Universities: Wet, Hard, Soft, and Harder

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"Uni", das ist wie "Kino".

Heidegger, Was heißt Denken?

In this paper (whose central European bias is unfortunate, but innate) I try to draw some diagnostic and even prognostic consequences from the eight hundred years our universities have given and received the best. A simplified version of Heidegger's *Seingeschichte* guides all three steps. I can think of no other means than historical inquiry to prepare us for the future.

1. Anamnesis

European universities were, as Ernst Robert Curtius put it, "original creations of the middle ages."[1] They differed from the higher studies of classical antiquity, by virtue of both their wetware, the so-called universitas magistrorum et studentium, and their hardware: lecterns, libraries, and mail systems.

To be sure, the arrangement whereby a single master teaches more than one listener was invented long before by Pythagoras of Samos (around 530, in southern Italy). And, of course, Plato's academy closely followed this pattern[2] except for the fact that it almost totally excluded women[3] and thereby established a long-lasting model for all higher studies up to the 19th century, when Ohio high schools and the Zurich university both rediscovered coeducation. Precisely because, however, Platonism would have been unthinkable without the presence of beautiful, naked, young, free men in Athens,[4] the wetware of knowledge could in no way be

compelled to write down what the masters had just said. Greek *scholé* meant leisure, not medieval schola, let alone compulsory school attendance and gymnastics in school uniforms...

Thus, it was only after the fall of the Roman Empire that writing fell as an obligation on monks, nuns, and finally male students. Of all forms of manual labor, mechanical copying, just as in present day computers, most closely corresponded to Saint Benedict's dictum: ora et labora. Even if the writer, simply because his tongue knew only some vernacular dialect, did not understand at all the Latin or even Greek words he was supposed to preserve, his handicap augmented the monastery library and, as Cassiodorus observed, inflicted a further wound to Satan's parchment or skin.[5] Except for some slips, the only data losses that thereby occurred were the goddesses and gods.

Most European universities came into being as extensions of former monasteries or cathedral schools. Therefore, they always possessed from the outset a library full of Latin manuscripts. This very wealth guaranteed not just the famous translatio studiorum transporting classical antiquity to the high Middle Ages, but constituted a kind of hardware, a storage device just as precious as our computerized read only memories. This storage had to be further transmitted, processed and recorded; that is, the three necessary and sufficient elements of a complete media system were all implemented by medieval universities such as the Sorbonne, Oxford, or Prague. Masters and later doctors or professors proceeded to explain ancient manuscripts; students, by writing these oral commentaries between the lines of their textbook, did the interpretatio, and after a student had been promoted to doctor, he enjoyed the libertas utrique docendi, that is, he was free to offer his teaching to universities throughout Europe. In

many cases, universities even entertained, just as did medieval guilds (most prominently that of butchers), a postal system of their own. Since students came from different countries and different language regions, they collectively formed distinct nations connected only by such mail systems and an all too basic Latin.

This threefold hardware - the data processing lecture, the data storing university library, and the data transmitting mail - enabled a cumulative and recursive production of knowledge for almost three centuries before two highly correlated events changed the whole infrastructure of academia: first, Gutenberg's invention of the printing press, second, the emergence of national, that is to say: territorial, states.

Contrary to common opinion, Johann Gensfleisch zum Gutenberg did not aim at "the first assembly line of history", as McLuhan remarked, confusing his accomplishment with that of Henry Ford.[6] The movable and (at least for Europe new) letters were meant to enhance both the calligraphic beauty and the literal correctness obtainable by medieval and mostly academia scriptoria, where up to fifty copyists had simultaneously to write text books from oral dictation and, in doing so, unintentionally but unavoidably multiplied the number of errata.[7] Mortals are error prone, as every programmer knows both from himself and his users. That is why humanists such as Rabelais praised the infallible printing press as a divine gift, whereas the equally infallible artillery figured as Satan's invention.[8] Thus, humanism, in its double dependency on universities and printers "thought" somewhat naively it could "tell heaven from hell."[9]

In fact things were more complex. Gutenberg's invention imposed on him a rather unheard of problem. Printing could only come into being and continue to proceed if and when

the notoriously underfinanced inventor got back the money he had invested. The circular economy of academic manuscript production and, more importantly, the universities' monopoly on scientific data storage fell under the blow of early capitalism. Only inside academic circles did books continue to be mutually exchanged and dedicated;[10] outside powerful new players took over the rights to them: the emerging national states.

