

# Media Theory, Education and the University: A Response to Kittler's History of the University as a Media System

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## Abstract

As the means through which specialized and general knowledge and practice is reproduced in a society, education, and the university, are indelibly shaped by media. With this in mind, the purpose of this paper is to re-think Kittler's (2004) history of the university as a media system by emphasizing how media shape pedagogy. Kittler points to a variety of moments within the history of the university: Its initial formation alongside manuscript culture; the advent of the printing press; university reform corresponding with liberalism and nationalism in the 17<sup>th</sup> & 18<sup>th</sup> centuries; and the era of psychometric study stretching from 1900 to the present. Referring to a variety of media theorists, and tracing the development of forms of curricular organization and representation, our paper develops a more detailed historical account of the function and characteristics of education in each of these academic media systems. In our conclusion, we provide a brief review Kittler's controversial diagnosis and prognosis of the contemporary university, in the light of our own historical overview of pedagogical methods.

## Media Theory, Education and the University: A Response to Kittler's History of the University as a Media System

### **Introduction: The University, Education & Media Theory**

Media and education have long been closely linked. Speaking of collective human education, Rousseau claimed an “almost exact correspondence” between stages of social development and modes of representation:

These three ways of writing correspond almost exactly to three different stages according to which one can consider men gathered into a nation. The depicting of objects is appropriate to a savage people; signs of words and of propositions, to a barbaric people; and the alphabet to civilized people. (1966, 17)

Developments in media technologies occurring more recently than cave paintings, hieroglyphs, or the phonetic alphabet have prompted similar epochal pronouncements. The computer and the Internet, we are told, will usher in a more civilized and advanced era for society as a whole –as well as for education and the university. For enthusiastic proponents of a completely networked university, this means that the tasks such as storing and retrieving books and of taking notes in the lecture hall will soon be history. The computer, together with digital networks, will render these familiar aspects of university education obsolete. For critics, the increasing computerization of the university signals the death of 500 years of print-based education. The future, they fear, is one in which Wikipedia entries and Google search results will surpass the utility and legitimacy of printed books and articles.

The strident positions of both the critics and enthusiasts in these debates ignore the historical imbrication of education and media, parallel to the irreducibility of education to its curricula. The university –among the oldest continuously operating institutions, east or west—has developed to its contemporary form in intimate interrelationship with changing mediatic technologies for storing, producing and disseminating knowledge. And this coevolution is certain to continue.

In 1986, German media theorist Friedrich Kittler pronounced that “media determine our situation,” and so doing, marked the beginning of ways of understanding media, culture and education that have come to constitute a new, interdisciplinary field of study predominant in German-speaking Europe: *Medienwissenschaften*. W.J.T. Mitchell and Mark Hansen (2010) explicate Kittler's memorable declaration as follows:

Packed into Kittler's statement is a crucial claim: that media form the infrastructural basis, the quasi-transcendental condition, for experience and understanding. Like the strata of the seeable and sayable that, in French philosopher Michel Foucault's archaeology of knowledge, make knowledge possible in a given historical moment, media broker the giving of space and time within which concrete experience becomes possible. (vii)

According to this way of theorizing media, any presuppositions of the inherent universalism of the pursuit of knowledge are subject first to the “quasi-transcendental condition” of media. Knowledge, education, and the university are contingent upon the existant media system –or upon the prevailing mediatic conditions or *mediality* (*Medialität*; Margreiter, 2006, 63-67)– such that any changes within this media system

result in changes in education and knowledge: how it is pursued, produced, stored, disseminated and reproduced within and among institutions.

