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Electronic Era Technologies, the European Experience: Historiographical Omissions and Ambitions

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I.

The canonical history of computing rests on several interrelated assumptions, all of which seem to affect the way we think about the history of computing in Europe. At the most foundational level, the canonical history assumes that the computer of the last few decades has been a universal (general purpose) machine, which was invented in the United States in the immediate post-World War II period. As far as the canonical view goes, in the following decades, while the essentially unchangeable computer was simply becoming smaller, faster, etc., it was also transferred to the rest of the world. According to this canon, the history of computing in Europe, just like the history of computing in the rest of the world, is of historical interest only in respect to one question: How successfully the initial computer invention and the subsequent evolutionary unfolding of the computer has been transferred to Europe from the US? In other words, in respect to the history of computing in Europe (and, for that matter, everywhere else except the United States), the canonical history of computing restricts itself to studies of the degree to which Europe (and every other place in the world) changed itself so as to become identical to the paradigmatic case, that of the United States. To the degree that the above line of reasoning is correct, historians interested in the history of computing in Europe have to start by asking, first, if the computer has in fact been a universal machine. Put simply, the history of computing in Europe cannot escape being organized around the question of 'how successfully Europe became the United States' without first researching if (instead of assuming that) there has been such a thing as a universal computer (for historiographical calls to pay attention to the realities of localization rather than, only, to the ideology of universalism, see, for example, Misa 1996, and, Scranton 1996).

In preparing ourselves for such study, we may begin by retrieving a broader pattern of *par excellence* universal machines of previous sub-periods of the period of historical capitalism, that is machines that were successfully ideologized as universal for some decades before the assumption of their alleged universalism was successfully challenged (and a new machine had to be introduced as the actual/eventual universal machine). For it seems to me that the hegemony of the successful presentation of the (electronic) computer as a universal machine follows in a long history of habituation to introducing machines as universal, a tradition exemplified by the ideology that surrounded, first, the (mechanical) steam engine, and, then, the (electrical) dynamo. The interaction between the claim to a machine being, finally, universal, and an individual's claim to be the ultimate inventor of this universal machine is implied by Ben Mardsen with respect to James Watt (Mardsen 2002), and Charles Bazerman with respect to Thomas Edison (Bazerman 1999). For a sample of works that include the history of challenges to the ideology of universalism in the history of use of the steam engine and the dynamo machine, I refer to the work of G. N. Von Tunzelmann (Tunzelmann 1978) and David Nye (Nye 1990) respectively.

Capable of automatically adjusting to any context, a universal machine is by definition an intelligent machine, a thinking machine. A historiographical move from the assumption that a technology has been universal to the study of what a technology actually has been may only be facilitated by taking advantage of a recent

historiographical emphasis on studying what David Edgerton calls 'technology-in-use', i.e., studying how a technology had to be changed/modified/reconfigured in order to be usable in specific contexts instead of assuming that a technology could be used without a change. Edgerton contrasts the two as 'technology-in-use' and 'use of technology' respectively (Edgerton 1999). In my opinion, the difference between 'technology-in-use' and 'use of technology' is not always as clear as it should be. We frequently run to histories that assume that an American computer (an IBM) has been the universal one and then register either the transfer and automatic use of this computer the nation of reference or original attempts at inventing the same computer at the nation of reference (for a collection of articles that places the emphasis on users, including computing users, see Oudshoorn and Pinch 2003; for a collaborative attempt at identifying one more sphere of computing activity, mediating between production and use, see the section on intermediaries in Guerreiro-Wilson, Heide, Kipping, Pahlberg, Van Den Bogaard, and Tympas 2004). In any case, what seems certain is that an historiography that places the emphasis on mediation and use brings into attention important new sites of computing work, when computing technology changes constantly (see, for example, De Wit, Ende, Schot, and Oost 2002).

