‘An Extremely Useful Invention’: Edison’s electric pen and the unravelling of old and new media

Peter Unwin
York University, Canada

Abstract
Using Edison’s electric pen as a case study, this article examines the role of media narratives in determining the ways in which a new medium is finally judged a success or failure. By challenging the narrative of the electric pen as a failed technology, it maintains that oppositional criteria such as new/old, winner/loser and successful/obsolete are counterproductive to a meaningful understanding of technical media. Instead, this article seeks to reposition and reappraise the electric pen, not as a study in failure and obsolescence, but as a site for the implementation of powerful cultural narratives that helped to define individuality and human agency in the beginnings of the modern age.

Keywords
Biographies of media, duplication, Edison, electric pen, electrification, handheld devices, machinic ecologies, media narratives, obsolescence, old and new media, predigital media

Introduction
When Thomas Edison introduced the electric pen to the public in 1876, at no time did it enter the mind of anyone involved in the project to promote the machine as ‘new’. Instead, they extolled the virtues of the device in terms carefully measured to meet the office, business and bureaucratic needs for which they presumed the machine had been invented. Today, a few dozen of Edison’s original electric pens are known to exist, several of them still operational (The Telegraph, 2009). Despite these surviving machines, or perhaps because of them, the device has assumed canonical status as an example of the failure and obsolescence of old media technology. The Smithsonian.com describes Edison’s device as an ‘epic fail’ and a ‘botched idea’ (Hendry, 2013). An account of the electric pen at New York University’s Dead
Media Archive highlights ‘the overall awkward[ness]’ of the device, even its dangerousness (NYU Dept. of Culture and Communication, 2010). A contemporary journalist described writing with the electric pen as holding ‘the business end of a wasp on a sheet of paper’ (cited in Cooper, 1996: 143). To the extent that Edison’s electric pen is remembered, it is remembered largely as an intriguing example of technological failure.

Yet in many ways, Edison’s electric pen did not fail at all. Far from being obsolescent, the technology itself ‘lives’, functions and continues to perform numerous operations today, each of which contributes to the scribal and other economies. Despite a lingering narrative of obsolescence and failure that surrounds the device, the technology is neither old nor dead. It did not die because it was never actually born to begin with. Instead, it was cobbled together out of a number of already-existing technologies such as the printing press, the stencil, the sewing needle, the electromagnetic motor and an obscure dental device known as a ‘dental mallet’. Since Edison’s pen was never presented to the public as new, the technology did not in any meaningful way become old. In the face of these continuities, remediations, re-patentings and what, since the digital turn, we have come to call hackings, the electric pen remains a technology that seriously unsettles concepts of obsolescence, of old and new media and of winners and losers. By refusing to sit still within these much-relied-upon categorizations, Edison’s strange invention demonstrates that such categories have little to do with the technology’s efficacy – the technology, in fact, often worked quite well. As Simone Natale has observed, ‘failure or marginality are first and foremost cultural constructions rather than phenomena inherent in the dynamics of technological change’ (Natale, 2016a: 5).

This article pursues a particular machine, ‘The Edison Electric Pen and Duplicating Press’, and examines the discursive constructions and defining discourses by which the technology was introduced, promoted, understood, known and finally judged to be a failure or success. It follows a growing body of communications scholarship that approaches media from outside dominant tropes of new, old, birth, death, success and/or failure. It seeks instead to locate Edison’s invention as a site for creating cultural narratives, for defining visions of the emerging times and for reimagining the role of the individual in those times. As an inscription technology, or what is generically described as a ‘writing machine’ (Gitelman, 1999; Hayles, 2002), the electric pen played a significant role in the privileging of certain cultural practices over others, exposing long-held and cherished assumptions regarding individuality, the handwritten word and their relationships to the seemingly mechanical fixity of print.

An extremely useful invention

From its beginning, Edison’s electric pen was rolled out within a rhetoric of usefulness and utility as a money saver and an ‘extremely useful invention for duplicating written or printed matter’ (Science, 1881). In his praise of the device, Lewis Carroll, an early and avid user, stressed not the electric pen’s newness but its ‘simplicity, expedition, and cleanliness in working’ (cited in Burns, 2018). That he furnished this praise, not as the celebrated author of Alice In Wonderland, but rather as the Cambridge mathematician Charles Dodgson, was wholly congruent with the machine’s decidedly adult, office oriented and practical applications – that of swiftly and economically duplicating a wide range of documents. Just how wide-ranging these documents actually were indicated an emerging environment in which, as
Friedrich Kittler states, ‘compulsory education [had] engulfed people in paper’ (italics mine, Kittler, 1999: 8). Edison’s own advertisement promoting the electric pen identified the rather mind-boggling variety of paper documents that in their singular importance were presumed to be in need of duplication, or as Edison was wont to put it, ‘reduplication’ (cited in Israel, 1998: 107). Amid this thick and thickening flora of paper forms, the inventor had no doubt that his device would be increasingly valuable for the cheap and rapid production of all matter requiring duplication such as Circulars, Price Lists, Market Quotations, Business Cards, Autographic Circular Letters and Postal Cards, Pamphlets, Catalogues, Ruled and Blank forms, Lawyers Briefs, Contracts, Abstracts, Legal Documents, Freight Tariffs, Time Tables, Invoices, Labels, Letters, Bill and Envelope Heads, Maps, Tracings, Architectural and Mechanical Drawings, Plans and Specifications, Bills of Fare, Music, Insurance Policies, Cypher Books, Cable and Telegraphic Codes, Financial Exhibits, Property Lists, Inventories, Schedules, Shipping Lists, College and School Documents, Rolls, Examination Questions, Examples, Illustrations, Scholars’ Reports, Lecture Notes, Regulations, Blanks, Official Notices, Mailing Lists, Committee Reports, Sermons, Lectures, Pastoral Information, Manuscripts, Journals, Facsimiles of Papers, Drawings, Hieroglyphics, Programmes, Designs, etc. (Thomas Edison Papers, Advertising booklet, 1876)

After such an exhaustive list, it is not clear what the obligatory ‘etc.’ could possibly stand for. With its dauntingly dense text, the advertisement’s list of paper-based forms constitutes a visual representation of textual control mechanisms that range from the office to the school, from the church to the lawyer’s office, from the trading floor to the postal station, with perhaps a hint of the bedroom suggested in ‘Manuscripts’ and ‘Journals’. Edison would employ such a wide-net approach several years later when it came to marketing his phonograph. Again, he would preemptively and speculatively define a vast area of need that would now be serviced by the marketing of his new machine. These suddenly necessary services ranged from the teaching of elocution to phonographic books for the blind. Rather like the comprehensive catalogue of what the electric pen could be used for, this list, according to Jonathan Sterne ‘appears as nothing more than a product of brainstorming’ (2003: 202).