The relationship between changing mediatic and educational forms is underdeveloped in both educational and media research. In this respect, Friedrich Kittler's discussion of "learning to read" in his *Discourse Networks 1800/1900* (1990), and particularly his history of the university as a changing media system in "Universities: Wet, Hard, Soft and Harder" (2004), are distinctive and original. Working backwards from categories representative of contemporary computer systems and technologies (such as "hardware," "software," or their human "wetware"), Kittler describes various epochs of the university –and also of scholarly and literary output– as constituting discursive or inscriptional "systems" or "networks;"

network[s] of technologies and institutions... allow a given culture to select, store, and produce relevant data. Technologies like that of book printing and the institutions coupled to it, such as literature and the university, thus constituted a historically very powerful formation... (1990, 369)

Changes in these mediatic networks –associated for example with the invention of the printing press, the rise of a reading public, and later the emergence of telegraph, film, gramophone and typewriter—are accompanied by corresponding changes in the culture of education and also in the university and its practical and institutional configurations and functions.

Yet, there is something missing from both Kittler's (2004) history of the university as a media system and his diagnosis and prognosis of the contemporary university: the role of education, pedagogy or the practices of teaching and learning. The link between media, what is being taught, and how is it being taught is largely unrecognized.<sup>1</sup> As the means through which specialized and general knowledge and practice is reproduced in a society, education, and the university, are indelibly shaped by media. With this in mind, the purpose of this paper is to re-think Kittler's (2004) history of the university as a media system by emphasizing how media shape pedagogy. Kittler points to a variety of moments within the history of the university: Its initial formation alongside manuscript culture; the advent of the printing press; university reform corresponding with liberalism and nationalism in the 17th & 18th centuries; and the era of psychometric study stretching from 1900 to the present. Referring to a variety of media theorists, and tracing the development of forms of curricular organization and representation, our paper develops a more detailed historical account of the function and characteristics of education in each of these academic media systems. In our conclusion, we provide a brief review Kittler's controversial diagnosis and prognosis of the contemporary university, in the light of our own historical overview of pedagogical methods.

### **Kittler and German Media Theory**

Kittler is only one of the earliest of a succession of theorists and philosophers (*Wissenschaftler*) of media in German-speaking Europe. Others in this "first generation"

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<sup>1</sup> Although it is little recognized in educational research, Kittler provides detailed and original treatment of pedagogical understandings and techniques of the late 18<sup>th</sup> and early 19<sup>th</sup> centuries in the first two chapters of his *Discourse Networks: 1800/1900* (1990). Despite the fact that Kittler does not focus specifically on the university in these chapters, they will be discussed in this connection later in this paper.

include Norbert Bolz (e.g., 1999), Ludwig Pfeiffer and Hans Ulrich Gumbrecht (e.g. Gumbrecht and Pfeiffer 1994). In North America, Kittler's work has sometimes been understood to be the continuation of insights provided by media theorists from Canada and the USA (Marshall McLuhan, Walter Ong, Harold Innis, Elizabeth Eisenstein, Joshua Meyrowitz). In their original German context, contemporary *Medienwissenschaften* appear as broadly poststructuralist studies of technological culture, and much more as a successor to German literary studies and theory than to the critical sociology of the Frankfurt School. One of the principle interpreters of this movement to English-language audiences, Geoffrey Winthrop-Young, cautiously characterizes the current "post-Kittlerian" generation of *Medienwissenschaftler* by emphasizing largely what they are *not*. This generation, he says, represents "at best a motley crew of media-theoretical paradigms that pit incommensurable basic approaches against each other... marked by a conspicuous absence of...hegemonic approaches [or] alpha theories" (2006, 89). At the same time, Winthrop-Young admits that these theorists share some commonalities following from Kittler himself, and from poststructuralist inquiry into the technical conditions that make "knowledge possible in a given historical moment" (cf. Mitchell and Hansen):

Nevertheless they [current media theorists] do share to a greater or lesser degree some basic assumptions that are most clearly evident in Kittler's work, among them a tendency to fuse aspects of French poststructuralism with an increasingly technologically informed focus on the materialities of communication... [and] a hostility toward subject- and/or consensus-oriented philosophical and sociological approaches... (2002, 828)

Along with the influence of the French poststructuralists, most notably Foucault, these theorists also share a keen interest in historical configurations and precedents, undertaking intensive archaeological investigations of developments (for example) in radio, postal and typewritten media. And like the French post-structuralist analyses that preceded them, these investigations are typically performed as histories of the *longue durée*, focusing on periods of epochal and mediatic stability and the caesura that punctuate them.

