes it described had been separated, not only technically but legally and institutionally. In the regulatory order that prevailed when it was written, print enjoyed strong constitutional protection and operated free of licensing; common carriers such as the telephone were regulated as neutral conduits obliged to carry all traffic without discrimination; and broadcasting,

treated as the use of a scarce public resource, was licensed and subjected to content obligations from which the press was exempt. Each mode was governed by its own body of law, premised on the distinct technical characteristics of the medium that carried it. The prescience lay in seeing that a common digital substrate would dissolve the technical premises on which these separate regimes rested, so that activities once clearly assignable to a single mode and a single body of law would increasingly be carried by systems fitting none of the old categories cleanly.

The analysis drew out a consequence that remains pertinent: that the convergence of formerly separate modes would also bring together the formerly separate regulatory regimes that governed them, raising the prospect of a creep of one domain's rules into another and posing, in the author's view, a threat to communicative freedom that the older compartmentalised order had inadvertently protected (de Sola Pool, 1983). The warning that the more permissive regime might be colonised by the more restrictive one, rather than the reverse, identified a danger that subsequent debates over the regulation of digital communication have repeatedly confronted. Convergence was understood from the beginning to be not only a technological matter but a matter of policy and power — a point worth holding onto, since the phases that follow are often narrated as though policy dropped out of the story after 1983, when in fact the question of which rules should govern communication that is at once like publishing, like telephony and like broadcasting has remained one of the defining problems of the converged era, and returns with particular force in the platform phase examined in Section 10.

6. THE DIGITAL SUBSTRATE: FROM ATOMS TO PROGRAMMABLE MEDIA, C. 1990–2001

The technical foundation that de Sola Pool intuited was the conversion of diverse media into a common form, and elaborating what this conversion meant became one of the central projects of new-media theory. The popular articulation framed it as a shift from atoms to bits: where the older media economy trafficked in physical objects — printed pages, reels of film, vinyl records — the digital economy traffics in bits, weightless and infinitely copyable units of information that intermingle effortlessly and can be transmitted, stored and recombined without regard to the physical form in which their content had once been fixed (Negroponte, 1995). Because text, image, sound and moving image could all be represented in the same code, the boundaries that had separated the media carrying them lost their technical basis.

The more rigorous theorisation identified the properties that distinguished media once they had become digital: their numerical representation as data subject to algorithmic manipulation, their modular composition from independent elements, their susceptibility to automation, their variability or capacity to exist in many versions, and the mutual influence between the logic of the computer and the logic of culture that the theorist termed transcoding (Manovich, 2001). These properties together explain why digitisation was the precondition of convergence: once media became programmable data, they could be processed, combined and distributed by the same systems.

The deepest implication was that media became programmable. Once a text, an image or a passage of sound existed as numerical data, it became subject to manipulation by software in the same way as any other data, and media acquired, in effect, a second existence as code beneath their familiar surface as culture. This programmability is the substratum of every form of convergence that followed: it is what allows the same device and the same network to handle every kind of content, what allows media to be searched, filtered, recommended and recombined automatically, and — as Section 12 argues — what ultimately allows media to be generated by algorithm. The same analysis observed that the computational logic of new media, organising information into modular, addressable units available for reassembly, stood in tension with the older cultural logic of linear narrative (Manovich, 2001). Whether or not one accepts that claim in full, the underlying point is fundamental: the reduction of media to programmable data did not merely permit the combination of formerly separate forms but altered the nature of media themselves.

7. REMEDIATION AND METAMORPHOSIS: HOW NEW MEDIA CARRY OLD, 1997–2001

New media did not simply replace or erase the media that preceded them, and the relationship between new and old proved to be one of refashioning rather than supersession. An influential theory characterised this relationship as remediation — the representation of one medium within another — and argued that new media achieve their cultural significance precisely by refashioning earlier media, borrowing and reworking their forms and conventions even as they claim to improve upon them (Bolter & Grusin, 1999). On this analysis, the digital media that seemed most novel were in fact saturated with the older media they remediated: the web page remediated the printed page, digital photography the photograph, streaming video film and television. The theory identified a double logic at work, a desire for immediacy that seeks to erase the medium and present its content as if unmediated, coexisting with a fascination with hypermediacy that delights in the multiplication and foregrounding of media. Remediation gave convergence a longer memory, showing that the coming together of media in digital form was also a coming together of media histories.