Whether aware of it or not, what Edison was envisioning here with his electric pen was not merely the quick and cheap duplication of office documents, but the marketing of a technology that would become central to how society negotiated itself, how it established, maintained and furthered its very structures. Elizabeth Eisenstein has made a similar and compelling argument for Gutenberg’s press (1979). Indeed, one of the more audacious if not extraordinary components of Edison’s autographic system was that, in design and manufacture, it resembled a DIY desktop version of the printing press. Consisting of a battery-driven reciprocating needle that drove in and out of a hollow stylus at high speed, the electric pen made a series of minute perforations on the paper, producing a stencil made of very small punctures. Once the stencil had been cut by the needle, the writer then placed the stencil on top of a blank sheet of paper on a flat iron bed and inked the stencil with a roller. From this point on, Edison’s ‘invention’ would have been instantly comprehensible to Gutenberg and Fust and any pressman or typesetter from the late 15th century. More than comprehensible, the non-electrical end of the electric pen would have been immediately recognizable for what it was – a miniature printing press:
With such an obvious borrowing from a technology invented centuries earlier, it is hardly surprising that Edison and his agents expressed no interest in marketing the electric pen technology within a discourse of the ‘new’. Practically, however, Edison’s device appeared at an historical moment when it seems that the obligation for a technology to be ‘new’ did not exist. In today’s environment of constant and obligatory newness, of expected newness, of what Wendy Hui Kyong Chun has aptly termed the ‘habitual new’ (2017) and Gitelman the ‘already new’ (2008), it has become difficult to imagine an environment that does not employ the required rhetoric of newness.

**Figure 1.** The frame, or printing press components of the electric pen. *Source:* Engraving from L’Illustrazione Italiana, Year 5, No17, April 28, 1878 (de Agostini, 2016).

**Figure 2.** The printing press, ca. 1568. *Source:* Adapted from Amman J (1568). Image cropped by the author.
Instead, the patent caveat for the electric pen stressed ‘improvement(s)’ on what already existed and ‘methods’ by which ‘improvements’ were to be implemented. A year after the pen patent, Edison would again write, ‘Be it known that I THOMAS EDISON have invented an improvement in phonograph or speaking machines . . . . I claim as my invention the method herein . . . ’. (italics mine, 1878).

The decades-long application of the word ‘new’ to ‘media’ has become, as Simone Natale observes, ‘one of the most widely debated notions for the field of media studies’ (2016: 586). The question of when ‘newness’ became an obligatory attribute of communications technology, or when media went from being simply ‘media’ to ‘new media’ is given some examination by Jonathan Sterne (2007). ‘Telephony’, for example, as Sterne notes, is frequently dated to 1876, but ‘by 1916 commentators were no longer calling the telephone a “new” medium’ (2007: 19). That technologies such as the telephone, the radio, the movie projector and even the television fit rather uncomfortably, if at all, within a rhetoric of ‘new media’, remind us again of what Carolyn Marvin convincingly argued, that ‘[n]ew technologies is a historically relative term’ (emphasis in original, 1988: 3). Newness itself often appears to have less to do with a device, but rather, as Tom Gunning puts it, ‘is always in some sense the product of discourses surrounding it’ (1998: 6–7). Media archeologist, Jussi Parikka, has urged scholars to become increasingly aware of ‘the hegemony of the new’ (2012: 11), while Paul Duguid cautions against the new as a ‘marketing ploy’ and an unquestioned acceptance of supersession, the yielding of the old to the new, the past to the future (1996: 68). ‘Digital media technologies’, writes Terry Flew, ‘are now so pervasive in our work, our home lives, and the myriad social interactions we have with each other . . . that they are ceasing to be “new” in any meaningful sense of that term’ (2008: 2).

Increasingly, the new has become an ideology to which machines and the human actants who use them are expected to adhere. However, ‘new’ as an obligatory rhetorical device in the marketing and domestication of technology did not exist in the years of Edison’s electric pen. There was no fetish of newness that required its immediate appellation. Instead, as a booklet for the device (and other advertisements) made clear, the story of the electric pen was one of an emergent modern America epitomized by the ‘economizing [of] time and money . . . ’ (Wheeler, cited in Burns, 2019) in a way that was ‘cheap and rapid’ (Davidson George, 2005). What is on display as new in these ads is not so much ‘new media’ but the attributes of speed, range, cheapness, ease and even cleanliness. Whether a failure or success, new or old, Edison’s electric pen was intended to locate itself within an increasingly urbanized and monetized culture that saw itself as effective, versatile, fast and economical.

The electrical wonder: Performing the modern

Despite Edison’s lack of interest in marketing the electric pen within a discourse of the new, his invention nonetheless represented an instantly recognizable performance of the speed-based and efficiency-oriented modern world. This world, like the electric pen itself, at least according to claims made by its makers, could be ‘easily mastered by any person of ordinary intelligence’ (cited in Coll, 2009). Thanks to technology, one did not have to be Thomas Paine or even Thomas Edison to partake fully in the benefits of American democracy. Such benefits were now implied by the machine itself. With this device, the person of ordinary intelligence becomes a ‘master’ or is at least granted the democratic right to master. Told in
press releases, advertising booklets and public endorsements, the ‘story’ of the electric pen represents the early exposition of a narrative fundamental to ‘new media:’ that of increased self-expression and efficiency, of an increase in individuality, freedom and power, of mastery – a narrative that Paul Duguid has eloquently termed ‘liberation technology’ (1996: 73), and what James Carey and John J. Quirk refer to as ‘mythos’ (2009: 87). As Fiona Coll suggests, the ordinary user of the electric pen became ‘an ideal citizen of the modern age’, performing the right to belong in the ‘modern, efficiency-oriented world’. She further suggests that in doing so this ideal citizen included herself in ‘broader expectations for individual accomplishment in an age where technology can obliterate the limits of the body as the Pen does’ (Coll, 2009).

Edison’s advertising booklet for the device adamantly aligned the technology to the very essence of modernity itself: ‘Like the gun, sewing machine, etc. the parts of this apparatus are made by the modern methods…’ (Thomas Edison Papers, Advertising booklet, 1876: 12). This insistence on the modern takes place regardless of whether the sales figures for the electric pen met its inventor’s expectations or not. Pundits and media writers who frame the apparatus as an ‘epic fail’ and a ‘botched idea’ invariably neglect the epic of apparent empowerment that the technology unfolded. In success or failure Edison’s device, like many of his other devices, heralded the individual through the gateways of the present and into the future. In this light, emphases on the newness, oldness, success or failure of the device serve rather to obscure the cultural implications of the technology and its role in both American society and media history.