Nationes no longer designated just French, English, German, and Romanic students living in their own vernacular fraternities near the Rive gauche; henceforth whole European peoples followed the pattern of their universities that spoke one of many printed languages. In Rabelais' France, Charles XI had already been eager to import a printer and his tools from German Mayence; François took two more steps by prescribing French as the language of the legal code and secondly by ordering two copies of each book to be stored in his royal dépôt légal.[11] Otherwise, he could not prevent the book in question from being illegally reprinted by some other printer. So obviously, so shamelessly did the nation state's legal deposit, the forerunner of the French Bibliothèque Nationale, devalue the wealth and subvert the monopoly of medieval university libraries. The same holds true for postal systems maintained by butchers, scholars, or cities. The production of modern subjects (in the Cartesian sense) required their extrication from the older guilds. All their mail systems were either bluntly forbidden or smoothly integrated into a national communication privilege, which in Western Europe, before the Empire of Ronald Reagan took over everything, went on to devour the telegraph, the telephone, broadcasting, and finally television.[12]

For universities now bereft of their privilege to stand, next to imperium and sacerdotium,

as the third column of medieval power,[13] there remained just one possible path to adaptation, even to innovation. They had to become a res publica litteraria. This, however, in no way implied, despite its republican Roman disguise, a republic of free citizens, let alone bourgeois. Precisely since every nation state needed to be represented in each single town and province, the three higher faculties - theology, jurisprudence, and medicine -, had to supply it not simply with doctors, but with civil servants.[14] Only the most vulgar materialism of the past could and did confuse such academic public servants with the so-called bourgeois. Indeed, a doctor's hat still privileged its bearer to a noble's sword: certainly not, however, the old medieval noblesse d'épée, but rather- it goes without saying- the noblesse de robe.

Only when, during the first third of the 18th century, the swords belatedly realized how far the robes had outdone them as ministers of the state, did high nobility react by modernizing the curricula of its knights' schools. From ca. 1750, then, the noblesse d'épée alone surrounded the thrones. Alberto Martino goes even so far as to suspect that the whole of Enlightenment was a cover name for much more earthly goals: French academics and intellectuals, newly unemployed, wanted back their posts in power and therefore proclaimed a revolution.[15]

This revolution, sadly, was mistaken. Those who came to power were not priests or physicians, albeit some lawyers, but engineers and teachers.

On the one hand, the early-modern university had relied so heavily on printed books in all their multilingual interrelations that the rather simultaneous emergence of technical, equally infallible construction drawings escaped its notice. Letters, ciphers, and diagrams in their threefold combination proved too alien for humanists. The combination, however, of type and

woodcut or copperplate enabled scientific visualization at a level of precision unheard of by Greeks and monks. Technology as a science was just the ever expanding output of this alliance,[16] Carnot's and Monge's École Polytechnique, founded in 1794, its earliest institutional instantiation. And a brilliant young student of all these technically applied mathematics, a certain Bonaparte, overran, equipped with Satan's heavy artillery, old Europe. Since that time universities on both sides of the Atlantic have had to cope with engineers. To make a long story short: European emigrants to America's shores settled all these issues, and two World Wars.[17]

On the other hand, an ancient initiation rite came to an abrupt end. The former first faculty, despite its name, was in no way philosophical. It just led from trivia, the grammatical, rhetorical, and dialectic aspects of language, to the higher quadrivia of Pythagorean mathematics: music and arithmetic, astronomy and arithmetic in their Greek interconnection.[18] As such, this faculty had to remain a mere propadeutic - the wonderful undergraduate courses of good old USA before affirmative actions were taken - to the other politically relevant faculties, without awarding doctor titles in its own right. The bloody Revolution and its dreamy German counterpart changed all this. In France, the medieval universities remained as unreformable as ever, but new Écoles Normales, by teaching future teachers, enabled Napoleon to procure a new elite of bureaucrats. In Prussia, the king made academic professors and high school teachers civil servants, so that a dramatically modernized philosophical faculty could invent - by dialogic seminars and hermeneutic lectures - the so-called unity of Forschung und Lehre (teaching and research) that then fed back from universities to the gymnasia, from philosophy to literary studies.[19] Interpretation was no longer an interlinear version, but its contrary, as Gadamer,

despite the evidence of programming languages, persuaded Habermas.