A complementary account framed the emergence of new media not as remediation but as metamorphosis, emphasising the gradual and evolutionary character of media change. On this view, new media emerge through the transformation of older media in response to the interplay of perceived needs, competitive and political pressures, and social and technological innovation, a process for which the term mediamorphosis was coined (Fidler, 1997). Media should be understood as a system in which new and old forms coevolve and coexist rather than one in which the new displaces the old, and the dominant traits of earlier forms tend to propagate into their successors. Convergence, in this framework, was one principle governing the metamorphosis of media, but it operated alongside the equally important principles of coevolution and coexistence, which implied that convergence would not produce the wholesale replacement of old media by a single new one but a more complex ecology in which many forms persisted and interpenetrated. This expectation would prove one of the more accurate predictions of early new-media theory.

8. THE NETWORKED PHASE: SOCIETY, ECONOMY, AND PARTICIPATION, C. 1996–2010

While the theorists of digitisation were describing what media had become, a second body of work recast the entire social environment in terms of the network, arguing that the network had become the dominant organisational form of the information age. On this analysis, the diffusion of networked information and communication technologies had given rise to a network society, a social structure organised around networks of information flows in which the network form reshaped economy, politics and culture alike (Castells, 1996). The significance for convergence lay in the implication that the coming together of media was part of a larger transformation in which the network became the basic morphology of social organisation.

The argument was later extended to communication itself with the proposition that networked digital media had given rise to a form combining the reach of mass communication with the self-generated and self-directed character of interpersonal communication, a hybrid for which the term mass self-communication was proposed (Castells, 2009). This named a convergence of particular importance: the integration, within a single networked environment, of the one-to-many broadcasting that had defined mass media with the one-to-one and one-to-some exchange that had defined interpersonal communication.

That integration was given systematic formulation in an account distinguishing three fundamental degrees of media. The first was the human body itself, the medium of face-to-face communication bounded by physical co-presence; the second the technically reproduced media of mass communication; the third the digital metatechnologies integrating one-to-one, one-to-many and many-to-many communication within a single networked system (Jensen, 2010). The crucial argument was that these three degrees coexist rather than succeeding one another, and that digital media

of the third degree are distinctive precisely in their capacity to recombine the communicative possibilities of the other two.

The economic counterpart to these arguments held that the networked information economy had lowered the cost of producing and distributing information, knowledge and culture to the point where large-scale cooperation among individuals, coordinated without markets or managerial hierarchies, had become a viable mode of production, a phenomenon termed commons-based peer production (Benkler, 2006). The collaborative creation of free software and of collectively authored reference works demonstrated that the converged, networked environment enabled forms of nonmarket production that the older media economy had foreclosed. The analysis was careful, however, to frame these possibilities as contingent achievements to be defended rather than guaranteed outcomes — a caution that the platform phase would vindicate.

9. THE CULTURAL PHASE: CONVERGENCE CULTURE AND ITS COUNTER-CURRENTS, C. 2004–2012

The reframing that did most to establish convergence at the centre of media studies came with the argument that convergence is not fundamentally a technological process at all but a cultural one, and that to understand it as the merging of devices is to miss what is most important about it. On this account, convergence refers to the flow of content across multiple media platforms, the cooperation between multiple media industries, and the migratory behaviour of audiences who move almost anywhere in search of the experiences they want (Jenkins, 2006). Convergence in this sense alters the relationships among existing technologies, industries, markets, genres and audiences rather than simply combining hardware, and it is driven simultaneously from the top down, by corporations seeking to move content and brands across channels, and from the bottom up, by consumers who appropriate, recombine and circulate media on their own terms (Jenkins, 2004).

This carried a pointed critique of the technological understanding, captured in the diagnosis of what was termed the black box fallacy: the mistaken assumption that convergence would culminate in a single device through which all media content would flow. The history of media, the argument ran, pointed toward a proliferation of devices and channels rather than their collapse into one, and the error was to confuse the convergence of content and culture with the convergence of hardware (Jenkins, 2006). Convergence, properly understood, was an ongoing process rather than an endpoint.

The grassroots side of this dynamic is what most distinguished the cultural account from the industrial and technological understandings preceding it. The converged environment was characterised by an active and participatory audience that appropriated, annotated, remixed and recirculated content, blurring the boundary between producers and consumers. Fan communities that extended the worlds of popular films and television, amateurs who distributed their own media to potentially vast audiences, and publics that pooled knowledge through networked communication all exemplified a participatory culture in which media power was, at least potentially, redistributed (Jenkins, 2006). The account did not claim this redistribution was complete or guaranteed, and it was alert to the ways corporate strategies sought to harness participatory energies; but it insisted the converged environment had opened a space for audience agency that the broadcast era had largely denied. A related example of networked participation can be found in virtual education. Dastyar et al. (2023) describe how online courses, webinars, and videos can extend learning to wider audiences, while social media platforms facilitate discussions and information-sharing among learners and experts, helping create communities around shared issues.

