“That machine from hell”; Word Processing in Sociology

Maarten van Wesel

Dept. of Education, Content & Support, University Library, Maastricht University; Dept. of Family Medicine, Faculty of Health, Medicine and Life Sciences, Maastricht University

Email M.vanWesel@Maastrichtuniversity.nl

ORCHID <https://orcid.org/0000-0002-6197-8702>

Abstract

Scholars spend much of their time processing words with the help of a computer. Yet not too long ago, scholars would have typed or even written their lectures and articles by hand, and often a secretary would have (re)typed the final version.

This paper examines the transition from one set of socio-technical relationships to another, focusing on resistance to change and the closure that has led to the current ubiquity of word processors. The article draws on insights from Science and Technology Studies (STS), and on material from email and telephone interviews conducted with older and retired members of university sociology departments in the English-speaking world.

Keywords: Word Processing, Closure, Resistance, Science and Technology Studies, academic labor

Introduction

The entry of the word processor into universities was, by some fields, met with skepticism, or even fear, about the impact of such a tool on writing (see for a short summary Perry and Morphett (2015)). This paper studies the introduction of word processing¹ in the field of sociology and offers insight in how introducing such an artefact is not just about technology, but also about embedding it in a broader socio-technological network. These insights help us to understand how technologies for scholarly communication are appropriated by some scholars and resisted by others.

Some scholarship suggests we are currently in the midst of a new transformation of the socio-technical fabric of producing manuscripts. Digital technologies now allow us to write text which the author, authors, or others, can continuously update, creating version after version filled with new insights, but simultaneously keeping track of what changed between versions, and who made the changes (see, among others, Fitzpatrick 2011; Brown and Simpson 2014; Perry and Morphett 2015). To understand how such new arrangements in the socio-technical arrangements for producing knowledge come about, a study of another already complete transformation is helpful, namely the arrival of Word Processing.

Various combinations of people and tools can be used in preparing a (sociological) text for publication. Despite claims to the contrary (Perry and Morphett 2015; Brown and Simpson 2014), the process of writing was usually a social process, a collaboration between scholar, typist, other scholars etc. (Fitzpatrick 2011). This changed with the arrival of computers and word processing, which changed the relationship between typist/secretaries and scholars, and the method of producing a manuscript. In this paper, I draw on Science and Technology Studies (STS) and interviews with older, largely retired sociologists, in order to understand the transition to word processing that began to take off in the 1980s.

After this introduction, which also provides a summary of the framework used, the methods section sheds light on how input for this paper was gathered. Thereafter, a semi-chronological account takes the reader through the different phases of the introduction of Word Processing.

¹ “creation, editing, formatting, printing, and storage of text with a computer’s aid” (Pfaffenberger 1986).

Technology in a social world

Technology does not stand on its own. When technologies are introduced into a place of work, they are introduced into social networks, consisting of actors, artefacts, and the social structures already in place. The new technology, the actors, artefacts, and the social structures involved may need to be adapted. We need to ask questions “Why do we need this technology?”, “What problem does it solve?” etc. Technological artefacts, organizations, people, knowledge and culture form a *seamless web* (Hughes 1987, 1986; Bijker 1995; McLaughlin et al. 1999). These networks consist of social and natural entities (Callon 1986). This socio-technological network is arranged around the components thereof, when components are replaced by a component with different characteristics, the socio-technological network needs to be rearranged. Attributes and interest are actively defined and redefined to align the components of the network with their role (Hughes 1986; Callon 1987).

Different actors can have different interpretations of the characteristics and meanings of an artefact (Kline and Pinch 1996; Pinch and Bijker 1984). While some actors might interpret an artefact as being useful or in line with their values, others might interpret the same artefact as highly useless or against all they stand for. This interpretative flexibility can give rise to controversy when the artefact is embedded in a socio-technological network, as it is unclear how the socio-technological network should be formed. When the interpretative flexibility of an artefact diminishes, closure can be reached. Reaching closure is an active social process, actors try to reach closure in a way favourable to themselves (Misa 1992). Different mechanisms for reaching closure are mentioned in STS literature, rhetorical closure (no change is made, actors are convinced their problems are closed), closure by redefinition of the problem (the actors are convinced the artefact solves another problem) are prominent examples (Pinch and Bijker 1984; Bijker 1995).