We have to look elsewhere for what we may want to call an 'external' challenge to the transfer of the American computer by existing national computing traditions that were better from the perspective of a synchronic comparison in regards to a specific use, and, also, by what was diachronically experienced as an 'internal' resistance to the American computer's universalism. Since the purpose of our meeting is to detect points of contact that may lead to research collaboration, I shall give two examples: first, James Sumner's 2005 SHOT conference paper as an example of the former, and, second, a paper I presented at the 2003 SHOT conference as an example of the later (Sumner 2005) (Tympas 2003, conference paper). Sumner identifies the initial presence and the subsequent persistence of 'heterogeneity' in British home computing, with the standardization assumed by the concept of a universal computer being challenged by producers of a variety of computer configurations, and, also, by users who refused to assume that one computing configuration ought to be left encased because it was indeed the much sought universal one. In my paper, having used for my study the example of a national context that is linguistically different from that of the country of the origins of the universal computer, I focused more on how a computer that made it to Greece from the US could not be used before reconfigurations that treated the perpetual language support problems—I have studied problems lasting from the, mid-1980s, when Greek fonts could not be properly installed or printed, to the mid-1990s, when they could not make it to the other end of a computer mediated communication (e-mail). Sumner retrieves existing actors acting externally to a US computer that was shipped to Britain; I was trying to retrieve actors generated internally before a US computer that was shipped to Greece could be used. I shall conclude this section by noting that in both cases the required reconfiguration was substantial, both at the hardware and software level. In the Greek case, in respect to software, the protagonists discovered that they had to keep changing things all the way down to the assembly language level, thereby opening space for the Greek software industry, which looked quite similar in orientation to the British hardware and software industry retrieved by Sumner.

II.

For the purpose of our meeting, I suggest that we should not exhaust ourselves compiling the full list of works written from the perspective of early or belated, successful or problematic, European imitation of the American model (this, to my knowledge, is the case with the bulk of the available histories on IBM's subsidiaries in the various European countries, from the days of mechanical and electromechanical assemblages of tabulators, sorters, and associated machines—also known as punched card machines—to the electronic computer). In respect to the electronic computer, a comparison that falls soundly within the Tensions of Europe agenda is the one between attempts at creating national European champions to beat IBM and the Unidata experiment that sought the same at the European level (see the chapter by Eda Kranakis in Coopley 2004).

For our discussion, I suggest we focus on one case that stands out for more than one reason. I have in mind the history of the use of punched card machines in Europe, in a manner that, as the charge goes, ushered in the development of totalitarianism orientations in various European countries, including France (Heide 2004), while reaching an extreme in the use of such machines in Nazi Germany concentration camps (Black 2001) (Allen 2002). As I read most of the available literature, lost behind the focus on whether one should blame the subsidiary of the American computer company or the American company itself is the key fact that the most dramatic perhaps event in the history of computing during the century that Eric Hobsbawm has called 'the age of extremes' took place in Europe, not in the US. An emphasis on studying computing technology-in-use helps us acknowledge this as a key indeed fact, regardless of how we position ourselves to the debate over much Thomas Watson knew about it. The history of how this technology has changed in interaction with changes in key European societies of the period before and in World War II, offers us, I venture to suggest, a privileged research topic for understanding the history of computing in Europe, for a broader understanding of the history of computing in general and for understanding the history of Europe in general. Incidentally, I think that, taken together, the available studies on IBM punched card machinery in various European countries offer a valuable testimony to the validity of one of the 'Tensions of Europe' constitutional hypotheses, namely that the configuration of technological infrastructures, in this case the availability of key computing infrastructures in the services of various branches of several European states and firms, and their connections (or lack of connections), will add invaluable corrections to what we know about Europeanization as a political only process (for the historiographical orientation that inspires the Tensions of Europe projects, see Schot, Misa and Oldenziel 2005).

III.

But I don't simply want to suggest a change of focus within the history of punched card machinery. The proper study of the history of punched card machinery in Europe must go hand in hand with the study of the computing technology that the standard emphasis on punched card machinery have obscured. The computing technology used in World War II for the atomic bomb offers us a comparably dramatic but considerably understudied case. Here, I have in mind the history of the technological infrastructures built around military fire control, formed by tens of thousands of computing bombsights (such as the one used for the drop of the atomic bomb) and anti-aircraft directors in complex combinations of ground, air, and sea

networks. We have samples of their history in a scattered body of secondary sources that have yet to be integrated to the history of computing. What we so far know suggests that they were not less important than that of punched card machines. We don't know enough about this computing technology because of the hegemony of a second assumption about the computer, namely that it is has been universal because it has been digital, as opposed to being analog. Projected a posteriori to the 1920s-1940s history of computing, the digital-analog demarcation of the post-1940s has created a serious historiographical distortion. Computing bombsights and anti-aircraft directors now belong to the supposedly inferior class of analog computers, along with diagrams, slide rules, linkages, various integrating and differentiating mechanisms and machines, models, analyzers, and much more. Consider the slide rule. Tens of millions of them were used to build the transportation and communication networks of modernity and to fight the terrible modern wars. We know practically nothing about the tens of millions used in Europe, let us say in the two decades before and after World War II. Volumes already written on the history of the computer's 'operating systems', how they were invented in the US and why Europe failed to have its own, during the last two to three decades; not a single chapter on the lasting 'Darmstadt standard' and the other preceding European based standards of slide rule scale systems that sustained all major and minor modern technical initiatives for many decades (for attempts at a synthetic introduction to the history of all of the above mentioned artifacts, see Tympas 2004, and Tympas 2005; for samples of the advantageous use of scale modeling and many more of these artifacts in a European national context, that of the Netherlands, see Van Den Ende 1994, and, De Wit 1997; for an example of the use of models by one of the participants of this session, see Bogaard 1999).