It would be a distortion, however, to present the history of media solely as a story of convergence, and this is the point at which the counter-currents must be given their due. Alongside the coming together of media there have always run tendencies toward divergence, fragmentation and specialisation. The same period that saw the integration of media forms and the consolidation of industries also saw a

proliferation of channels, formats and niche audiences, the fragmentation of mass publics into countless smaller communities of interest, and, at the level of industry, episodes of de-consolidation in which conglomerates assembled in the name of synergy were subsequently broken apart. Scholars of convergence have accordingly cautioned against treating it as a single unidirectional master process, noting that convergence and divergence frequently occur at the same time and at different levels, so that media may converge technically while diverging in form, or industries may converge in one decade and fragment in the next (Meikle & Young, 2012). The critical study of convergence has accordingly come to insist that the phenomenon be analysed at several levels simultaneously — the technological, the industrial, the social and the textual — since a process that runs in opposite directions at different levels cannot be captured by a single measure of it (Dwyer, 2010).

These counter-currents do more analytical work than is usually allowed them, and they supply the answer to the question of discipline raised in Section 1. If convergence were an irresistible technological tendency one would not expect to find such persistent counter-movements, and their existence is therefore evidence for the anti-determinist thesis. But they also give the concept of convergence a testable edge: the claim that convergence is occurring is falsifiable precisely because divergence is possible and observable, and a history that could not record the checking of convergence would not be recording anything. The coming together of media is real and consequential, but it is neither total nor inevitable, and the converged environment is also, and simultaneously, a fragmented one.

If any single artifact came to embody the convergence these theories described, it was the smartphone, in which the integration of formerly separate media became, for billions of people, an unremarkable feature of everyday life. Its significance for the argument is twofold. On one hand it appears to vindicate the very black box the cultural account had warned against, for it is a single device through which an extraordinary range of content flows. On the other it confirms the deeper insight of that account, because the smartphone did not collapse the multiplicity of media into a single uniform form but became a portal to an ever-expanding diversity of applications, services and channels; the device converged while the media it carried proliferated. The smartphone thus reconciles the apparent tension between the convergence of hardware and the divergence of content, demonstrating that the two proceed together.

10. THE PLATFORM PHASE: DATAFICATION AND ENCLOSURE, C. 2013–

The most consequential development of the convergent media environment in the present century has been its consolidation into a relatively small number of large, data-driven platforms, a transformation that has given convergence a new and more troubling character. A critical history of the rise of social media described how the networked environment of the early twenty-first century, initially marked by a profusion of experimental and often non-commercial services, was progressively organised into an ecosystem of connective media dominated by a handful of major platforms, and how this consolidation transformed the participatory promise of networked communication into a system governed by the commercial logics of datafication, commodification and the engineering of popularity (van Dijck, 2013). The platforms did not merely host communication but actively shaped it, rendering social activity into data and structuring the visibility of content through mechanisms designed to maximise engagement.

Three developments since have given this phase a more precise description than the initial account could offer, and they matter to the history because each names a distinct form of coming together. The first is datafication itself, analysed as the transformation of aspects of social life into quantified data amenable to tracking and predictive analysis, and as an ideology as much as a technique — a belief in the objectivity and interpretive authority of data that underwrites its collection (van Dijck, 2014). This is a convergence of communication with measurement: the same act that sends a message now also produces a record of having sent it.

The second is platformisation, the process by which the platform becomes the dominant infrastructural and economic model of the web, extending its data infrastructure outward so that other sites and services are made platform-ready and their activity rendered legible to the platform's systems (Helmond, 2015). This is a convergence of services with infrastructure, and it explains something the earlier accounts did not: how a small number of platforms came to mediate activity occurring nominally elsewhere. Extending the analysis, the platform society has been characterised as one in which platform mechanisms penetrate the institutions that organise public life — news, education, health, transport — so that the question of platform governance becomes a question about public values rather than about media alone (van Dijck, Poell, & de Waal, 2018).