When a socio-technological system grows it gains *technological momentum* (Hughes 1994). The technological system shapes society around it, rather than society shaping the technological system (Hughes 1994). The technological system becomes deterministic forcing a specific way of its use. It becomes like the railroad, riding upon us, instead of the other way around (Thoreau 2016).

Next, to this social component of the introduction of a technological artifact, this study will also give attention to the place and moment of introduction. Technology diffusion and use have a spatiotemporal component. There is a sense of ‘being in the right place at the right time’ in technology diffusion, actor and artefact need to be co-present in both time and space. Often this coming together can be a coincidence. If an artefact is bound to a space, leaving this space also means leaving, possible, interaction with the artefact. An act of moving can mean leaving access to a technology if this technology is not widely diffused or at least until this technology becomes more widely diffused. Thus if an actor, or social group, which sees an unsolved problem with an artefact moves away from contact with the artefact, they are not relevant anymore and closure can be reached. This paper refers to this closure mechanism as *temporal closure* and it augments rhetorical closure and closure by redefinition of problem.

Methods

This paper forms part of a larger study exploring how Word Processing arrived on the desks of sociologists. To this end, I sent email-requests to heads of sociology departments, and closely related fields² in Australia (26), Canada (53), New Zealand (7), the Republic of Ireland (7), the United Kingdom (89), and the United States (172) between June 2011 and April 2013. I analyzed the responses containing relevant information for this paper and conducted three interviews by phone and/or skype. Additional information was solicited via email, if needed. Fifty-three people provided responses I judged to be useful for this paper, about their own early experiences with word processing and those of their departmental colleagues.

² “Sociology”, “Anthropology, Gender & Sociology”, “Political Science & Sociology”, “Social Science, Parks, Recreation, Tourism and Sport”, “Psychology & Sociology”, “Sociology, Anthropology, and Gerontology”, “Criminal Justice and Social Sciences” etc.

The emails did not ask for further demographic information, such as gender and age, which could have provided some additional insights. Judging from the first name, and with help from Google, 11 of the respondents are female, 42 male. As far as can be extracted from responses³ and additional information⁴ some respondents are retired, others are in senior positions. To preserve anonymity, I replaced all names by pseudonyms, the institution is not mentioned, but the country is. The information received was clustered and ordered to provide a partial chronological story, and to highlight important issues raised by several of the respondents. If needed, I searched for additional background information.

Typewriters, secretaries, and mainframes; the time before desktops

Early mainframes were built and used for complex calculation and (re-)arranging data for a few scientists in the 1950s (Agar 2006). They came into wider use, with more power and accessible for more scientists, in the following decades (Agar 2006; Hockey 2004). As computing facilities were enormously expensive, only a few universities possessed mainframes. Experiences with early mainframe computing, such as running data analysis from punch cards and tapes, shaped perceptions of computing. Harold (UK), one of the respondents, described how some of his colleagues sent their punch tapes to Manchester. Their tapes went on a queue and they had to wait two to three weeks to receive tape back with results. This time-consuming, error-prone process led some to see the computer as a complicated, tape-chewing, time-wasting machine.

In the 1970ies, terminals, also called glass teletypes, were introduced. These allowed real-time interaction between end-user and mainframe. At some universities, text-editors and even early word processors ran on mainframes, facilitating writing and editing. Computer terminals were often located in separate rooms. Staff members had to leave their own offices, sometimes offering an escape from students and colleagues. A problem with the spatial separation from one's office was the separation from bookshelf and archive. Leaving the space where these artefacts are present means leaving behind interaction possibilities. Still, some, like Andrew (Canada), have affectionate memories of those early days when the new users could badger the more experienced users with questions and requests for help. Dedicated, standalone, Word Processors with CRT-screen, also were available in the 1970ies (Haigh 2006; Utterback 1994; Kirschenbaum 2016), there are no indications these were used by the scholars interviewed.