Out of these two most successful and often copied models of higher studies originated modern mathematics (from Fourier to Hilbert) as well as modern philosophy (from Hegel to Heidegger).[20] In order to give rise to our actual world epoch it only remained to ally this alliance between ontology and meta-mathematics with technological hardware. Felix Klein, Hilbert's colleague in Göttingen, and "wizard" Steinmetz at MIT did so by building up experimental labs inside their universities[21] and, in the first case with a little help from the Kaiser, imposed a doctor title for engineers on reluctant German universities. Otherwise Alan Turing could never have devised his famous mathematical machine, which on the one hand disproved Hilbert's *Entscheidungsproblem*, but, on the other hand, proved that a small, although practically speaking powerful subset of the real numbers is nevertheless computable.[22] The Turing machine, then, was, is, and will be the condition of possibility of all computers. Just as in ancient Greece where one and the same alphabet stood at once for speech elements, natural numbers, and musical pitches,[23] our binary system encompasses everything known about culture and nature, but formerly only encoded in letters, images, or sounds.

2. Diagnosis

Quite suddenly, our anamnestic short story has led to the present, which, as we know, is not the past. Universities, however and to say the least, have utterly forgotten that glorious history. Especially in those parts of Europe where states still feed, control, and starve them, universities do not think of themselves as more venerable than the nation states, their short-term partners. Instead of seeking a sudden divorce, both universities and nation states still keep

trembling for the former's survival. On the other hand - and this is the good news - universities have finally succeeded in forming once again a complete media system. Turing's universal machine, vulgo the computer, processes, stores, and transmits whatever data it receives, whether textbooks, measurements, or algebras. Computers, therefore, have come full circle: from the mathematics departments where they once began, making their way through physics, chemistry, and medicine, they have finally arrived in the humanities. For the second time in its eight centuries, the university is technically uniform, simply because all departments share one and the same hardware.

This logistical fact has yet to be taken into systemic account. It will not do to equip every office or desktop with Microsoft Office and Wintel machines, but we have to draw each happy consequence from the new uniformity of knowledges, disciplines, departments. As Heidegger said, early and humbly: precisely because the core of the Greek episteme, ontology or the logos of Being, has materialized in computing machines, European philosophy comes to its very end and thinking may begin again. "La philosophie prend fin à l'époque présente. Elle a trouvé son lieu dans la prise en vue scientifique de l'humanité agissant en milieu social. Le trait fondamental de cette détermination scientifique est par ailleurs son caractère cybernétique."[24]

Clearly, there remains a twofold task. First, we have to organize this "end" within each single university; secondly, we must pose a new question.

"La fin de la philosophie se dessine comme le triomphe de l'équipment d'un monde en tant que soumis aux commandes d'une science technicisée. Fin de la philosophie signifie: début de la civilisation mondiale en tant qu'elle prend base dans la pensée de l'occident européen."[25] In

this direction, our universities are well under way.

For the first time since Galileo's experiments, mathematicians and physicists work on the same workstations. For the first time since Steinmetz's electro-technical lab, engineers and scientists pose the same questions about better hardware design that by itself will feed back still better questions. And for the first time since the invention of alphabetic library catalogues[26] and structured manuscript pages,[27] every file in Dewey's sense turns into a file in our computerized sense.[28] Thus, even the humanities' knowledge volatizes into software libraries. Furthermore, whereas the book-based humanities encountered difficult problems when trying to store or address images, animations, and sounds, computers do not simply record such data, but address and process them. The methodical integration of studies in language and music, film and poetry may begin.

3. Prognosis

And more is to be done. Humboldt's unity of teaching and research remains at stake as long as university systems do not overcome the unfortunate distinction between Geisteswissenschaften and Naturwissenschaften (humanities and sciences).[29] When the human face dissolves "comme à la limite de la mer un visage de sable,"[30] humanities should better be called cultural studies. When, on the other hand, physics is no longer a transcendental apperception, informing Kantian scientists on data given in the twofold frame of space and time, but rather some computer-preprocessed data flow, a scientific visualization or even sonification,[31] the distinction maintained between science and engineering should be annulled. Cultural studies vis-à-vis technical ones would be a smoother constellation of departments,

offices, and faculties where two things come from darkness into clearance, from lethe to aletheia:

1. If and when the old humanities deal not with man, their topics are cultural technologies such as writing, reading, counting, singing, dancing, drawing—[32] surprisingly almost the same skills that every free young man and girl in Lakedaimon or in Athens once displayed.[33] For the humanities, there is nothing nontechnical to teach and research (throwing Habermas's infamous opposition between "communicative" and "instrumental reason" overboard).

