Communications Undergraduate Journal
2022, Vol. 1, No. 1, page range: 8 – 14
ARTICLE |cujournal.ie

An Analysis of the History and Development of the Printing Press as Critique of Technological Determinism

Clodagh O'Donnell[1]

[1]*School of Communications / Dublin City University, Dublin, Ireland*

Abstract: *The relationship between radical technological innovation and the social world is scrutinised in this article. Informed by the contrasting approaches of technological determinism and social shaping of technology to understanding the roles and outcomes of technology in society, the article critically evaluates the early history and evolution of Gutenberg's printing press. In doing this, the author ultimately argues that social forces ultimately shape the outcome of technologies. The original version of this article was submitted as an essay assignment for the CM392 'Science, Technology and Society' module.*

Keywords: *Printing press; technological determinism; social shaping of technology; actor network theory; structuration theory*

"In technological determinism, research and development have been assumed as self-generating. The new technologies are invented in an independent sphere and then create new societies or new human conditions" - Raymond Williams (2000: 38)

Technological determinism is the "idea that technology develops as the sole result of an internal dynamic and then, unmediated by any other influence, molds society to fit its patterns" (Winner, 2007 p.19). An outline of the history of the printing press may, on the surface, seem to support such a definition. However, further examination demonstrates how unforeseeable and unpredictable the future can be. The perspective of the social construction of technology (Latour, 1987) sees society as having choices within the direction of innovation for artefacts, and "particular groups and forces to shape technologies to their ends" (Williams, 1996, p.857) will be discussed. This concept will be exemplified through the history of the printing press and its ability to help spread the Protestant Reformation due to the increasing difficulty for the Church and the state to censor and control information spread by individuals.

Furthermore, an argument of how simplistic it is to view technology as self-generating will be debated through a social constructionist lens, using Elizabeth Eisenstein's book, The Printing Press as an Agent of Change (1980). The concept that the printing press led to an explosion of knowledge will be argued, and that it more realistically had a slow rippling effect on society during the Enlightenment era. With this in mind, Latour's Actor-Network Theory (1987) will emphasise that technology drives society and vice versa, leading to unintended consequences; and this argument will be strengthened by Giddens' Structuration theory (1984). Moreover, Braidotti in Posthuman (2013) will help contextualise how heavily Eurocentric the printing press' history is, and the importance of understanding how social forces impact the use and direction of technology. Lastly, a discussion of how the printing press still holds value within modernity and how social construction theory upholds scrutiny when looking at the history of printing press.

Despite the movable type invented in 1040 in China by Bi Sheng, the printing press was reborn in 15th Century Europe by Johannes Gutenberg. This "cranky German businessman" (Pettegree, 2010) caused a schism within society when, in 1455 he began printing the Gutenberg Bible, which sought to undercut the scribe competition (Christine, 2015, p.2). Whilst determinists would interpret this as

technology winning out, Eisenstein recognised that this was simply a transformation, defined as an "occupational mutation" (Eisenstein, 1980, p.253). Descriptive relativism understands how cultures adapt within a new technological frame (Winner, 1986), as Pinch and Bijker's empirical relativism (1984) demonstrates how technology is "not a monolithic other-worldly phenomenon, but…sharing the multiplicity and diversity that characterises all social and cultural undertakings" (Collin, 2011, p.83). Consequently, the view that the development of the printing press was purely deterministic is an oversimplified understanding of its complex history and direction of innovation. (Williams, 1996, p.857).

The history of the printing press does not support this conception of technological development. However, Williams makes a valid argument when stating:

> the basic assumption of technological determinism is that a new technology – a printing press or a communications satellite – 'emerges' from technical study and experiment. It then changes the society or sector into which it has emerged. (Williams cited in Freedman, 2002 p.427).

As demonstrated, determinism holds the falsified view that assumes a priori knowledge that technology exists as a stand-alone artefact. As will be discussed, technology does not move in a cyclical process, and technological artefacts have not "created the modern world" (Williams 1974, p.13), but society is at the crux of its invention.

As printing became the dominant form of media, it shifted society from an oral to literate culture. According to Marshall McLuhan, this schism from ear to eye enabled the creation of a nation-state. As the printing press evolved, it impacted the trajectory of evolution for the "human condition" (Williams, 1974, p.6). According to McLuhan (1964), the transformation to the visual changed the understanding of how we view society - how we receive information is more important than the information itself; the medium is the message. Hard determinists acknowledge that the printing press's hot media enabled widespread social and cultural changes to occur that may otherwise not have. Nonetheless, this hegemonic view is shattered when discussing individuals who caused the splintering of the Church and Christendom.