Most likely, only a small number of scholars used mainframes for writing. Most scholars still relied on pen and paper and/or a typewriter (mechanical or electric) to produce their work. Some typed out the final version themselves. Others relied on secretarial support (Fitzpatrick 2011). Some institutions had different scholars doing their work in different ways: handwriting, typing and typing by secretaries, on computerized or traditional typewriters. Many respondents depended on secretaries to type their work. This seems more dominant in the United Kingdom than in the United States. This can, however, not be generalized. Since secretaries often had to retype drafts created by different scholars, it took some time before an individual scholar received a new typed version of the paper. There were also often limitations on the numbers of drafts. Secretaries sometimes would prepare only two or three drafts. This hampered the process of writing, as writing a scholarly paper involves refining and revising (Brown and Simpson 2014).

To save work and time on (re)typing drafts, some institutions provided more advanced technology to secretaries and/or typists; electronic typewriters, dedicated word processors or PCs with word processors⁵. At first, the introduction of these technologies did not affect the writing process, at least from the perspective of the scholar. The computer with word processor does not define how work is organized. Rather technology itself is influenced by the relations of production (Wajcman 2015). Word processors did not immediately facilitate a change in the division of labour, which is also observed in non-academic offices (Webster 1990). Old practices of scholars writing with pen and paper and secretaries typing these out still continued. While saved documents made the correction process easier and less time-consuming, scholars still had to wait before it was there papers turn. This more or less continued until word processing became available for scholars themselves;

³ “Even today, more than four years after my retirement...”

⁴ Such as “I will forward this information to my retired college”

⁵ As happened in non-academic office settings (Webster 1990). Also fiction writers increased productivity by eliminating retyping (Kirschenbaum 2016)

I remember being amazed that my hand-edited papers no longer had to await being re-typed by the dept. staff: at least a week, sometimes more. It wasn't that they were slow, just that there was always a long line of other faculty before me. Being able to do it myself in a few hours was like getting out of prison. (Edward, USA)

Pioneers

Around 1980, with the advancement of microprocessors, personal computers became a viable alternative to other computing solutions⁶ with regard to some of the work scholars do. Still, in the early days of personal computers, there was no real incentive to get a computer with a word processor. Without the benefits of email (which existed, but was not commonplace⁷) and the World Wide Web (which would not exist for another 15 years), the personal computer was not perceived as a communication device. Technologies do not have value to its, potential, users if there is no, apparent, usability⁸ and no utility (McLaughlin et al. 1999). The word processors used were not built with scholarly needs in minds (Pfaffenberger 1986). Thus, the word processing pioneers had to be intrinsically motivated.

The pioneers started acquiring their first machines in the early 1980s when the IBM PC and Apple II became the dominant business machines. They were expensive, most pioneers could not afford them, but this depended on the source of funding. Some opted for cheaper brands, such as Amstrad and Apricot. Not everybody who wanted to be a pioneer was able to be one, some were *have nots*, those who are for some reason or another excluded from use (Wyatt 2003).

Some pioneers depended on more experienced, even earlier, users for their introduction to computers and word processing. In some cases this was a family member, for instance, his son introduced an initially reluctant Edward (US) to word processing. For others, it was secretaries who first became experts and to whom academics turned for tips and tricks (as reported by Richard, UK) or students, who adopted word processing earlier and taught faculty, as in the case of Andrew (Canada).

The type of hardware differed between pioneers in the USA and the UK, as the pioneers who were unable to afford an expensive Apple or IBM opted for more localized brands in the UK, such as BBC Micro, Amstrad, and Apricot. Many different brands of computers were in use. This was before IBM-compatible PC with MS-DOS became the de facto standard. The hardware, because of compatibility, availability, and bundled sales, had an influence on the software used by the early users. And, although the market was dominated by MicroPro Wordstar, from 1983 till 1986 (Peterson 1994) followed by WordPerfect (Bergin 2006a; Peterson 1994), there was much variation. These different word processing products were not compatible. Exchanging information with a colleague who used a different, incompatible, system meant downgrading to a lower level format, such as ASCII (if the disc system was compatible) or printing.