2. The so-called sciences and technologies, far from dealing with ahistorical truth, are involved in history simply by making it. Computer science, for example, has quite another impact than Greek or modern mathematics. It follows that the cultural contexts of proofs, experiments, and hypotheses are in no way trivial and require elucidation.

3. To accomplish these two operations, universities - just as their base, philosophy - have to exorcise each last remnant of their monotheistic, that is: monkish, legacy,[34] built in to them since the Middle Ages. The gods do play at dice "and the gods made love."[35]

In order not to remain merely nominal, these reformulations must be followed by institutional consequences. From now on the cultural sciences need computer specialists as well as mathematicians on their teaching staffs, and, inversely, the technical ones need historians of science. Just as Hegel's Geis*t* was only as deep as its explications,[36] today's knowledge is only as powerful as its implementations are. The future of the university depends on its faculty to unite separated notation systems of alphabets and mathematics into a superset, which Vilem Flusser once ironically called the alphanumerical code.

All chances and risks of this future, however, stem from a correct diagnosis of our

present. What has happened to high technology since the end of World War II must be conceptualized - in order to make universities able to act - as a recursion of much older stories. Computer technologies have arisen just as academically as Europe's scholarly knowledge, but they have also been just as commercialized. The universal discrete machine was the product of a Ph.D. thesis, the still most influential hardware architecture the draft of a Princeton mathematician, whose elegance led to a brilliant career inside the Pentagon. Unix, prototype of all modern operating systems and, therefore, programming language styles, were developed, it is true, by Bell Labs. Its world-wide success, however, came about only after the University of California at Berkeley had heavily modified it,[37] after Linus Torvalds, while a bloody young student of Helsinki Technical University, wrote the free Linux kernel from scratch in 1991, and finally after a whole bunch of hackers, internet-based students, and faculty members had helped Torvalds in helping thirty million people.[38] "When we speak of freedom, we mean freedom, not price."[39]

This is no wonder. A Turing machine, just like the medieval student, is a copying machine at almost no cost, but a perfect one. The internet is a point-to-point transmission system copying almost infallibly not from men to men, but, quite to the contrary, from machine to machine. The liberty to connect whole computer farms throughout the world has strong affinities to the old libertas utrique docendi. That is also why the internet, originally a digital connection between military commands and the most brilliant US universities, closely resembles the early-modern connection between territorial states and academic mail systems (to pass over the structural identity between middle Latin and our/my Pidgin English.) In this regard, universities

seem better prepared for their alphanumerical future than any other competing institution.

Just as Gutenberg's printing press, although it was only meant to mechanize the calligraphy of medieval scriptoria, brought about the separation of universities and book markets, mainly Californian universities have seen before their gates or even on their grounds the rise of hardware labs or software companies that actually dominate the information market. Once again, knowledge wanders into private sectors - the free entrepreneurship so dear to George W. Bush as to wage wars in its name. This change, alas, means not opening, but closure. The secret manifest in commercial chip designs, operating systems, and application program interfaces (APIs) lies in the fact that technical documentation - in screaming contrast to all technical history - is not published anymore. By virtue of their inaccessibility alone, blueprints and source codes earn money. The unique possibility of criticizing so called late capitalism will be its tremendously practical self-critique: the mass price of computer chips, once they have been designed, sinks rapidly to zero.

This is precisely what the software industry doesn’t admit. Instead of source codes and application programming interfaces, it publishes a future's music celebrating systematic closure. On the road maps of a famous firm there are two goals: computers shall hide more and more behind the inconspicuous facade of cars or washing machines; users shall be treated more and more like computers, that is, as programmable. Thus, some new medieval darkness threatens to separate the monkish elite of a few programmers from the billions of laymen also known as computer illiterates. Countless proprietary solutions, patents, trademarks, and copyrights exist for this very purpose, protected as they are by Bush's Digital Millennium Copyright Act. To say

nothing of a Pentagon which, as if to mock four thousand years of mathematics since Babylon or Baghdad, tends to classify prime number algorithms and others for the sake of the NSA. Patenting or secreting knowledge, however, is not only tantamount to hindering insight and discovery. It threatens sheer survival under conditions which obtain not merely inside Airbuses or Stealth bombers dictated by computers: Aerodynamically instable airplanes would instantly fall from heaven if their computer systems crashed - like a rolling stone.