What can today be seen as ‘new’ in Edison’s device is not the technology – stencil technology is thought to be almost 40,000 years old (Aubert et al., 2014) – but the determined effort to bring the handwritten word under the control of an emerging electrical network, as well as the introduction of an emerging class of new and self-described ‘professionals’. It is perhaps here the electric pen achieves its unqualified success, and even its unsought qualification as new with the creation of a new heroic male, divorced from the arts, but right at home with electricity: ‘Mr. Edison has taught the lightning how to write’, observed a fawning 1879 biography of Edison, ‘in more ways than by chemistry’ (McClure, 1879: 95). Regardless of its commercial success or failure, the narrative accompanying Edison’s electric pen, and even the young Edison himself, was one of evangelical enthusiasm provoked by the promise that electricity held for unlocking human potential (Marvin, 1988).

In heralding the new proximity between the written word and the electrical, Edison’s first biographer strikes a note of rhetorical excitement in which the old and antiquated is swept away by the emerging presence of electrical technologies. As McClure put it,

Electrical Science has suddenly flashed into general utility, and is now rapidly lifting, not only the veritable darkness from the earth, but everywhere in home and office, field and mine, on land and on sea, is demonstrating a scope of usefulness commensurate with the loftiest aspirations of man. (McClure, 1879: 4)

Thanks to Edison, lightning itself had received an education. In the process, the written word was now improved and modernized – by becoming a phenomenon of electricity.
In his description of the device, Charles Barnard, the technical editor of *Scribner’s Monthly*, was quick to call Edison’s invention a ‘wonder of electricity’ (cited in Cooper, 1996: 132). The evident satisfaction in having an American inventor teach writing to lightning through the wonder of electricity expressed an eagerness to usher in the electrical future, to be an active player today in the action that was coming. Because of this ‘omnipotent agent’, as the *New York Times* (1881) defined electricity, people would soon be able to ‘drink, build our houses, plow our fields and manure them, sail our yachts, propel our steamers and trains, print our books and perhaps write them by the aid of electricity’ (italics mine, 3). Edison’s electric pen was one of the technologies that made this observation both compelling and plausible. With the device’s appearance, it became tenable that electricity was applicable to the technology of the written word. Furthermore, as the swift dominance of today’s digital textuality has demonstrated, there would be no shortage of interest in subsuming mechanical and handwritten text within an emerging technological order in which electricity was the ‘omnipotent agent’.

At the time that Edison’s electric pen was introduced to the public electricity was far from a common feature of the business office, or of business machinery in general. Narratives that highlight the technology’s apparent failure to take hold in this environment largely ignore what the electric pen signified in this regard. By electrifying handwriting for the purpose of creating stencils, Edison’s autographic system is now often singled out (incorrectly) as the first attempt to attach an electric motor to a consumer item. More significantly, it represents a watershed
historical moment when the American office was about to fling open its doors to the ‘wonders’ of electricity. Not only the office door, but the household door was opening wide for a process that has since witnessed the attachment of electrical motors to every conceivable form of appliance. From toothbrushes to can openers, from pencil sharpeners to adult toys, to the smart phone of today, the miniature handheld electric device is now a ubiquitous reality in the practice of everyday living, both in the working and domestic environments. Viewing Edison’s device within binary perspectives of failure or success, past or future and old or new tends to obscure these low-lying but pertinent cultural significations. As Kenneth Lipartito has observed of another supposedly ‘failed’ technology, the Picturephone, there are deep cultural paradigms shaping technological inventions, and ‘failures are not inherent in hardware but constructed by contingent social conditions’. (2003: 52)

Such a perspective of winners and losers also serves to reinforce an unexamined and epochal ‘big-four’ understanding of evolutionary media change – the inexorable transition from the spoken word, to the scribal word, to the printed word and finally to the digital word. This narrative, leapfrogging directly from Gutenberg’s press to the digital age, renders invisible other potentially epochal and revolutionary moments in the history of media, particularly the ground-changing decades of the late 19th and early 20th century (Gitelman, 1999; Gunning, 1998). In today’s environment, when a plethora of invasive communications technologies have forcefully made their way into the practices of daily living, crucial insights can be gained from studying old and dated communications technology that just as forcefully made their ways into the practices of daily life in the 1880s. As Duguid has observed, by ‘disinheriting the present from the past’ we run the risk of eliding the contributions of entire generations of media, ‘just as we are trying to build new ones’ (Duguid, 1996: 71).

In this way, consigning the electric pen to an insignificant and predigital past in which wacky machines sputtered and disappeared on their way to the present is to ignore the profound technological, social and economic anxiety that confronted the inscription of text in the late 19th century. Friedrich Kittler, Gitelman and others have identified the 1870s to 1880s and beyond as an era of intense destabilization centred around concern for the supposed fixity of text and the nature of the written word. Piano rolls, the phonograph, the electric pen, the X-ray machine and even the transatlantic cable were all technologies seeking to present reading and writing as something that could be, and even should be, both mechanized and electrified. In this context, Edison’s electric pen is something more than merely a failed and forgotten contraption, but a remarkable case study of an historical moment that witnessed the electrification of just about everything. Suddenly the phenomenon of electricity, ‘ubiquitous yet inscrutable’, as David Nye neatly puts it (1990: 138), was now ‘inextricably bound up with ideas of social progress’ (p. 147). Electricity, rather like the electric pen, itself provided ‘persuasive images for the progress of society, the operation of the mind, and the nature of the body’ (Nye, 1990: 157).

Framed this way the electric pen can be seen as a forerunner in a model that would be repeated a century later with the coming of the digital turn. Despite the seeming and well-rehearsed ‘revolutionary’ and epochal nature of the computer and its digital regime, Edison’s electric pen epitomizes an earlier and equally revolutionary period, a period of constant ‘rupture and transformation’ (Gitelman, 1999: 220). For it was in this earlier age, before the 20th century that, to use Kittler’s dramatic term, Gutenberg’s monopoly on the storage of data was first ‘exploded’ (1999: 16). This explosion did not occur out of thin air, but in a climate of growing enthusiasm for
electricity, its practical applications, and a thickening plenitude of inscription technologies, including the electric pen, each vying for favour in a rich field of commercial pressure and technical inventiveness.

Finally, it appears the very richness of this field, the thickness of the technical flora itself, exerted its downward tug on the sales figures of the electric pen. Edison may have believed that ‘[t]here is more money in this than telegraphy’ (cited in Stross, 2007: 19), but the office workers, who were the ones to be operating and maintaining the device, were decidedly unimpressed. According to Edison’s chief New York sales agent ‘the thing is highly praised everywhere but it will be harder to sell than you anticipate . . . the chief objection comes from clerks who do not want to have to use it – others offer such trifling objections as the noise’ (cited in Cooper: 134). By 1880, Edison’s perceptive London agent solemnly observed in a letter;

the day of the electric pen is over . . . it is too late to make any headway with the E.P. against a field born of its own seed . . . Had it been launched in a different manner it could have held its own – but there are now a multitude of new devices for transferring letters ad lib, many of them simple, effective & cheap.