The epitome of this is the Protestant Reformation, with pioneer Martin Luther stating, "[P]rinting is the ultimate gift of God," (Roos, 2019) as it enabled 300,000 copies of his infamous 95 Theses (1517) to be printed in only three years. Furthermore, the printing press promoted the decentralisation of gatekeeping knowledge, as the vast number of books published made censorship and suppression difficult; knowledge became power as "revolutionary ideas and priceless ancient knowledge were placed in the hands of every literate European" (Roos, 2019). However, the spread of knowledge was not an explosion as often described but was limited to the literate population. Thus, on the other hand, the linear path of technology set out by determinists is rather simplistic, as "we all know people have politics, things do not" (Winner, 2007, p.20). A more nuanced understanding would be that the printing press accelerated reading and writing, expediting the enlightenment of technology.

Drawing upon Williams (1974), Lister et al. state that print "can only take effect through already present social processes and structures and will therefore reproduce existing patterns of use and basically sustain existing power relations" (2009, p.72). Thus, this reductionist theory of determinism is a glib understanding of the complexity of the human condition, as "blaming the hardware appears even more foolish than blaming the victims when judging conditions of public life" (Winner, 2007, p.19). Given the above, the history of the printing press does not support technological development.

The concept of the Gutenberg Man arose from theorists after McLuhan's publication of the Gutenberg Galaxy (1962). McLuhan described how the arrival of printed technology inflicted a shift in the consciousness with how society received information. Furthermore, he stated that the visual culture would be one of homogenisation and unification (ibid. p.36). However, this view can be deconstructed when discussing the splitting of Christendom, which was initiated by actors such as Martin Luther and Nicolaus Copernicus, with printing used as a vehicle to disseminate their ideas of 95 Theses (1517) and Geocentrism (1543) respectively; thus, "God was pushed back into the corner" (Ravetz, 2006 p.27) by these individuals. This demonstrates how society is socially constructed, as "social, economic, and cultural factors shaped the direction of innovation and technological artefacts change outcomes on groups of society" (Williams, 1996, p.4). Technology simply helped accelerate these social changes.

Compellingly, the social construction of technology theory outlines that technology does not determine society, but instead, societal choices shape technology. According to Elizabeth Eisenstein, "one must wait until a full century after Gutenberg before the outlines of new world pictures begin to emerge into view" (1980, p.33). This perspective demonstrates that hindsight is essential when looking at technologies, as development is not always linear or inevitable, which Andrew Feenberg reiterates as subversive rationalisation (Feenberg, 1992; Jones, 1998). In other words, democratising the written word had a slow rippling effect within society. As Palmer satirically states: "[C]ongratulations, you've printed 200 copies of the Bible; there are about three people in your town who can read the Bible in Latin" (cited in Roos, 2019). Palmer highlights that technology did not bring about an explosion of knowledge as often described, but the invention of mass printing took time for society to decide its uses for printing. Unlike determinism, social construction more accurately depicts the importance of both society and technologies' impact on social progression; as Eisenstein has shown, the interception of the printing press by Gutenberg caused a magnification of both "breadth and depth" of the "Renaissance and the Scientific Revolution" (Dewar, 1998, p.2).

Indeed, the printing press "gave birth to a new individual, the intellectual" (Liulevicius, 2020), although one must open up the black box to understand the complexity of the printing press. Therefore, in line with social constructionists like Bijker and Pinch, Actor-Network Theory (1987) understands the critical role science and technology play in society's reconfiguration (Waelbers and Dorstewitz, 2014). Latour's micro-social approach highlights that "technologies are highly malleable to local actors" (Latour, 1983; Williams, 1996, p.862). As Europe was recovering from the Black Death, the printing press was "in the right place at the right time" to help in the secularisation of Western culture" (McFadden, 2018), with many separating themselves from the Church, promoting Luther and Copernicus. Many consequences highlight how different society could have developed and how difficult it is to disentangle the black box, as it is hard to grasp what could have happened if society was different.

Many actors and networks were involved in the rise of the printing press, and the 'unintended consequences' seen by this technology reinforce that we cannot be too deterministic when projecting the impact of technology, as "the important effects of the printing press era were not seen clearly for more than 100 years" (Dewar, 1998, p.3). The printing press revolution outlines that "we no longer register the impact of the printing press because we have no easy way to retrieve the ambient sensation of 'before'" (Murphy, 2020). To understand the effects of the printing press, we need to have some parallel universe to see the world with or without it, as the fate of technology is not determined, but unpredictable. Thus, this absurdity reinforces that the printing press was not a stand-alone artefact, but when actor met technological structure, it created social change, which reinforces the social constructionist argument, as many 'technological' and 'social' outcomes shape the direction of innovation (Williams, 1996, p.857) due to particular social groups.