For scholars collaborating on writing projects converting to a lower level format meant losing the markup of the document. This also implies at one point or another someone had to type both sides into the same computer to make a combined document. Clearly, there would be an advantage to standardization from the point of collaborative writers. In the pioneering days, however, universities had no policies. In most cases, the scholar decided what to buy, most likely driven by the perceived features useful to the specific scholar (if budget allowed choice). Through lack of standards for those using computers and the different other methods with which scholars⁹ produced texts within departments, those pioneering days were quite chaotic.

⁶ Such as mainframes

⁷ And derives its utility from the use by others, what economists call a ‘positive network externality’.

⁸ “When users search for usability, they are looking for a way to work with the technology alongside other technologies, their job role and identity, and their place in the organisation.” (McLaughlin et al. 1999).

⁹ Or in some cases; scholars and secretaries.

Turning mainstream: Computerization, standardization, and communication

Universities, schools, or departments became more active in moving to computers and word processing and started to impose standards. The move to word processing was not easy for everyone. Richard (UK) asserts it is important whether one wrote using a typewriter or in longhand when making the transition to word processing. He used a typewriter and had no trouble moving to word processing. Others, who drafted by hand instead of immediately typing their work, had more trouble making the transition and continued to handwrite articles before typing them on their word processor. A study from the 1980s found similar results (Case 1985), putting extra weight on this observation. This is, likely, linked with compatibility of typing on a typewriter and on a PC, which influences the rate of adoption.¹⁰

Universities and even departments began this move to full computerization at different moments. In some departments half the scholarly output was already word processed by scholars around 1986, whilst at others, it was as late as 1998. 1992 surfaces as the moment 50% of the output was word processed by scholars themselves¹¹. It is clear from this the transformation to word processing was not as high on the agenda of all institutions and departments.

Regardless of this technological push by the institutions, there was also a pull by journals and/or publishers. At least from the 1990s journals began accepting electronic manuscripts, in the early days together with a hard copy. Not only for journals, but also for books, electronic submissions became the norm. Institutions and journal/publishers pull and push of word processing gave technological momentum (Hughes 1994) to word processing and computerization within universities, it became more shaping of the social relations within departments. As more scholars came to do their own word processing and no longer relied on secretarial support for typing or word processing their papers (for as far as they did), there was a change in the division of labour. Instead of typing out documents for scholars as an extension of the academic branch, secretaries became an extension of the administrative branch of the university. In the UK this seems related to the Management and Administrative Computing (MAC) initiative which ran from 1988 till 1995 and aimed to introduce administrative software to universities (see for instance McLaughlin et al. 1999). Introducing Word Processing, from an organizational perspective, is “about restructuring work, reclassifying roles in the workforce, relocating people in the workplace, and reconfiguring the individual workstation” (Kirschenbaum).

Most universities standardized word processing software eventually, and at most universities, the standard became Microsoft Word. At the time universities standardized, WordPerfect was losing its hold on the word processor market, which it had held for five years (1987-1992), to Microsoft Word (Bergin 2006a, 2006b; Liebowitz and Margolis 1999). The choice by universities seems to reflect this. A central body of the university or college/faculty mostly initiated these processes of standardization. From the perspective of the organization, standardization seems a viable strategy; support and procurement become cheaper when all used the same software.

Standardization not only benefits the organization; for end-users standardization of software such as a word processor facilitates the exchange of files, within the organization and with users in different organizations using the same software, in short, a network effect¹². As a standardization move, switching from one word processor to another also comes at a cost to end-users as they have to learn the new package and have to convert previous work. Some were reluctant to switch because of investments made in a certain word processors in the form of macros¹³. Others, even today, mention still mistakenly using WP commands in Word. This might happen when in a flow muscle memory and experience takes over (Kirschenbaum 2016).

¹⁰ As perceived compatibility with current practices influences willingness to adopt (Rogers 1995)

¹¹ From 14 respondents 1992 is both medium and mean, because of the low numbers we cannot draw statistically valid conclusions from this. In contrast, for literary authors in the USA this point was reached in 1984 (Kirschenbaum 2016).