(Johnson cited in Burns, 2019)

This letter, with its frank appraisal of the economic and technical problems facing the electric pen, was part of an emerging narrative in American business; that of the ‘business agent’. The appearance of this new occupation in the 1870s and its role in the marketing of the electric pen has been examined by Jill Cooper, who carefully delineates the extent to which Edison and others ‘relied upon a growing corps of business agents to gather and interpret customer feedback to ensure the success of their inventions on the new national market’ (1996: 130). To the extent that a narrative of failure is discernible with regard to the electric pen, it can be found first here in the feedback of this new storyteller. The letter from Edison’s London agent, replete with its intimacy and insider knowledge, employs a range of literary techniques to explain how American individualism and the ingenuity of its own ‘seed’ has been brought low by the imposters who sprang from it. The letter employs a biographical narrative for the electric pen – a device that, like a human life, ‘had its day in the sun’, that tried to hold its own, and now is fading away into a vast field. If the letter described the failure of anything, it described the failure of the narrative surrounding the electric pen, a flaw in the story by which people were meant to comprehend new technologies and to integrate them into the practices of their daily lives (Natale, 2018). It would appear that from this agent’s admission, the narrative of the electric pen was wrong from the beginning – ‘had it been launched in a different manner it could have held its own’.

The letter also reveals, rather intimately, one of the numerous ways ‘that technology is enmeshed within textuality’ (Gitelman, 1999: 8). In the case of the electric pen, this entanglement is visible in the countless redesigns, modifications and tinkerings that took place and that were documented by the correspondence between Edison’s lab and his numerous business agents. After only 3 years on the market, the weight of the perforating pen had been reduced by half, and structural changes had taken place with both the batteries and the pen itself (Cooper, 1996). The letter also trumpets a new coda by which technologies and inventiveness will be judged as successful: that is, ‘simple, effective & cheap’. Arguably, Edison’s machine was all of these things, but it was not the only machine to be all of these things. It was, finally, merely one inscription technology in a wildly fertile ecology of inscription technologies.3
By harnessing the electrical power of the lightning bolt, Edison may have taught nature how to write, he may have brought handwriting itself into the electrical era, but the clerks and office administrators of the age were indifferent to this achievement. It was the clerks’ ‘reading’ of the electric pen and the batteries in particular – two voltaic wet cell batteries capped with a removable lid and filled with caustic chemicals – along with the rather fussy maintenance they required, that had a role to play in keeping sales low. Publicly, Edison and his team insisted on the somewhat different narrative of unqualified and even stunning success. To this end, they routinely inflated sales numbers. Charles Batchelor, Edison’s right hand man and business partner, wrote letters claiming their New York agent was selling eight pens a day when it appears he was selling less than an average of one. ‘No difficulty at all is experienced in selling them’, he wrote (cited in Cooper, 1996: 7). The American press, already narrating Edison as a living symbol of American ingenuity and success, was invested in ensuring that their narrative flourished. At the 1876 Philadelphia Centennial Exposition, Edison’s pen, against some stiff competition, was awarded the bronze prize. Such exhibitions had an extensive history as sites from which to market and publicize new inventions, and also provided technical credibility to both the invention, and the inventor (Bazerman, 1999). Competing alongside Edison’s electric pen were numerous examples of mass-produced and mass-producing technologies, including the Remington typewriter, the sewing machine and a machine that allowed for the daily manufacture of 100,000 screws and bolts – an improvement on the previous daily figure of 8000. Alexander Graham Bell gave his first public demonstration of a machine that he called the ‘telephone’. Amid such lofty demonstrations of technical ingenuity and awards-giving, the electric pen, regardless of whether the clerks wished to use the machine or not, was to be ‘written’ as a part of an exhilarating future based on the ‘wonders of electricity’ as personified by Thomas A Edison, soon to be branded ‘the Wizard of Menlo Park’. Within this narrative, failure was not an option. JB McClure’s deifying 1879 book Edison and his Inventions insisted that 60,000 units of the electric pen had been sold (McClure, 1879: 95). This number, seemingly pulled out of a hat, is repeated in the first volume of Francis Jehl’s (1937) Menlo Park Reminiscences (Jehl, 1937: 99). The same number appears today in online publications, including Wikipedia, and can found in technology blogs and similar online sites. However, determined research by electric pen enthusiast and historian Bill Burns puts the number at significantly less than 10,000. According to Burns, no serial number on any surviving electric pen exceeds 8739 (Burns, 2019).

Nonetheless, a decade after its introduction, Edison’s electric pen had demonstrated a system of writing performed electrically. It offered a narrative of advancement and improvement through technology, and in particular, electricity, and revealed a deepening penetration of the ‘electrical wonder’ into the practices of everyday life. The electric pen also served to further blur the difference between the handmade and the machinemade, destabilizing the distance between human activity and technology, between script and type. Unlike the typewriter (on which Edison held a patent), the electric pen inscribed and duplicated handwriting. It made mass that most individual and personal production: the author’s own script. It was suddenly possible to endlessly duplicate what has always been understood to be entirely singular; the unique ductas of strokes, repetitions, shadings and pressure points visible in any writer’s handwriting, and historically invested with a plethora of cultural assumptions regarding individuality, personhood and the uniqueness of the self. Edison’s device rather dramatically challenged these assumptions. By electro-mechanically rendering the individual
uniqueness of a person’s handwriting, Edison’s electric pen exposed the tension and emerging threats that existed between the self-written individual and the machine-made product. A century later, Kittler would insist it was such technological threats, made manifest in these years, that transformed man into ‘so-called man’, life into ‘so-called life’ and the world itself into ‘the so-called world’ (1999: 204, 115, 229).

Edison’s electric pen challenged not only cultural assumptions concerning the printed word and its authority but, in the case of the US postal service, it exploited them as well. Handwritten documents were presumably considered more valuable and were therefore more costly to send through the mail, but the US Post Office maintained significantly reduced rates for promotional flyers. Any text or illustrations produced by an Edison pen was classified as ‘third class matter’, like print, a form of writing that apparently lacked the cultural capital of the handwritten word, and was allowed to pass through the US mail systems at a reduced price. Without exception, ads for Edison’s electric pen were swift to note that ‘[c]irculars prepared with the Electric Pen pass through the mails as third class matter at one cent per ounce or fraction thereof’ (Edison’s Electric Pen and Press, n.d.). The electric pen demonstrated that, regardless of its personal nature, handwriting was now just another movement to be ‘amplified and optimized’ (Coll, 2009) to fit the needs of a mass market. The device convincingly demonstrated that the most personal expression of an individual, his or her handwriting, could now be endlessly duplicated and turned into what today we commonly call junk mail.