The third is the recognition that platforms exercise editorial power while disclaiming it. The study of content moderation has shown that the decisions by which platforms permit, rank, demote and remove content are constitutive of what the platform is, that they are made continuously and largely invisibly, and that the platform's self-presentation as a neutral conduit is a strategic posture rather than a description (Gillespie, 2018). This returns the history to the regulatory question raised in Section 5: the difficulty of assigning to platforms the obligations of publisher, carrier or broadcaster is precisely the difficulty de Sola Pool anticipated when he observed that a common digital substrate would leave activities fitting none of the old legal categories cleanly. That the problem he identified in 1983 remains unresolved four decades later is among the strongest pieces of evidence for the article's processual thesis.

Taken together these developments describe a phase in which convergence came to mean not only the coming together of media forms but the coming together of communication with data collection and algorithmic processing, so that the converged media environment became simultaneously an apparatus for the harvesting of behavioural information. The grassroots participation the cultural account had celebrated did not disappear, but it was increasingly enclosed within, and subordinated to, the commercial architectures through which it now flowed. The recurring pattern identified by the historians of earlier media — the braking and channeling of a new technology's radical potential by established institutions and interests — is visible once more, a contemporary instance of the suppression of radical potential that the history of media technology had taught one to expect (Winston, 1998).

A broader theoretical framing has emerged alongside these specific analyses and deserves mention because it names what may be distinctive about the present. The concept of deep mediatisation holds that media have ceased to be a separate domain acting upon social life and have become constitutive of it, so that social processes are not merely influenced by media but are increasingly conducted in and through datafied media infrastructures (Couldry & Hepp, 2017). If this is right, then the convergence traced in this article has reached a point at which the category itself begins to strain: when media infrastructure is the medium of social life as such, the question of which media have converged with which becomes less useful than the question of what social processes have converged with media.

11. UNEVEN GEOGRAPHIES: CONVERGENCE BEYOND THE CENTRES

The unevenness of convergence is as much geographical as social, and a history attentive to it must resist generalising from the experience of the wealthy societies in which the dominant accounts of convergence were produced. The observation, central to the cultural account, that the rate of convergence is uneven both within and across societies applies with particular force at the global scale (Jenkins, 2004). But the problem runs deeper than uneven rates. The scholarship synthesised in the preceding sections was produced almost entirely in North America and Western Europe, and the field has long been aware that its central concepts carry the marks of that provenance — a recognition that prompted the call to de-Westernise media studies by attending to media systems whose histories, state relations and market structures differ fundamentally

from the Anglo-American case (Curran & Park, 2000). A history of convergence assembled from this literature is therefore a history of a particular trajectory presented in universal terms, and saying so is a substantive qualification rather than a formality.

What is lost by the omission is not only local detail but a dimension of the phenomenon. An Iranian perspective provides a complementary illustration of how global communication and virtual education intersect with local cultural and educational concerns, including environmental awareness (Dariush et al., 2025). The convergence of media in much of the world has proceeded through platforms owned elsewhere, and the resulting relations have been analysed as a form of platform imperialism in which a small number of firms, overwhelmingly American, control the platforms, operating systems and intellectual property through which digital culture is produced and circulated globally, so that the convergence experienced in the periphery is one whose terms are set in the centre (Jin, 2015). This reframes several of the phases traced above. The participatory promise of the cultural phase reads differently where the platforms hosting participation are foreign and unaccountable; datafication reads differently where the data leaves the jurisdiction; and the regulatory problem de Sola Pool identified reads differently for states with no leverage over the firms concerned.

The pace, forms and consequences of convergence have accordingly varied enormously, shaped by differences in infrastructure, wealth, language, regulation and political circumstance, and the converged environment is experienced very differently where mobile networks rather than fixed broadband provide the principal point of access, where particular platforms enjoy effective dominance, or where states exercise extensive control over communication. A fuller history than can be attempted here would attend closely to these divergent trajectories and to the distinctive media ecologies that have emerged outside the centres of the global media economy. That such a history remains to be written is itself a finding about the field, and the present account should be read as describing a trajectory rather than the trajectory.

12. THE AUTOMATED PHASE: MEDIA AND MACHINE LEARNING, C. 2020–

The most recent layer of convergence extends the integration of media with data and computation into the domain of machine learning, as the systems that curate, recommend, generate and moderate media content bring the converged environment together with automated decision-making. The programmability identified in Section 6 as the substratum of digital media reaches here its furthest consequence: media that could be processed and recombined by software can also be produced by it.