Regardless, the printing press facilitated the scientific revolution, as the gift of copying with accuracy fostered "more energy to breaking new ground" (Roos, 2019). Social constructionist Bijker acknowledges that technologies effect on the progress of a society is axiomatic (Mody, 2004, p.102). However, to black box technology spawns the "failure to take into account the content of technological innovations results in the widespread use of simple linear models to describe the process of innovation" (Pinch and Bijker, 1984, p.405). Seeing the issue of diluting the scientific revolution down to simply 'an internal logic that is self-generating' (Williams, 1974, p.6) is to oversimplify the cultural shift that bisected science and religion. The duality of both actor and the artefact "threatened the ironclad power structures of Europe" (Roos, 2019), which dissolved the powers of Christendom and triggering a shift in the human condition (Williams, 1974, p.6).

To further the argument on social construction theory, Giddens' social-led approach of structuration theory exemplifies how the continuous "transformation of structures" results in the "reproduction of systems" (Mouzelis, 1991, p.26). Giddens positions "temporality (and the spatiality) of human existence and all social phenomena at the heart of his approach" (Joas, 1987, p.16). The printing press warranted "priceless ancient knowledge was placed in the hands of every literate European" (Roos, 2019). The capacity to do so is within the duality of structure (Gibbs, 2017); The medium of the printing press, alongside philosophers such as Locke, Voltaire and Rousseau, contributed to "an increasingly literate populace" (Roos, 2019), engendering Europeans' demand for printed texts. Therefore, structuration theory underscores how the printing press has "no inherent stability outside human action" (Gibbs, 2017) as it has been socially constructed.

Despite Gutenberg not inventing the printing press, he reinvented it into European society. As the printing press was constructed in an independent sphere, it caused a rupture within society when it emerged. Whilst a technological determinism would interpret this as the dying out of scribes, through a posteriori perspective, ANT understands that this is simply an evolution, where "new connections are made and old connections broken off" (Latour, 2005; Waelbers and Dorstewitz, 2014, p.27). Like humans, non-human artefacts also evolve, as Latour's concept of symmetry within ANT demonstrates how within the techno-social network, scribes and the printing press are one-of-the-same, coined as the 'sleeping policeman' (Latour 1994; Waelbers and Dorstewitz, 2014, p.25). A Latourian viewpoint sees the reflexivity from scribes to the printing press as simply an evolution. Thus by conceptualising the printing press retrospectively, constructionists apprehend that through interpretive flexibility, that technological development is endless, and will continue to evolve alongside humanity.

Moreover, it can be argued that the history of the impact of the printing press has been overstated. The promised utopian that was predicted pre-Revolution in France is illustrated by Louis-Sebástien Mercier: "printing was only born a short while ago, and already everything is heading toward perfection" (Roos, 2019). The hyperbolic manner evoked from Mercier that the printing press has the power to create a new human condition, is an idealistic pipe dream. Conversely, the enlightened truth attached to the printing press was overstated, as "witch-burning was more likely to happen in places where there were more printing presses" (Hohmann, 2018). Mass-produced pamphlets of witch-hunting by Dominican priests, such as Malleus Maleficarum (1486) led to crazes like this spreading and "the book was a bestseller and strongly influenced the obsession with witchcraft for two hundred years" (Eschner, 2017). The correlation is ironic when compared to Mercier's predictions. This illustrates the lack of control the printing press had over transforming society, but that "whoever controlled the hub to dominate…led to more hierarchical power structures" (Hohmann, 2018). McLuhan's (1962) ideological worldview of the global village does not consider the complexities of social, cultural, religious and political differences as well as their unpredictability.

Braidotti in Posthuman (2013) examines how the triad of science, technology and posthumanism is interconnected and how one accurately must "integrated post-human theory that includes both scientific and technological complexity and its implications for political subjectivity, political economy and forms of governance" (ibid, p.43). The political aspect of the printing press is based on the hiatus between 15th Century Germany as opposed to 11th Century China, which is enveloped within a Eurocentric bias. Europe, as such, perceived itself as the origin of rationality. (Shaw, 2015). Braidotti's feminist and post-humanist perspective casts light on how our patriarchal society privileges the white man, who is at the crux of "mental, discursive and spiritual values" (Braidotti, 2013, p.13). Thus, the reinvention of the printing press by Gutenberg stresses how society is not controlled by technology, but those at the forefront of Western power who make "Eurocentrism into more than just a contingent matter of attitude: it is a structural element of our cultural practice, which is also rooted in both theory and institutional and pedagogical practices" (ibid. p.15). The distinction between the self and the other (Braidotti, 2013, p.15) has been socially constructed, with the latter deemed as lesser human.