Kittler's historiography is also emphatically epochal, tracing four long periods of stability, and the disruptions that separate them. As indicated above, Kittler begins with medieval manuscript culture, progresses via the Renaissance through to 1800 (Enlightenment, Romanticism) and finally, arrives at the period stretching from 1900 to the present (the epoch of "psychophysics" or physiological psychology). Kittler's coverage of these four stages follows a broadly Hegelian narrative of original mediatic, systematic and disciplinary unity, followed by an extended period of growing alienation and contradiction among these elements, and ending with the promise of a reconstituted mediatic and disciplinary unity. This unity, according to Kittler, is enabled by the "universality" of the computer and Internet as devices for generation reproduction and dissemination:

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 (2004, 249-250).

Kittler imagines a truly interdisciplinary university in which humanities “topics are... [defined in terms of] cultural technologies... [with] nothing nontechnical to teach and research,” and in which science, math and engineering correspondingly give explicit consideration to the “cultural contexts of proofs, experiments and hypotheses” (251). The long-standing split between science and the humanities that has characterized the university can be corrected, according to Kittler, when we recognize that the basis of this split was mediatic in nature. “The future of the university depends on its faculty to unite the separated notation system of alphabets and mathematical symbols into a superset” (252). After centuries of the contest of the faculties –and of a split between heterogeneous media germane to the pursuits of each– the university is seen as currently occupying a moment of enormous promise.

### The Manuscript Era: 1100-1500

The university as an independent institution, upon its appearance in Europe in the 12<sup>th</sup> century, represented a complete media system in the sense that oral and written means of processing and reproduction were all of a kind, and proper to the university itself. The basis of the medieval university was its library of Latin manuscripts which were inherited from monasteries and cathedral schools. This information needed not only to be stored, but also to be subject to processes of recording, transmission and processing. “Professors proceeded to explain ancient manuscripts; students, by writing these oral commentaries between the lines of their textbooks, did the *interpretatio*” (245). Transmission of information, according to Kittler, was accomplished via an informal “postal” system linking universities. As mentioned earlier, Kittler works backwards from categories derived from contemporary computer and systems science, and thus describes the early incarnation of the university as a three-fold hardware system which mirrored the functions enabled by today’s computers,

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 Gutenberg’s invention of the printing press (245-246).

Education or instruction is endogeneous to the medieval university mediatic system. This is not discussed explicitly by Kittler, but is registered clearly in Marshall McLuhan’s (1962) comments concerning writing in the medieval university. The teaching of writing, McLuhan explains, was accomplished through dictation and transcription, an educational method that was directly related to the production and consumption of manuscripts themselves:

There can be no doubt that one of the essential reasons for the custom of dictation finds its explanation in the fact that, before the era of printing, schools and scholars had no adequate supply of texts. A manuscript book cost too much; the simplest way of getting them was for the teacher to dictate the texts to his pupil. (McLuhan, 1962, 95-96)

A necessary complement to Kittler's discussion of the medieval university, then, is an understanding of the educational process as simultaneously a form of recording, processing and of mediatic production: "the rise of the universities brought masters and students into the field of book production in class time, and these books found their way back to the monastic libraries when students returned after completing their studies" (1962, 134). McLuhan goes on to explain that what was being dictated was hardly uniform, as in many cases instructors "strove to give to the matter taught a new form suited to its own assumptions...[The instructor] mostly dictated to his students the results of these personal insights" (1962, 97). Instruction thus involved a form of processing in addition to processes of data "backup" or reproduction. This type of instruction, in turn, highlights another way in which knowledge was "made possible" in the historical moment of medieval university. The integration and interdependence of pedagogy and the mediatic system here is total: one is inconceivable without the other. The division that exists today between media (re)production, consumption and storage on the one hand, and education and instruction on the other, as we shall show, has a long history. But this history begins only *after* the transformation of the university through the introduction of the printing press.