I find it tremendously rewarding to frequently return to the study of the many classes of computing artifacts that figure in the hundreds of pages of the handbook of the 1914 Edinburgh World Fair that was the first to be devoted exclusively to computing. For European contemporaries, this fair was testimony to the depth and richness of the European computing tradition, a tradition also obscured by an uncritical projection of the analog-digital demarcation into the past (for the handbook, see Horsburgh 1914; for the employment of many of these artifacts in an early European laboratory context, see Warick 1994).

I may isolate one genre of artifacts that I happened to have studied in the past, the gigantic network analyzers developed and used worldwide between the 1920s and the 1960s in order to compute the lengthening and interconnection of electric power transmission lines (Tympas 1996) (Tympas 2003, article). While I have focused on the US case, I was puzzled by their persistent use in Europe. By the 1960s, these machines were also placed under the class of analog computers. What we know about electronic analog computers of the recent decades from the work of James Small points to the same direction. Electronic analogs were used extensively in both Eastern and Western Europe during the recent decades (Small 1993). This seems to have been the case with European approaches to cybernetics a version of on-line computation that counts on explicit computing analogies (Gerovitch 2004). And so were hybrid computers, linking analog-to-digital and digital-to-analog by artifacts called 'converters' (Tympas 2005).

IV.

Elsewhere I had the opportunity to argue that the analog-digital debate was replaced by the software-hardware one, with the software replacing the analog as the privileged domain of living computing labor. More recently, the software-hardware debate was replaced by the difference between standard (operating system) and customized software (Tympas 2004) (Tympas 2005). If this argument is correct, I don't find it accidental that, as historians of software have noticed, Europe as a whole has done much better in 'custom' software than in software for 'global sectors' (the terms are from Martin Campbell-Kelly, see (Campbell-Kelly 1995). It seems to me that this followed in the rich European analog tradition. Differences in the treatment of software rights, the institutionalization of software education (Hashagen, Keil-Slawik, and Norberg 2002) (Mowery 1996), as well as in software research (see the chapter by Dimitris Assimakopoulos, Rebecca Marscan-Peikkari, and Stuart MacDonald on the *Esprit* series of programs in Coopey 2004) point to the same direction. In respect to more recent history, I take the opportunity to register the perpetuation of the same difference in the history of how the web was initially perceived on the two sides of the Atlantic (a difference captured, I believe, in the biography of Tim Berners-Lee, who has experienced both sides of the Atlantic, see Berners-Lee 2000). Historians of recent information technology seem to touch on the same issue in discussing the difference between the information 'highway' US initiative and the information 'society' rhetoric of recent years (Kubicek, Dutton, and Williams1997). The rhetoric surrounding the emerging 'Quaero' European initiative, designed as a European response to Google, also seems to contain the same difference.

For a possible research collaboration in the history of software, my suggestion is to also consider the issue of software piracy. My research in the history of piracy in Greece from the 1980s to the present has suggested to me that the further back one goes the more contested the term has been. For many actors of the early Greek PC computing scene (late 1980s) piracy was a functional prerequisite for the development of computing in the country.

V.

The ideology of universal machines is a key ingredient of the history of attempts at devaluating the persistent demand for skilled labor (for a synthetic and programmatic account of how the cooperation of labor and computing history will benefit both, see Blok and Downey, 2003; for an argument on how an emphasis on users and labor will allow the history of computing to be read, also, as cultural and intellectual history, see Ensmenger 2004). This is where this ideology interacts with traditional sexist and racist ideologies (in respect to the issue of the historical relationship between gender and computing, I may simply bring to the attention of our meeting a work that involves several European scholars, including a member of this session Grundy, Kohler, Oechtering, and Petersen 1970). I may simply conclude this section by mentioning the confirmation of such interaction by the study of the gender-computing interaction in the Greek banking sector (Stratigaki 1996).

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