In actual technical systems, errors and failures cannot be ascribed anymore to persons. Therefore, independent control instances have become just as necessary as they are rare. Since the sheer complexity of actual hardware and software excludes infallibility, proprietary solutions prevent even debugging. Actual knowledge needs places to produce, store and transmit itself independently of any company. What better places are there than universities? This applies just as much to digitally processed data as to the digitalized data of history. In the first case, the plans of enormous scientific publishing houses to monopolize academic journals in their hands are probably doomed to failure because Ph.D. advisers, getting at the data much earlier, can publish them electronically. The same holds true for free source code. In the more trivial case of formerly analog data, sounds and images, their future seems to be up to the gods. Whether or not arts and treasures of bygone cultures can be saved from private digital rights does not seem of primary concern. Whereas in Gutenberg's time the university had to renounce its storage monopoly, its leading role in processing and transmitting now remains as crucial as ever. In entirely academic freedom, ever-new codes and chips have to be developed in order to climb from the all too low level of zeroes and ones to higher levels of filtering and processing digital

data streams. Just as in the old days neither books nor libraries proved usable without metalevels of knowledge, nowadays neither algorithms nor data bases can do without Wissenswissenschaften (knowledge of knowledges, *histoire des systèmes de pensée*).

Only if envious states succeed in persuading the university in general and cultural studies in particular to think of themselves as a mere compensation and a mere assessment of the consequences of technology, will eight centuries from Bologna to Stanford have passed in vain. The sciences are too good merely to avert attention from what science does.

4. Envoi

However (and forever), "science does not think."[40] Throughout our daily labors to make it possible that tomorrow's universities will still work, may a deeply recursive gratefulness stay in our minds and hearts: To all the Minoans and Achaeans, who, fucking, founded Europe long ago; to all the scholars who freed her from the one God, Hebrew, Christian, or Muslim.[41] This is what Heidegger's Seinsgeschichte tells us to do. Computers may be copying machines, but, thanks to Aphrodite, we are not.[42] The way from her to now and back must always be gone over again.

Zukunft der Wissenschaft.- [...] Desshalb muss eine höhere Cultur dem Menschen ein Doppelgehirn, gleichsam zwei Hirnkammern, geben, einmal um Wissenschaft, sodann um Nicht-Wissenschaft zu empfinden; neben einander liegend, ohne Verwirrung, trennbar, abschliessbar; es ist diess eine Forderung der Gesundheit. Im einen Bereiche liegt die Kraftquelle, im anderen der Regulator; mit Illusionen, Einseitigkeiten, Leidenschaften muss

geheizt werden, mit Hilfe der erkennenden Wissenschaft muss den bösartigen und gefährlichen Folgen einer Ueberheizung vorgebeugt werden.[43]

Friedrich Nietzsche, "The Future of Science"

1. Ernst Robert Curtius, Europäische Literatur und lateinisches Mittelalter (Bern, 1963), p. 64.

2. See Plato, Republic X, 600a.

3. See for example Plato, Phaedrus 60a and 116 a–b.

4. Compare Friedrich Nietzsche, "Götzen-Dämmerung oder Wie man mit dem Hammerphilosophirt," Werke: Kritische-Gesamtausgabe, ed. Giorgio Colli and Mazzino Montinari (Berlin, 1967), 6.3.120: Plato geht weiter. Ersagt mit einer Unschuld, zu der man Grieche sein muss und nicht "Christ," dass es gar keine platonische Philosophie geben würde, wenn es nicht soschöne Jünglinge in Athen gäbe: deren Anblick sei es erst, was die Seeledes Philosophen in einen erotischen Taumel versetze und ihr keine Ruhelasse, bis sie den Samen aller hohen Dinge in ein so schönes Erdreichhinabgesenkt habe.

5. Compare Cassiodorus, De institutione christina.

6. See Marshall McLuhan, Understanding Media (New York, 1964).

7. Compare Michael Giesecke, Der Buchdruck der frühen Neuzeit: Eine historischeFallstudie über die Durchsetzung neuer Informations- und Kommunikations-technologien (Frankfurt am Main, 1991).