In the modern age, the printing press has matured into a symbol of luxury and trust in the 21st Century. Printing was unparalleled for 400 years until the arrival of the internet; even so, it did not disappear as the history of the printing press exemplifies that one technology do not simply win out. What scribal writing became with the emergence of print, so too did print with the emergence of the internet. As seen in The Social Impact of the Printing Press (2020), "scribal work had not vanished overnight. In fact, the prestige of handwritten texts endured, as more exclusive and rare books began to rise in value to the tasteful customer" (Liulevicius, 2020). This opposes Williams' deterministic perspective that technology has an "inescapable internal logic of development" (Freedman, 2002, p.427) as instead, what has been observed is that technology evolves based on social needs.

Above all, it seems pertinent to outline how the printing press is a prime example of a technology that is unmatched in our digital age. As printing is used to symbolise quality; "the printed magazine reflects similar brand values found within luxury companies – a high benchmark of quality, craft, care and professionalism" (Battles, 2017), as seen in the top of the range printing press, the Speedmaster CX 102 (Heidelberg, 2022). Therefore, printing technology in the information society has taken a new position as "digital content has elevated the printed magazine to a collectible premium product which cuts through the digital" (Battles cited in Print Power, 2019). Moreover, in our digital world, there is still not only a desire for printed texts but a necessity; as "in a world of fake news and superficial images, where time is lacking, print publications stand for substance and meaning" (Hennessy, 2017; Power, 2019). The medium of print does not create "new human conditions" (Williams, 1974, p.6) but has contributed to the acceleration of social progress. The emergence of new media does not stop other media from existing but expands the space for a multitude of artefacts.

It has been concluded that there is a false causality of viewing technology as an unravelling of society (Freedman, 2002, p.427) as technological determinism in an uncultivated perspective when compared to the complexity surrounding human evolution and the social processes that have conducted society. Thus social construction of technology recognises that social power will use technology for its own purposes. The history of the printing press has demonstrated how society shapes technology through complex social processes and that it did not determine societies fate. The interpretive flexibility within society has been empirically seen within the printing press' history as "different relevant social groups interpret a technology in different ways, according to their particular interests, the technology acquires different meanings, and eventually different shapes" (Ahmed and Khan, 2014, p.131). The uses of the printing press have been diverse and multi-disciplinary, spanning orthodox to secular and scientific; this was exemplified in the Protestant Reformation, Geocentrism, Malleus Maleficarum and the Enlightenment era. Furthermore, Braidotti has helped address the complexities of the political and patriarchal issues surrounding technology and how the white

European male was synonymous with power and control. Thus, given the above considerations, the printing press' long history and social construction of technology have helped understand how society uses technology as a tool for its own progression.

Word count: 3,007 words (excluding abstract, keywords and references)

References

Ahmed, H., Qureshi, O.M. and Khan, A.A. (2015) 'Reviving a ghost in the history of technology: The social construction of the recumbent bicycle', *Social Studies of Science*, 45(1), pp. 130–136. doi:10.1177/0306312714560640.

Braidotti, R. (2013) *The posthuman*. Cambridge: Polity.

Christie, A. (2015) 'What the world's first Zuckerberg told us about technology', *The Irish Times*, 5 July. Available at: https://www.irishtimes.com/culture/books/what-the-world-s-first-zuckerberg-told-us-about-technology-1.2269806.

Collin, F., 2011. Science Studies as Naturalized Philosophy. *Springer*, 348(1), p.83.

Dewar, J., 1998. *The Information Age and the Printing Press*. Los Angeles: Rand Corporation.

Eisenstein, E., 1980. *The Printing Press as an Agent of Change*. Cambridge: Cambridge University Press.

Eschner, K. (2017) 'How New Printing Technology Gave Witches Their Familiar Silhouette', *Smithsonian Magazine*. Available at: https://www.smithsonianmag.com/smart-news/how-new-printing-technology-gave-witches-their-familiar-silhouette-180965331/.

Feenberg, A. (1992) 'Subversive rationalization: Technology, power, and democracy', *Inquiry*, 35(3–4), pp. 301–322. doi:10.1080/00201749208602296.