The critical analysis of this development has argued that automated media differ from their predecessors in the character of the mediation they perform. Where earlier media represented a world to an audience, automated systems operate in advance of representation, sorting and pre-empting rather than portraying, and they do so at a scale and speed that removes the operation from view; the framing, selection and judgement that were once editorial acts performed by identifiable people become properties of systems whose operation is opaque even to those who deploy them (Andrejevic, 2020). This is a convergence of a distinctive kind. It integrates not two media but two orders of agency, human and machine, and it does so asymmetrically, since the machine's contribution is neither visible nor easily contestable.

This development is best understood not as a break with the history traced here but as its continuation, and the periodisation of Table 1 places it accordingly. It is marked by the same tensions that have characterised convergence throughout: between the possibilities it opens and the concentrations of power it enables, between participation and control, and between what the technology makes possible and what social and commercial forces actually permit. It is also, predictably, the occasion for precisely the rhetoric of unprecedented transformation that Section 4 showed to accompany every new medium from the telegraph onward — which is a reason for the historical perspective this article has tried to supply, not a reason to dismiss the development as merely more of the same. The history of convergence is not concluded, and the

integration of media with machine learning is its current chapter rather than its end.

13. CONCLUSION

The history of media convergence, reconstructed across the foregoing sections, resists the popular understanding of convergence as a sudden and recent technological event, and supports instead an understanding of it as a long, uneven and socially shaped process by which media forms, technologies, industries, communicative practices and audiences that were once separate have been progressively brought together. That process has a deep prehistory in the earlier moments of media novelty whose study reveals newness to be a recurrent and transient condition, and whose lesson — that technologies are shaped by social forces rather than arriving as autonomous causes — remains the indispensable corrective to the determinism that the rhetoric of media revolution perennially invites (Williams, 1974; Gitelman, 2006). It has a definite conceptual origin in the recognition that digital electronics would erode the boundaries between historically separate modes of communication, and would erode with them the legal categories built upon those boundaries (de Sola Pool, 1983). It has a technical foundation in the conversion of all media into programmable data (Negroponte, 1995; Manovich, 2001). And it has a cultural and economic dimension, brought into focus by the reframing of convergence as a process driven from below as well as above, that is at least as important as its technological dimension (Jenkins, 2006).

Organising this material into eight phases has made visible something a thematic treatment obscures. What converged was different in each phase, and the object of the process shifted from modes of communication, to media forms, to social organisation, to industries and audiences, to communication and data, and most recently to human and machine agency. A history that spoke of convergence as a single continuous process operating on a constant object would flatten these distinctions and would license the very determinism the literature warns against. The final column of Table 1 makes the complementary point: every phase exhibits a gap between what the technology permitted and what arrangements of power allowed, and the regularity of that gap across two centuries is the strongest argument available against technological explanation.

What the longer history also makes clear is that convergence has consistently meant integration and coexistence rather than the simple replacement of old media by new, and that the recurring prediction of a single converged form has been confounded by a reality in which media forms proliferate even as they are drawn together. The smartphone converged the devices while multiplying the content, and the network society integrated mass and interpersonal communication without abolishing either (Castells, 2009; Jensen, 2010). At the same time the history cautions against the participatory optimism that accompanied the networked phase, for the coming together of media has proceeded alongside a concentration of ownership and an enclosure of participatory possibility within the commercial architectures of a few data-driven platforms (van Dijck, 2013; Helmond, 2015; van Dijck, Poell, & de Waal, 2018). Two qualifications must be attached to the whole. Convergence has been accompanied throughout by counter-currents of divergence and fragmentation that are not noise but part of the phenomenon, and the account offered here describes a trajectory whose centre of gravity lies in a small part of the world (Curran & Park, 2000; Jin, 2015).

To study the history of convergence is therefore to acquire a particular disposition toward the media of the present: a recognition that the sense of unprecedented transformation is itself a recurrent feature of media history, a wariness toward the claim that technology alone is remaking the world, and an attentiveness to the social, economic and political forces that govern the pace and shape of media change. The integration of media with machine learning that now defines the leading edge of convergence is, on this view, neither an unprecedented rupture nor the culmination of the process, but its current chapter, continuous with everything that has gone before and marked by the same enduring tensions. The new media of the present will become the old media of the future, and they will be succeeded by forms not yet imagined,

which will be greeted, in their turn, with the same rhetoric of revolution that has accompanied every new medium from the telegraph to the present. The most valuable lesson of the history of convergence may simply be this: that the coming together of media is an ongoing process without a final state, that its course is determined by human choices rather than technological destiny, and that understanding it requires the historical perspective that sees in each new convergence both what is genuinely novel and what is a return, in altered form, of patterns as old as media themselves.

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