8. See François Rabelais, Pantagruel (1532), Œuvres complètes de Rabelais, ed. Jacques Boulenger (Paris, 1955), p. 204: "Maintenant toutes disciplines sont restituées, les langues instaurées: grecque, sans laquelle c'est honte que une personne se die sçavant [!], hébraïcque, caldaïcque, latine; les impressions tant élégantes et correctées en usance, qui ont esté inventées de mon [scil. Gargantua's] eage par inspiration divine, comme à contrefil l'artillerie par suggestion diabolicque." For wider contexts, see Paolo Rossi, La nascità della scienca moderna in Europa (Rome, 1997).

9. Pink Floyd, Wish You Were Here (1974).

10. See Heinrich Bosse, Autorschaft ist Werkherrschaft: Über die Entstehungdes Urheberrechts aus dem Geist der Goethezeit (Paderborn, 1981), pp. 25–36.

11. See Jacques Derrida.

12. For the U.S. part of the story, see Thomas Pynchon, The Crying of Lot 49 (New York, 1966).

13. See Herbert Grundmann, Vom Ursprung der Universität im Mittelalter (Darmstadt, 1964).

14. See Thomas Ellwein, Die deutsche Universität. Vom Mittelalter bis zurGegenwart (Wiesbaden, 1997), pp. 47–52.

15. See Alberto Martino, Daniel Casper von Lohenstein: Geschichte seiner Rezeption,

vol. I: 1661–1800 (Tübingen, 1978). This fits well with the self-fulfilling prophecies of a better enlightened future analyzed by Reinhart Koselleck, Kritik und Krise. Ein Beitrag zur Pathogenese der bürgerlichen Welt (Freiburg, 1969).

16. See Johann Beckmann, Entwurf einer allgemeinen Technologie (Leipzig, 1806).

17. See John Gimbel, Science, Technology, and Reparations: Exploitation and Plunder in Postwar Germany (Stanford, Calif., 1990).

18. See Archytas of Taranto, B1 (Diels-Kranz). Here is one of those Greek light(ning)s that Curtius's imperial latinism choose to ignore.

19. See the references given in Friedrich Kittler, Discourse Networks 1800/1900, trans. Michael Metteer and Chris Cullens (Stanford, Calif., 1990), pp. 148–64. Also see Michel Foucault, "Qu'est-ce qu'un philosophe?" Dits et écrits, ed. Daniel Defert and François Ewald, 4 vols. (Paris, 1994), 1:552.

20. For Heidegger's relation to Hilbert and the mathematical Grundlagenkrise, see Martin Heidegger, Sein und Zeit (Halle, 1931), §3, p. 9.

21. For MIT, see Steve Heims, The Cybernetics Group (Cambridge, Mass., 1991); for Klein and Wilhelm II, see Heinz Manegold, Universität, Technische Hochschule, und Industrie: ein Beitrag zur Emanzipation der Technik im 19. Jahrhundert unter besonderer Berücksichtigung der Bestrebungen Felix Kleins (Berlin, 1970).

22. See Alan M. Turing, "On Computable Numbers with an Application to the Entscheidungsproblem," Proceedings of the London Mathematical Society 2 (1937): 42.

23. See Johannes Lohmann, Musiké und Logos, ed. Anastasios Giannarás (Stuttgart,

1971), p. 10.

24. Heidegger, "La Fin de la philosophie et la tâche de la pensée," in Kirkegaard vivant (Paris, 1965), p. 178. In those long bygone days, cybernetics or elsewhere logistics meant computer science and computer hardware indiscriminately. Many further references could be given.

25. Ibid., p. 180.

26. See Lloyd W. Daly, Contributions to a History of Alphabetization in Antiquity and the Middle Ages (Brussels, 1967).

27. See Ivan Illich, Im Weinberg des Textes: Als das Schriftbild der Moderneentstand (Frankfurt am Main, 1991).

28. See Markus Krajewski, Zettelwirtschaft: Die Geburt der Kartei aus dem Geiste der Bibliothek (Berlin, 2002), pp. 99–121, 150–55.

29. It could be factually shown that Wilhelm Dilthey in drawing this distinction did little else than to prevent Helmholtz's growing influence on contemporary departments of philosophy and psychology.

30. Although it is deemed unfashionable now, I quote from the first edition: Michel Foucault, Les Mots et les choses: Une Archéologie des sciences humaines (Paris, 1966), p. 398.