The electric pen and the body electric

Despite the documented and self-generated narrative of satisfied customers and solid sales, Edison’s writing machine appears to have garnered barely a toehold in the modern office environment and failed to secure any lasting position in the business of duplicating text. Even with Edison’s radical, if inevitable, introduction of electricity into mimeographic technologies, the field of document duplication, in the end, remained a decidedly chemical one. Yet at no point could it accurately be said of Edison’s electric pen that it actually failed, became outdated, obsolescent or dead media, or even abandoned technology. In the early 1890s, an itinerant tattoo artist, Sam O’Reilly, took up Edison’s electric pen and began to ink tattoos with it. With slight modifications, the machine passed easily into Sam O’Reilly’s tattoo parlour, with Mr O’Reilly patenting his own self-named apparatus in 1891. After he replaced Edison’s single needle with a cluster of five needles to improve shading, definition and ink distribution, the machine decisively left the confines of the business office and assumed its role as the technology for the inscription of tattoos. As the site of the ‘last genuine folk art in the United States’ (Steward, 1990: 169), the tattoo parlour welcomed the device’s electrical capabilities in a way the American business office did not. While traditional hand methods of the tattoo artist permitted two to three ‘pokes’ per second, the Edison pen’s ability to puncture a surface 50 times a second proved revolutionary in the field of inking tattoos, suddenly making the machine what Edison’s London agent insisted the electric pen had failed to be, that is, ‘simple, effective and cheap’. With this repositioning, Edison’s electric pen managed to effectively escape the narrative that has come to largely define it; a narrative of failure and obsolescence.

 Whether defined as winner, a loser or an ‘epic fail,’ it is clear the device played a dominant role in both revitalizing and revolutionizing the art of the American tattoo. By leaving behind its intended purpose, or its presumed purpose, the technology successfully assumed another. The 1891
patent for the SF O’Reilly Tattooing-Machine is virtually indistinguishable from Edison’s patent of 17 years earlier. Under its new name, the device unravels what, exactly, Edison’s invention was. Now, reimagined outside of its previous association with Property Lists, Manifests, Inventories, Schedules, Shipping Lists and so on, the pen was no longer a failure ‘lost in a field of which it was the seed’, but rather an instant success that quickly established a monopoly on an inscription technology that rejected paper, and that existed decidedly outside the confines of the modern business office.

Ironically, despite the determination on the part of Edison and his team to envision the electric pen as a device central to the modern office, the electric pen was put to use as a writing machine that protested the very standardization it had been built to duplicate. Instead of Bills of Fare, Lectures and Pastoral Information, Edison’s electrical contraption would now be used to inscribe a bohemian individuality, and even what has been called ‘freakdom’. By becoming the standard writing machine of the tattoo trade, Edison’s device inscribed itself instead exclusively on human
skin. From this new site, it continued to exploit the intimacy and individuality of handwriting while rejecting, outright, the modern cultural demand for duplication.

Although Edison himself had set out to solve the problem of duplicating text, the electric pen, now an electric tattoo pen, inscribed only the singular, original text and employed the individual human body as its inscription surface. In doing so, the device opened up an enormous gulf between the intended use of a technology and the actual use of that technology. In her writing on ‘blank books’, Gitelman notes that each blank book ‘catered to the repetition of a certain kind of writing’, aiding people ‘to locate themselves or others within or against the site, practices, and institutions that helped to structure daily life’ (Gitelman, 2014: 21–22). Edison’s electric pen had been invented to fit precisely within this milieu: to generate the forms (including even blank books themselves) and textual shapes that structure and schematically bureaucratize daily life. Instead the electric pen, now patented as the ‘SF O’Reilly Tattooing-Machine’, was radically renegotiating its use and functions and opening up another textual terrain for American individualism and vitalism. This expression took place outside of the office, by way of the tattoo parlour, the backrooms of barbershops, the ship’s berth and the tents of travelling circuses. By significantly reducing the amount of time, and thus the cost, required to ‘ink’ a tattoo, the electric device thoroughly transformed the trade, making a tattoo an affordable form of self-expression for an increasing number of US citizens (Nyssen, nd).

Even before it had ceased operating as stencil cutting technology, the electric pen, now a ‘tattoo machine’, began generating an ongoing body of scriptural work, a corpus comprised of human skin, and one that insisted on the expressive potentialities, not of the office, but of the individual. In nervous times of mass replication, mass technology and increasing bureaucratization,
electrical tattooing, because of its newfound speed and affordability, provided a flourishing, intensely personal and provocatively un-businesslike genre of inscription. As a writing machine of the human body, the technology made possible a reaffirmation of the uniqueness of the individual in a time of increasing uniformity and mass technologies. By maintaining its connection to the scribal, the electric pen, as both a paper and skin-based technology, confirmed many cherished notions regarding the uniqueness of handwriting itself, while alarmingly linking those notions to the suddenly ubiquitous electrical fluid and the potential for mass duplication. In the face of these tensions, Edison’s pen, echoing Whitman’s celebrated opening to *Leaves of Grass*, would ‘sing the body electric’, not on paper, but on the actual body of the modern American male and, it turned out, the American female as well. And it would do so with a vengeance: It is estimated that this particular form of inscription can be read on the bodies of more than one in five Americans (Crum, 2017).

**Instruments to be operated by electricity**

In hindsight, it is clear that the conception and the narrative of the electric pen as a stencilling technology meant to meet the needs of a paper-based office belonged to Edison alone. As the sewing machine of Edison’s era indicates, there was nothing inherent in a perforating technology that directed it toward the duplication of text or, for that matter, paper. Indeed, Edison’s pen, now employed as technology for inking tattoos, predicts a generation of inscription technologies, including Edison’s soon-to-be-marketed phonograph, which would be divorced from paper as an inscription surface. Sam O’Reilly, the American tattoo artist, was apparently not the first to see Edison’s electric pen and think at once of applying it, not to paper, but to human skin. That idea, some say, belongs to ‘Clarence Smith, a young sailor who claimed to have seen an Edison pen in a shop window and adapted it for tattooing’ (Boyd, 2017). As early as 1878, the *Brooklyn Daily Eagle* had identified the tattooing potential of Edison’s electric pen and published an article urging Edison to ‘lessen the sufferings of humanity and extend the glories of the American name by devising some modification of the electric pen in combination with some hints taken from the guillotine and the sewing machine’ (Phresh, 1878: 3). The article further suggested, the ‘anguish’ of sitting for a tattoo could even be ‘mitigated...by a fine selection of story and song ground out from a phonograph by a polite assistant’. To the *Brooklyn Daily Eagle*, there was no doubt that Edison’s device not only fit intuitively into the tattoo business, but that such a device fell naturally within a constellation of Edisonic inventions, whether it be the electric pen, the talking book or the phonograph.