¹² For a description in relation to software, including Word Processing, see Liebowitz and Margolis (1999).

¹³ “A stored series of commands which, when activated by pressing a single key, preforms a complex series of operations.” (Pfaffenberger, 1986, p. 347)

Bureaucratization & Control

He [person refusing to use a computer] just didn't like computers and he thought they were being used as a form of tyranny. Once you had a computer in your room, people could start controlling you, they could start telling you what to do, and can be talking to you at all times. (Harold, UK)

The advance of word processing and email contributed, or even led to, a new administrative and control systems within universities. Scholars became ever more responsible for administrative duties. The computerization of offices was a way to change administration procedures. This shift in task had consequences not everybody was willing to accept, leading to the early retirement of some faculty members at institutions in the USA and UK alike.

Furthermore, providing computers to all faculty members offered possibilities for long distance control¹⁴, arrange matters so a small number of people in a central office could control what happened within the university. By virtue of the word processor, it is easy for central management to produce thick guidelines for filling in simple forms. Also within some departments, faculty members perceived the new possibilities of communication as a threat to their autonomy. Department heads became able, “to issue requests for information instantly” (Kenneth, UK).

Nowadays administrative tasks are just as common a task as teaching and research for most academics. Receiving instructions, guidelines, requests for information, and the like by email does not surprise anyone anymore. Maybe the people resisting computer use were on to something.

Want nots and the paths to closure

Even when computers and word processing came of age and became mainstream, not everyone was keen on using them. Some non-users are not excluded from use because of technical or social reasons, they were *want nots* (Wyatt 2003). Institutions paid for hard- and software, thus they were unconstrained by their own finances. Moreover, being scholars, one can assume they were also intelligent enough to learn to use a computer. They were non-users of word processing by choice or at least not because of outside pressure. Maybe because of the fear to learn something new on these complex machines. Or, maybe, because of negative perceptions about computers caused by early mainframe experience.

Whether they were actively or passively resisting, is a matter of interpretation, which could be linked to the institution's stance on computing¹⁵. In some cases, non-use was not problematic. In such a case, a person not needs to actively resist, and maybe if forced, the person would opt to adapt and not move to active resistance. In other cases, if people were forced, they had to move to more active forms of resistance. Only when this act is labelled as deviant, which can depend on many factors (Becker 1996), there is a problem.

Age seems to be a discriminating factor, as several respondents reported it was the older faculty who were non-users of the word processor. Jasmine (Canada) explains, “there has been resistance of some of the ‘older’ members of the department to using a computer. I still have a colleague who is not adept at using email (he can read them but doesn't know how to reply).” Timothy (USA) tries to pinpoint the distinction between older and younger faculty to a certain era, those who got their universities degrees before 1974 and those who got them after.

Eventually, some of the non-users opted to become users. “Not everyone began using computers at the same time and some kept using their long yellow pads later than others, but I would call that habit rather than resistance.” (Leo, USA). Not all non-users became users; some kept fighting the system until they could quit it,

¹⁴ See Law for Long Distance Control in Portuguese's expansion (1986) – and Latour generally – technology is action at a distance

¹⁵ The resistor is only an outsiders if the organization creates a rule which labels the act of ‘not-Word Processing’ as deviant; based on (Becker 1996).

for instance through reaching the retirement age. Nevertheless, even among the more fierce resistors, some came to terms with computers; this could be because of a *redefinition of the problem*¹⁶

We had one older faculty member who declined the first generation of computers and referred to it as "that machine from hell." He did get one of the second generation of campus desktop computers because word processing made it easier to update and revise his lectures. (Catherine, USA)

Rearrangements of the socio-technical network in which both scholar and word processor were embedded might have coerced some resisting scholars in adopting the use of the new technology, for instance by doing away with the word processing office. This can be viewed as a way of *constructing utility* (McLaughlin et al. 1999) or as *closure by redefinition of the problem* (Pinch and Bijker 1984) a new problem was created to which self-word processing was the solution.