Freedman, D. (2002) 'A "Technological Idiot"? Raymond Williams and Communications Technology', *Information, Communication & Society*, 5(3), pp. 425–442. doi:10.1080/13691180210159346.

Giddens, A. (1984) *The constitution of society: outline of the theory of structuration*. Cambridge: Polity Press.

Gibbs, B.J. (no date) 'structuration theory', *Encyclopedia Britannica*. Available at: https://www.britannica.com/topic/structuration-theory.

Hohman, J. (2018) 'How Zuckerberg's Facebook is like Gutenberg's printing press', *News India Times*, 1 April. Available at: https://www.newsindiatimes.com/how-zuckerbergs-facebook-is-like-gutenbergs-printing-press/.

Joas, H. (1987) 'Giddens' Theory of Structuration: Introductory Remarks on a Sociological Transformation of the Philosophy of Praxis', *International Sociology*, 2(1), pp. 13–26. doi:10.1177/026858098700200102.

Heidelberg (2022) *Speedmaster CX 104*. Available at: https://www.heidelberg.com/global/en/products/offset_printing/format_70_x_100/speedmaster_cx_104/product_information_5/product_information_cx_104.jsp.

Latour, B. (1987) *Science in action: how to follow scientists and engineers through society*. Cambridge, Mass: Harvard University Press.
Lister, M. (2009) *New media: a critical introduction*. 2nd ed. London: Routledge. doi:10.4324/9780203884829.

Liulevicius, V. (2020) *The Social Impact of the Printing Press*, *Wondrium Daily*. Available at: https://www.wondriumdaily.com/the-social-impact-of-the-printing-press/.

McLuhan, M. (1962) *The Gutenberg galaxy: the making of typographic man*. London: Routledge & K. Paul.

McLuhan, M. (1964) *Understanding media: the extensions of man*. London: Routledge & K. Paul.

Mody, C.C.M. (2004) 'Small, but Determined: Technological Determinism in Nanoscience', *Hyle*, 10(2), pp. 99–128.

Mouzelis, N.P. (1991) 'Restructuring Structuration Theory: Duality and Dualism in Sociological Theory', in Mouzelis, N.P. (ed.) *Back to Sociological Theory: The Construction of Social Orders*. London: Palgrave Macmillan UK, pp. 25–47. doi:10.1007/978-1-349-21760-1_3.

Murphy, C. (2019) 'Our Predictions About the Internet Are Probably Wrong', *The Atlantic*, 10 December. Available at: https://www.theatlantic.com/magazine/archive/2020/01/before-zuckerberg-gutenberg/603034/.

Pettegree, A. (2010) *The book in the Renaissance*. New Haven: Yale University Press. doi:10.12987/9780300168358.

Pinch, T.J. and Bijker, W.E. (1984) 'The Social Construction of Facts and Artefacts: or How the Sociology of Science and the Sociology of Technology might Benefit Each Other', *Social Studies of Science*, 14(3), pp. 399–441. doi:10.1177/030631284014003004.

Print Power (2019) *How Print Became the Definition of Luxury in the Digital Age*, *Print Power*. Available at: https://www.printpower.eu/insight/how-print-became-the-definition-of-luxury-in-the-digital-age/.

Ravetz, J.R. (2006) *No-nonsense guide to science*. Oxford: New Internationalist (The no-nonsense guides).

Roos, D. (2019) *7 Ways the Printing Press Changed the World*, *HISTORY*. Available at: https://www.history.com/news/printing-press-renaissance.

Shaw, D. (2015) 'Summary of Rosi Braidotti's The Posthuman (Part 1)', *Open Objects*, 14 June. Available at: https://medium.com/open-objects/summary-of-rosi-braidotti-s-the-posthuman-part-1-12e79316940f.

Waelbers, K. and Dorstewitz, P. (2014) 'Ethics in Actor Networks, or: What Latour Could Learn from Darwin and Dewey', *Science and Engineering Ethics*, 20(1), pp. 23–40. doi:10.1007/s11948-012-9408-1.

Williams, R. and Edge, D. (1996) 'The social shaping of technology', *Research Policy*, 25(6), pp. 865–899. doi:10.1016/0048-7333(96)00885-2.

Williams, R. (1974) *Television; technology and cultural form*. London: Fontana.

Williams, R., 2000. The Technology and the Society. J. Thornton Caldwell (ed), *Electronic Media and Technoculture*. New Brunswick, NJ: Rutgers University Press.

Winner, L. (2007) 'Do Artifacts Have Politics?', in Weckert, J. (ed.) *Computer Ethics*. Routledge.