That Edison’s perforating device could be employed as technology for the human body had already been imagined, and even successfully implemented, by the dentist and inventor, William Bonwill. In 1875, Bonwill received a patent for his ‘Dentists’ Electromagnetic Mallet’, or dental plugger; an electrical device for pounding metallic fillings into cavities. Although Edison stated that his idea for the electric pen came to him during telegraphic experiments, his pen’s exact resemblance to Bonwill’s invention strongly suggests otherwise. Bonwill himself had no doubt that Edison had modelled the electric pen upon his own invention. In fact, Bonwill’s electromagnetic dental mallet, successfully patented a year before Edison’s electric pen, was already in practical use and had been displayed at electrical and dental exhibitions since 1871. The patent application, filed 21 July 1873, was granted 16 November 1875, nearly 10 months prior to Edison being issued his patent for the electric pen. It is difficult to imagine Edison was unaware of this device, particularly as it had been awarded the Franklin Institute’s highest honour: the 1875 Elliot Cresson Medal (Nyssen, 2015).
The striking similarities between the two devices, and to other devices that followed, disrupts a central theme within media historiography. Who invented it? Who ‘authored’ it? What is the proprietary link between inventor and invention, between text and author? These considerations are often central to narratives that enshrine each new medium. Gutenberg’s invention may well have been a ‘sobered-up wine press’, as Kittler described it, but it is decidedly not named after the inventor of the wine press (Kittler, 2002: 38). The rather cluttered technical environment in which Edison’s electric pen can be unravelled to become S.F. O’Reilly’s tattooing machine, or Bonwill’s dental mallet, confounds a central tenant of media narratives that there is a discernible proprietary link between the human inventor(s) and the mechanical invention. Instead, Bonwill’s electric dental mallet suggests that Edison’s electric pen is not the story of a discrete individual device invented by a single individual, that was born, grew old and became obsolescent, but belonged instead to what Parikka has usefully termed a ‘machinic ecology’ (Parikka, 2015: 11). Within this particular ecology, the machines were so similar that it is difficult to tell one ‘species’ from another. This situation, not of individual inventions associated with individual male inventors, but of shifting pluralisms and objectives, is hinted at in the dentist Bonwill’s own patent application. In it, Bonwill provides a useful description not only of his own invention, but those other near

Figure 7. Bonwill-type dental mallet shown without wire and batteries (Ingram, 1876).

Figure 8. Edison’s electric pen shown without wires and batteries (Burns, 2018).
identical technologies that would follow, including Edison’s Electric Pen, O’Reilly’s tattoo machine and several other similar machines that appeared in these years. ‘My invention’ wrote Bonwill, ‘relates to dental instruments to be operated by electricity’ (emphasis mine, cited in Nyssen, 2015). These instruments, dental or textual, describe an ecology of media in which, for different reasons, each technology had been conceived to perforate, to hammer, to indent a surface and all of which were continuously borrowing from each other and from previous technologies. Collectively these technologies achieve their status as ‘new’, not so much as technical commodities but in a new relationship to human beings, a working relationship in which electricity made possible a previously unknown technology, and one that the modern citizen was learning to eagerly embrace in the form of a handheld, electrical device.

**Conclusion: The machine in the hand**

By placing the electric pen equally alongside its less-storied variants, this article has foregrounded how similar machines, through modification and borrowing, established a genus of nearly identical devices that announced an increasingly intimate, at least physically closer relationship between people and technology. These machines shared key characteristics; all were miniaturized, electrically driven and all involved the attachment of an electromagnetic motor to a handheld mechanical device. This alliance represented a class of technology that had not yet existed, an emerging category of machines that both anticipated and fostered an increasing proximity between technology and the human body. The electric pen made clear that the machine was no longer a smoking dynamo that haunted the gardens of pastoral America (Marx, 1964). The machine was now in the hand. In the commonplace epithet of today, it had become ‘mobile;’ the machine was now moving, out of the laboratory, into the office and, increasingly, into the home. In the case of the electric dental drill and cavity hammer, these machines were also in the mouth, just as Edison’s pen, now a tattoo technology, was on the skin, even under the skin. In their daily use, these perforating devices represented a performance of modern society and the performance of the modern individual as she or he attempted to navigate an environment increasingly based on electricity and the electromagnetic motor.

Rather than being elucidated in any meaningful way through a framework of the ‘new’ or the ‘obsolescent’, the contributions and cultural impacts of these machines are revealed within the larger discursive context of their histories. Such narrative patterns substantially inform the ways in which new media are rendered palatable for widespread use, and ultimately incorporated into everyday living (Natale, 2016). This domestication, as we have seen here, included a founding narrative in which nature, in the form of electricity, had been tamed by American ingenuity, and inaugurated a future of which these machines became visual manifestations. Through devices such as the electric pen, the tattoo machine and the electric dental mallet, the modern was made visible. These machines established electrification and miniaturization as a defining ethos of the modern age and instituted the new and soon-to-be common practice of holding an electrical machine in the hand.

Like all communications technology, the electric pen, from the beginning, was inextricably dependent on the practices of textuality. Not only do such technologies exist to generate texts, they are themselves, as we have seen here, generated by textuality. From office memos to word of mouth, product endorsements and press articles and science fair prizes, they are technologies that come to be understood and domesticated through the narratives in which they are imbedded. That a technology such as Edison’s pen appears in the ‘Dead Media Archive’ of the NYU’s Culture and
Communication Department and yet continues to be meaningfully employed in the scriptural and other economies, forcefully reminds us that the failure or ‘death’ of a technology has little to do with the working of the machine, but with interpretations of those workings. In the case of the electric pen, its reputation as a failure occurred when the machine’s function and its place in society were realized outside (and in this case, dramatically outside) the discursive structure into which the device was built to fit. The electric pen became old, obsolescent and even ‘a short-lived textual duplicating device’ (Gitelman, 1999: 202) because its rhetorical structure, its story, had been firmly set by Edison to fit within the booming business and office environment of urbanizing modern America. Such a story was tailor-made to easily imbed itself into a discourse of practicality, time, labour-saving and office efficiency. Instead, the technology entrenched social practices inherited from the indigenous peoples of the Americas, and one that carried with it implications of sordidness, delinquency, the demimonde existence and even criminality.