The active resistors (and the passive ones) saw different problems with and gave different meanings to, computing and word processing. Scholars did not direct all of the resistance to the computer or word processing itself. Some fierce resistance was against being forced to use a hardware platform and being forced to use a specific word processor, for instance, Microsoft Word instead of WordPerfect. Some resistors of word processing, in general, seem to express status as an issue, much as in the pioneering days. Social structures, that were still in place (or perceived to still be in place), might have influenced their behaviour;

We did have one senior colleague who refused to use a computer at all, saying it was a clerical task and that he was a scholar. This created problems for him as he would be uninformed about news disseminated by internet email and he could not do his student advising since he would read and write only on paper forms. I explained to him that leading theorists used computers, but he did not change and finally retired without ever using a computer. (Timothy, USA)

Rhetorical closure (by telling about a leading college using a computer) and closure by redefinition of the problem (using a computer solved the lack of information and problems with student advising) did not achieve closure. However, retirement led to closure; the person, objection to computers and word processing, ceased to be of relevance. All that had to be done was let time pass, thus *temporal closure* was reached.

Discussion and Conclusion

The introduction of word processors in sociology departments shows a rich interplay between practices embedded within socio-technical networks, the artefact being introduced, and the broader technical and social context. In line with McLaughlin et al. (1999), this research provides evidence for the interdependency between organizations and technology, the influence they have on each other and the influence external forces, such as political processes have on both.

The present study demonstrates the importance of time and space in the diffusion process, both as affecting and being affected by word processing. A scholar's place of employment influenced greatly when (s)he was introduced to word processing. At some departments, half of the scholars were word processing as early as 1986 at others this was not until 1998. A difference of 12 years, which meant those who started later worked with a completely different kind of word processor than the early adopters: a very different artefact, incorporating a very different script. Due to the different diffusion patterns, being in the right place at the right time meant having access to a computer and to a word processor much earlier than in other places (if *right* can be defined by the place which was earlier, those forced to word process might not agree). Space, in the sense of a geographical location, should play a role in the study of diffusion of, non-stable, technologies, as spatial

¹⁶ It appears word processing was translated to solve a problem with lecture notes. In SCOT one of the methods to gain stability is to translate a solution and make it a solution to another problem (Pinch and Bijker 1984; Bijker 1995)

separation can create temporal separation. As time progresses, non-stable technological artefacts change. Separated by space, two places can be exposed to a different variant of the artefact at different times.

While such an emphasis on the social impact of word processing might suggest a technologically deterministic reading on the surface, the present study does not reject the role of agency and choice in the diffusion of technologies. Indeed, the respondents themselves all seem well aware it is not the arrival of the word processor as such that brought about changes, but it was choices made by themselves, or others, about how to appropriate word processing. ‘We’ always have choices about the use, or non-use, of technology (Henwood et al. 2000). The fact that today, almost, all scholars do their own word processing, is not something that was inevitable when word processors first appeared at universities. Rather it is a consequence of decisions about the rearrangements of socio-technical networks. “[T]echnical choices,” writes Wajcman (2015), “are simultaneously social through and through.” However, Word Processing, and the technical and social systems it is embedded in, acquired momentum as more and more users and universities adopted its use. Hughes (Hughes 1987) warns us not to confuse momentum with the system itself being autonomous. The apparent deterministic behavior stem from choices made earlier.

It seems word processors sped up the writing process, at least the tasks of revising and editing. This might have led to an increase in output productivity, although ease of revision can lead to endless revision (Case 1985)¹⁷. Word processors might have also changed standards, sacrificing saving time for the achievement of higher standards of some sort (Wajcman 2015), such as over-editing and taking over tasks which previously were done by the publisher as happened to, some, literature writers (Kirschenbaum 2016). Next, to this one can wonder if some of the scripts embedded in word processors are better suited for scholarly work than those of others are.¹⁸

This paper provides some insights into the introduction of word processors in a specific academic field. Specific case studies might provide richer insights into the before mentioned interplay. These studies should appeal to historians and sociologists of (information and communication) technology as well as creators of technology policies. The current study also adds to science and technology studies. It tells a story not about how actors managed to steer the direction of development of an artefact, but how, confronted by the black-boxed, but non-stable, artefact, they managed to adopt and appropriate it for their own purposes. A purpose not originally on the minds of those developing the artefact. In the material gathered for this research there were not always groups of resistance, sometimes there was only one resistor. They were faced locally, and their problems with respect to the artefact had to be solved locally.