31. See Peter Mittelstädt, The Interpretation of Quantum Mechanics and the Measurement Process (Cambridge, 1998).

32. Berlin's three universities, for practical purposes, have recently allowed at Humboldt Universität such an interdiscplinary framework. The Helmholtz-Zentrum für Kulturtechniken

includes among others: mathematicians, computer scientists, literary critics, art historians, and Kulturwissenschaftler (untranslatable as "cultural studies," in the British sense are all too biased for popular culture).

33. I can live with the fact that drawing was facultative, but the other skills obligatory. See for example, Aristotle, Politics VIII 3, 1338a40–42.

34. See Heidegger, Sein und Zeit, §44, p. 229: "Die Behauptung `ewiger Wahrheiten' ebenso wie die Vermengung der phänomenal gegründeten `Idea-lität' des Daseins mit einem idealisierten absoluten Subjekt gehören zuden längst noch nicht radikal ausgetriebenen Resten von christlicher Theologie innerhalb der philosophischen Problematik." Who ever cares, then, about deconstruction straddles Athens and Jerusalem.

35. The Jimi Hendrix Experience, Electric Ladyland (1968).

36. See G. W. F. Hegel, Phänomenologie des Geistes, ed. Johannes Hoffmeister (Hamburg, 1952), p. 15: "Die Kraft des Geistes ist nur so tief alsihre Äußerung, seine Tiefe nur so tief, als er sich in seiner Auslegungsich auszubreiten und sich zu verlieren getraut." The key word, to my colleagues' knowledge, seems to be, getrauen, "to dare."

37. See Peter H. Salus, A Quarter Century of Unix (Reading, Mass., 1994).

38. See Linus Torvalds and David Diamond, Just for FUN: The Story of an Accidental Revolutionary (New York, 2001).

39. Richard M. Stallman, The GNU General Public License. Without GNU/Linux, nonetheless, I could not teach any programming undergraduate course: all my students would have to spend about $1000 just for editors, compilers, software libraries, and debuggers. Under

GPL, all these are free.

40. "Die Wissenschaft denkt nicht" (Heidegger, Was heißt Denken? [Tübingen, 1961], p. 4).

41. See Pope Gregor IX, Epistulae saeculi XIII e regestis pontificum Romanorum selectae per G.H. Pertz, ed. Carolus Rodenberg, 2 vols. (Berlin, 1883), 1:653:

[ext] Sed quia minus bene ab aliquibus credi posset, quod se verbis non illaquaeverit oris sui, probationis in fidei victoriam sunt parate, quod isto rex pestilenti[a]e [Frederick II.] a tribus barratoribus, ut eius verbis utamur, scilicet Christo Iesu, Moyse et Machometo, totum mundum fuisse deceptum, et duobus eorum in gloria mortuis, ipsum Iesum in ligno suspensum manifeste proponens, insuper dilucida voce affirmare vel potius mentiri presumpsit, quod omnes illi sunt fatui, qui credunt nasci de virgine Deum, qui creavit naturam et omnia, potuisse; hanc heresim illo errore confirmans, quod nullus nasci potuit, cuius conceptum viri et mulieris coniunctio non precessit, quod omnes illa sunt fatui, qui credunt nasci de virgine Deum, qui creavit naturam et omnia, potuisse; hanc heresim illo errore confirmans, quod nullus nasci potuit, cuius conceptum viri et mulieres coniunctio non precessit, et homo nichildebet aliud credere, nisi quod potest vi et ratione natur[a]e probare.

Up to us to teach.

42. One of our earliest Greek vase inscriptions, written ca. 730 on far West Ischia (Pithakousai) and alluding both to "Ilias" and "Odyssea," has to say and sing:

Nestoros e[m]i eupot[on] poterion

hosdantodepiesi poteri[o] autikakenon

himeroshairesei kalliste[pha]no aphrodites

Nestor's cup I am good to drink from

He who drinks from this cup on the spot

Desire takes him of sweet-garlanded Aphrodite.

Compare Ernst Risch, Zum Nestorbecher aus Ischia ZPE 70 (1987), 1–9.

43. Nietzsche, Menschliches Allzumenschliches: Ein Buch für freie Geister, §251; KGA, 4.2.213. We scholars are a feedback loop in recursive action. Nietzsche's "Regulator" clearly evokes Maxwell's mathematical theory of "governors" or negative feedback loops, "Kraftquelle" James Watt's first untamed vapour energy.