Such an outcome is entirely antithetical to the narrative through which Edison’s electric pen was constructed. That the device had little and only limited impact within its intended environment is, on a narrative level, already proof of technological failure – the electric pen’s failure to align with the discursive construction written for it. There is no similar narrative of failure that surrounds Bonwill’s device or SF O’Reilly’s electric tattoo machine: both machines performed exactly the task for which they were invented. Only in its incarnation as ‘Edison’s Electric Pen’ did the technology noticeably wobble. There it failed to match the telling of its own story. Finally, Edison’s perforating technology secured its footing as a writing machine by transgressing the purpose for which it had been invented. No longer a duplicating technology, this vagabond writing machine was repositioned behind curtains in the tattoo parlour, generating a significantly different textuality. Through the radical renegotiation of its stated function, the machine now fostered cultural practices far removed from the bureaucratic schematizations, duplication and bureaucratic management uses for which it had been conceived.

In his patent caveat, Edison had made clear that ‘the object of this invention’ was ‘to print a number of copies of a drawing or manuscript’ (emphasis mine). Paradoxically, his invention secured its role by abandoning copies and duplication altogether. Within less than two decades, the electric pen was no longer a means of duplicating text. In what would appear to be the moment of its commercial failure, its oldness, even its obsolescence, Edison’s electric pen ensured its longevity by renegotiating itself into a markedly different area of American textual culture: one that favoured the individual against the many, and the original rather than the copy.

Acknowledgements
The author would like to express his appreciation to the editors and reviewers, to Scott McLaren and Deborah Clipperton, both from York University, and to Bill Burns, for his graphics and his broad knowledge of the electric pen. The author would also like to thank the Social Sciences and Humanities Research Council of Canada and York University for their support.

Notes
1. Written testimonial from Charles Dodgson for the British distributor of the pen, The Electric Writing Co. Ltd. (Cited in Burns, 2018).
2. According to the website wisegeek: clear answers for common questions: ‘The electric pen is an 1875 invention by Thomas Edison . . . and stands as the first safe motor-driven appliance for sale on the market’ (Newth, 2018). In fact, according to Cooper, Edison’s pen was a ‘combination of engineering marvel and
office menace’. Spillage from one of the machine’s two batteries could result in the ‘swift removal of a layer or two of shellac from the user’s desk’ (1996: 134).

3. The electric pen entered a crowded field of duplicating technologies. These included the old letterpress of James Watt (patented 1788); papyrography; carbon paper; reflectography; Herschel’s blueprint process, and others (Nadeau, 1993).

4. In Edison’s time, the life of a patent was 17 years. Given Edison’s reputation as a notorious patent troll, it was perhaps wise of Mr O’Reilly to allow 17 years to pass before patenting his ‘Tattooing-Machine’.

References

Amman J (1568) The printing press. In: Meggs PB (1998) A History of Graphic Design. Toronto: John Wiley & Sons, p. 64. Image available at: https://commons.wikimedia.org/wiki/File:Printer_in_1568-ce.png (accessed 31 October 2018).

Aubert M, Brumm A, Ramli M, et al. (2014) Pleistocene cave art from Sulawesi, Indonesia. Nature 514(7521): 223–227. Available at: https://www.nature.com/articles/nature13422 (accessed 31 October 2018).

Bazerman C (1999) The Languages of Edison’s Light. Cambridge: MIT Press.

Boyd B (2017) Samuel O’Reilly’s peculiar reciprocating electromotor tattoo machine. Tattooodo. Available at: https://www.tattoodo.com/a/2017/02/samuel-o-reilly-s-peculiar-reciprocating-electromotored-tattoo-machine/ (accessed 10 October 2018).

Burns B (2019) Edison’s electric pen 1875: The beginning of office copying technology. In: FTL History of Technology. Available at: http://electricpen.org (accessed 31 March 2019).

Carey JW and Quirk JJ (2008) The mythos of the electronic revolution. In: Carey JW (ed.) Communication as Culture: Essays on Media and Society. New York: Routledge, pp. 87–108.

Chun WHK (2017) Updating to Remain the Same: Habitual New Media. Cambridge: MIT Press.

Coll F (2009) The work of handwriting in the age of mechanical reproduction. The Floating Academy. Available at: https://floatingacademy.wordpress.com/category/fiona-coll/page/2/ (accessed 10 October 2018).

Cooper JE (1996) Intermediaries and invention: Business agents and the Edison electric pen and duplicating press. Business and Economic History 25(1): 130–142. Available at: https://www.jstor.org/stable/23703109?seq=1#page_scan_tab_contents (accessed 30 October 2018).

Crum M (2017) The prickly history of tattooing in America. Huffington Post, 12 June. Available at: https://www.huffingtonpost.ca/entry/america-tattoo-history_n_7690424 (accessed 10 October 2018).

Davidson George E (2005) Beehives of invention: Edison and his laboratories. National Park Service History Series, National Park Service. Available at: https://www.nps.gov/parkhistory/online_books/hh/edis/edisce.htm (accessed 1 May 2019).

De Agostini (2016) Veneranda Biblioteca Ambrosiana. De Agostini Editore. Used by permission of Age Fotostock, DAE-BA025231.

Duguid P (1996) Material matters: The past and futurology of the book. In: Nunberg G (ed.) The Future of the Book. Berkeley: University of California Press, pp. 63–102.

Edison T (1878) Improvement in Phonograph or Speaking Machines. Letters Patent No. 200,521A. Available at: https://patents.google.com/patent/US200521A/en (accessed 25 January 2019).

Edison’s electric pen and press. (2015) By X-Javier [CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0)], from Wikimedia Commons. Available at: https://upload.wikimedia.org/wikipedia/commons/b/bc/QB-TT_005_-_Electric_Pen%2C_pub.jpg (accessed 10 October 2018).

Eisenstein E (1979) The Printing Revolution in Early Modern Europe. Cambridge: Cambridge University Press.

Flew T (2008) New Media: An Introduction. Oxford: Oxford University Press.

Gitelman L (1999) Scripts, Grooves, and Writing Machines: Representing Technology in the Edison Era. Stanford: Stanford University Press.
Gitelman L (2008) *Always Already New: Media, History and the Culture of Data*. Cambridge: MIT Press.

Gitelman L (2014) *Paper Knowledge*. Durham: Duke University Press.

Gunning T (1998) Re-newing old technologies: Astonishment, second nature and the uncanny in technology from the previous turn-of-the-century. Available at: http://web.mit.edu/m-i-t/articles/index_gunning.html (accessed 15 January 2019).

Hayles NK (2002) *Writing Machines*. Cambridge: MIT Press.

Hendry ER (2013) 7 Epic fails brought to you by the genius mind of Thomas Edison. *Smithsonian.com*. Available at: https://www.smithsonianmag.com/innovation/7-epic-fails-brought-to-you-by-the-genius-mind-of-thomas-edison-180947786/ (accessed 9 October 2018).