It seems scholars have risen in importance as a target group of word processing software between the end of the above history and the present, as, for instance, Microsoft Word has a bibliography manager incorporated since their 2008 version. Perhaps it is not the scholars themselves word processors developers are interested in, but the students of the universities, as “who has the youth, has the future”. The interest in the potential future clients might also be the driving force behind the gifting of free or discounted software to some universities that started in the mid-1990s.

For some of the active resisters, rhetoric and redefinition of the problem did not close the controversy, whilst most likely, these strategies were used. Closure was reached when the active resistor(s) ceased to be relevant when they retired (or moved on). Thus no change in the artefact is needed, only a change in the composition of the actors surrounding the artefact. Closure was reached when the active resistor(s) ceased to be relevant when they retired (or moved on).

When striving to change either how scholars write (together) or publish their work, there will always be resistance, there will always be scholars who want to keep the status quo. What we can learn from the introduction of Word Processing is time will solve ‘the problem’ (if we assume it is a problem). As long as younger scholars adopt new ways of working, the old ways will fade away when those resisting move away.

¹⁷ This is also my experience with this paper, which has gone through many iterations.

¹⁸ Not all early Word Processors handled footnotes in the same way, if they were available at all (Pfaffenberger 1986).

References

- Agar, J. (2006). What Difference Did Computers Make? *Social Studies of Science*, 36(6), 869-907, doi:10.1177/0306312706073450.
- Becker, H. S. (1996). *Outsiders; studies in the sociology of deviance*. New York: The Free Press.
- Bergin, T. J. (2006a). The Origins of Word Processing Software for Personal Computers: 1976-1985. *Annals of the History of Computing, IEEE*, 28(4), 32-47, doi:10.1109/MAHC.2006.76.
- Bergin, T. J. (2006b). The Proliferation and Consolidation of Word Processing Software: 1985-1995. *Annals of the History of Computing, IEEE*, 28(4), 48-63, doi:10.1109/MAHC.2006.76.
- Bijker, W. E. (1995). *Of bicycles, bakelites, and bulbs : toward a theory of sociotechnical change* (Inside technology). Cambridge, Mass.: MIT Press.
- Brown, S., & Simpson, J. (2014). The Changing Culture of Humanities Scholarship: Iteration, Recursion, and Versions in Scholarly Collaboration Environments. [Versioning; Editing; Textuality]. *Scholarly and Research Communication*, 5(4), doi:10.22230/src.2014v5n4a191.
- Callon, M. (1986). Some elements of a sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay. In J. Law (Ed.), *Power, action, and belief : a new sociology of knowledge?* (pp. 196-233, Vol. 32). London ; Boston: Routledge & Kegan Paul.
- Callon, M. (1987). Society in the making: The study of technology as a tool for sociological analysis. In W. E. Bijker, T. P. Hughes, & T. Pinch (Eds.), *The Social construction of technological systems : new directions in the sociology and history of technology* (pp. 83-103). Cambridge, Mass.: MIT Press.
- Case, D. (1985). Processing Professorial Words: Personal Computers and the Writing Habits of University Professors. *College Composition and Communication*, 36(3), 317-322, doi:10.2307/357975.
- Fitzpatrick, K. (2011). The Digital Future of Authorship: Rethinking Originality. *Culture Machine*, 12.
- Haigh, T. (2006). Remembering the Office of the Future: The Origins of Word Processing and Office Automation. *Annals of the History of Computing, IEEE*, 28(4), 6-31, doi:10.1109/MAHC.2006.70.