Ingram JS (1876) Dentist’s electromagnetic mallet. In: *The Centennial Exposition*. Hubbard Bros. Cited in Nyssen (2015) Samuel F. O’Reilly vs Elmer Getchell. In: *Buzzworthy Tattoo History*. Available at: http://www.buzzworthytattoo.com/samuel-f-oreilly-vs-elmer-getchell/ (accessed 15 October, 2018).

Israel P (1998) *Edison: A Life of Invention*. Toronto: John Wiley & Sons.

Jehl F (1937) *Menlo Park Reminiscences*. Dearfield: Edison Institute. Available at: https://babel.hathitrust.org/cgi/pt?id=coo.31924003988429;view=1up;seq=9 (accessed 30 October 2018).

Kittler F (1999) *Gramophone, Film, Typewriter*. Stanford: Stanford University Press.

Kittler F (2002) The perspective of print. *Configurations* 10(1): 37–50. Available at: https://monoskop.org/images/9/93/Kittler_Friedrich_2002_The_Perspective_of_Print.pdf (accessed 10 October 2018).

Lipartito K (2003) Picturephone and the information age: The social meaning of failure. *Technology and Culture* 44(1): 50–81.

Marvin C (1988) *When Old Technologies Were New: Thinking about Electric Communication in the Late Nineteenth Century*. New York: Oxford University Press.

Marx L (1964) *The Machine in the Garden: Technology and the Pastoral Ideal in America*. New York: Oxford University Press.

McCarthy R (2011) Edison and the tattoo. *From the Stacks*. New York Historical Society Museum and Library. Available at: http://blog.nyhistory.org/edison-and-the-tattoo/ (accessed 2 May 2019).

McClure JB (1879) *Edison and his Inventions Including the Many Incidents, Anecdotes and Interesting Particulars Connected with the Life of the Great Inventor*. Chicago: Rhodes & McClure. Available at: https://babel.hathitrust.org/cgi/pt?id=loc.arcl:13960/t6n021269;view=1up;seq=99 (accessed 30 October 2018).

McComb D (2015) Woman Getting a Tattoo. Tattoo Archive, Winston Salem, NC. In: 100 Years of Tattoos. London: Laurence King Publishing, pp. 78–79. Available at: https://www.tattoodo.com/a/2015/08/100-years-of-tattoos-by-david-mccomb/ (accessed 30 October 2018).

Nadeau L (1993) Chronology of office copying processes. Available at: http://cool.conservation-us.org/bytopic/repro/nadeau1.html (accessed 31 October 2018).

Natale S (2016a) There are no old media. *Journal of Communications* 66(4): 585–603. Available at: https://doi.org/10.1111/jcom.12235 (accessed 30 October 2018).

Natale S (2016b) Unveiling the biographies of media: On the role of narratives, anecdotes, and storytelling in the construction of new media’s histories. *Communication Theory* 26(4): 431–449.

Natale S (2018) If software is narrative: Joseph Weizenbaum, artificial intelligence, and the biographies of ELIZA. *New Media and Society* (15 October). Available at: https://doi.org/10.1177/1461444818804980 (accessed 1 November 2018).

Newth A (2018) What is an electric pen? WiseGEEK Clear Answers for Common Questions. Available at: https://www.wisegEEK.com/what-is-an-electric-pen.htm (accessed 31 October 2018).

*New York Times* (1881) Future of the electric invention. Imagination picturing forth the marvelous things electricity is to do for us in ages to come, 16 April: 3. Available at: https://search-proquest-com.ezproxy.library.yorku.ca/hnpnewyorktimes/docview/93922844/fulltextPDF/6E10AC81D5E04C6FPQ/1?accountid=15182 (accessed 30 October 2018).

Nye D (1990) *Electrifying America: Social Meanings of a New Technology, 1880-1940*. Massachusetts: MIT Press.
Nyssen CF (2015) Samuel F. O’Reilly vs Elmer Getchell. In: Buzzworthy Tattoo History. Available at: http://www.buzzworthytattoo.com/samuel-f-oreilly-vs-elmer-getchell/ (accessed 15 October, 2018).

Nyssen CF (nd) Early Tinkerers of electric tattooing. In: Buzzworthy Tattoo History. Available at: http://www.buzzworthytattoo.com/tattoo-history-research-articles/early-tinkerers-of-electric-tattooing/ (accessed 21 January 2019).

NYU Dept of Culture and Communication (2010) Dead Media Archive. Electric Pen. Available at: http://cultureandcommunication.org/deadmedia/index.php/Electric_Pen (accessed 10 October 2018).

O’Reilly SF (1891) Tattooing-machine letters patent No. 464,801. United States Patent Office. Available at: https://patentimages.storage.googleapis.com/ff/1c/12/42b8701b60877e/US464801.pdf (accessed 31 October 2018).

Parikka J (2012) What is Media Archaeology? Cambridge: Polity.

Parikka J (2015) Mutating media ecologies. Continent 4(2): 24–32. Available at: http://continentcontinent.cc/index.php/continent/article/view/183 (accessed 30 October 2018).

Phresh P (1878) The Teletattoograph. Another field for the great inventor, Edison. Brooklyn Daily Eagle, 16 August, 3. Available at: https://www.newspapers.com/image/50423586/?spot¼4132827 (accessed 10 October 2018).

Science (1881) Advertisement 2(33). 12 February. Available at: https://www.jstor.org/stable/2900815?seq=1#metadata_info_tab_contents (accessed 10 October 2018).

Sterne J (2003) The Audible Past. Durham: Duke University Press.

Sterne J (2007) Out with the trash: On the future of new media. In: Acland CR (ed.) Residual Media. Minnesota: University of Minnesota Press, pp. 16–31.

Steward S (1990) Bad Boys and Tough Tattoos. New York: Haworth Press.

Stross R (2007) The Wizard of Menlo Park: How Thomas Alva Edison Invented the Modern World. New York: Crown.

The Telegraph (2009) Rare Edison pen to be sold. 8 November. Available at: https://www.telegraph.co.uk/culture/culturenews/6525253/Rare-Edison-Electric-Pen-to-be-sold.html (accessed 9 October 2018).

Thomas Edison Papers (1876) Edison’s electric pen & duplicating press company (Advertising booklet for Edison’s electric pen). D-76-07, Circulars and Brochures: 12. Available at: http://edison.rutgers.edu/NamesSearch/SingleDoc.php?DocId=D7607E (accessed 2 May 2019).

Author biography

Peter Unwin is an author and PhD candidate in the Humanities at York University, Toronto. His current research concerns the history and implications of ‘death-of-the-book’ discourses.