- Henwood, F., Wyatt, S., Miller, N., & Senker, P. (2000). Critical perspectives on technologies, in/equalities and the information society. In S. Wyatt, F. Henwood, N. Miller, & P. Senker (Eds.), *Technology and in/equality: questioning the information society* (pp. 1-18). London; New York: Routledge.
- Hockey, S. (2004). The History of Humanities Computing. In S. Schreibman, R. G. Siemens, & J. Unsworth (Eds.), *A companion to digital humanities* (pp. 3-19, Vol. 26). Malden, MA: Blackwell Pub.
- Hughes, T. P. (1986). The Seamless Web: Technology, Science, Etcetera, Etcetera. *Social Studies of Science*, 16(2), 281-292, doi:10.1177/0306312786016002004.
- Hughes, T. P. (1987). The evolution of large technological systems. In W. E. Bijker, T. P. Hughes, & T. J. Pinch (Eds.), *The social construction of technological systems: New directions in the sociology and history of technology* (pp. 51-82).
- Hughes, T. P. (1994). Technological Momentum. In M. R. Smith, & L. Marx (Eds.), *Does technology drive history? : the dilemma of technological determinism* (pp. 101-113). Cambridge, Mass.: MIT Press.
- Kirschenbaum, M. G. (2016). *Track changes: a literary history of word processing*. Cambridge, Massachusetts: The Belknap Press of Harvard University Press.
- Kline, R., & Pinch, T. J. (1996). Users as Agents of Technological Change: The Social Construction of the Automobile in the Rural United States. *Technology and Culture*, 37(4), 763-795, doi:10.2307/3107097.
- Law, J. (1986). On the Methods of Long Distance Control: Vessels, Navigation, and the Portuguese Route to India. In J. Law (Ed.), *Power, action, and belief: a new sociology of knowledge?* (pp. 234-263, Vol. 32). London; Boston: Routledge & Kegan Paul.
- Liebowitz, S. J., & Margolis, S. (1999). *Winners, Losers & Microsoft: competition and antitrust in high technology* (Independent studies in political economy). Oakland, Calif.: Independent Institute.
- McLaughlin, J., Rosen, P., Skinner, D., & Webster, A. (1999). *Valuing technology: organisations, culture, and change* (The management of technology and innovation). London; New York: Routledge.
- Misa, T. J. (1992). Controversy and closure in technological change: constructing "steel". In W. E. Bijker, & J. Law (Eds.), *Shaping technology/building society : studies in sociotechnical change* (pp. 109-139). Cambridge, Mass.: MIT Press.
- Perry, M. M., & Morphet, T. (2015). Panopticon or Panacea? Google docs, Word Processing, and Collaborative Real-time Editing. [Digital scholarship; Knowledge production; Tools and practices; Virtual research and learning environments]. *Scholarly and Research Communication*, 6(4), 11, doi:10.22230/src.2015v6n4a213.

- Peterson, W. E. (1994). *Almost perfect: how a bunch of regular guys built WordPerfect Corporation*. Rocklin, CA: Prima Pub.
- Pfaffenberger, B. (1986). *The scholar's personal computing handbook: a practical guide* (The Little, Brown microcomputer bookshelf). Boston: Little, Brown.
- Pinch, T. J., & 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*, 399-441, doi:10.1177/030631284014003004.
- Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York: Free Press.
- Thoreau, H. D. (2016). *Walden & Civil Disobedience*. Hertfordshire: Wordsworth Editions Limited.
- Utterback, J. M. (1994). *Mastering the dynamics of innovation : how companies can seize opportunities in the face of technological change*. Boston, Mass.: Harvard Business School Press.
- Wajcman, J. (2015). *Pressed for time: the acceleration of life in digital capitalism*. Chicago: The University of Chicago Press.
- Webster, J. (1990). *Office automation: the labour process and women's work in Britain*. Hemel Hempstead: Harvester Wheatsheaf.
- Wyatt, S. (2003). Non-Users Also Matter: The Construction of Users and Non-Users of the Internet. In N. Oudshoorn, & T. J. Pinch (Eds.), *How users matter : the co-construction of users and technologies* (pp. 67-79). Cambridge, Mass.: MIT Press.