### 1500-1800: The Printed Book, Universities & Ramean "Method"

For Kittler, two events changed the medieval university media system: The advent of Gutenberg's printing press and the emergence of unified European nation-states. The former would, over the period of 300 years, come to shape the latter so that by the time of the French Revolution, many universities in Germany and France (the two most successful and often copied models of higher studies [Kittler, 2004, 249]) were constructed as mere appendages of the state. The equilibrium of the medieval mediatic system of reproduction, storage, processing and transmission was upset when states began building libraries of their own which "devalued and subverted the monopoly of the medieval university libraries" (2004, p.247). The legitimacy of the teacher, lecturer or reader as a kind of processor and reproducer of information was also put into question. In a world in which books were becoming relatively cheap and plentiful, he was no longer an unrivaled source and master of information and learning:

Gifted students no longer needed to sit at the feet of a given master in order to learn a language or academic skill. Instead, they could swiftly achieve mastery on their own, even by sneaking books past their tutors – as did the young would-be astronomer, Tycho Brahe (Eisenstein 2005, p.38).

The academy as a unified mediatic system was also undermined by the emergence of scientific and technical disciplines that operated in relative autonomy from the medieval trivium. This development, too, finds its origin in the appearance of new mediatic forms and technologies, specifically the precise and readily-reproducible combination of text, graphics and specialized forms of notation enabled by the printing press. Kittler notes that the "combination... of type and woodcut or copperplate enabled scientific visualization at a level of precision unheard of by Greeks and monks" (2004, 248). Elizabeth Eisenstein explains further:

The fact that identical images, maps, and diagrams could be viewed simultaneously by scattered readers constituted a kind of communications revolution in itself...For scholars concerned with scientific change, what happened to numbers and equations is surely as significant as what happened to either images or words (Eisenstein, 2005, 14, 26).

The pictorial “communications revolution” was important not only for scientific progress, but for developments in education as well. Among the most important of these are developments closely associated with the educational reforms of Peter Ramus (1515-1572). (The fact that Kittler avoids mention of Ramus is testament to the marginalization of education within his media history of the university.)

Ramus was an educator and educational reformer who devised what became known as the “Ramean method” of instruction. Formulated in opposition to classical authorities (above all Aristotle and Cicero), this method was widely seen as providing a single efficient means of representation and organization through which one could learn all that there is to know. In making this contribution, Ramus prefigured or originated a range of pedagogical notions that are today taken for granted, such as the importance of a “lesson,” the structure of a “curriculum” and, of course, the necessity of an educational “method.” His educational reforms “dominated the teaching practices of European schoolmasters... [d]uring the late sixteenth and seventeenth centuries” and were particularly influential in New England. (Triche & McKnight, 2004, 41). Speaking even more broadly, media historian Walter Ong points out that before Ramus’s pedagogical innovation, “there was no word in ordinary usage which clearly expressed what we mean today by ‘method,’ a series of orderly steps gone through to produce with certain efficiency a desired effect” (Ong 1958, 225).

Ramus’s method can be thought of as a particularly mechanistic type of “literary empiricism” (1971, 171) in which texts and their arguments are broken down into isolated terms and concepts which are then placed visually into interrelationship according to rules of precedence and antecedence. “The literary text becomes for a Ramist a kind of uninspired collection of miscellaneous details...” to be analyzed and taxonomized (Triche and McKnight, 40). Quoting a 1992 study of Ramus’s attack on Cicero, the same authors go on to explain:

Ramus proposed that unclear and confused arguments could be understood only by organizing all parts into an orderly progression moving from antecedent to consequence. Ramus’s method of arrangement accomplished this by organizing an argument so that “the chief matter is placed at the beginning, is arranged according to whether it is simple or complex, and then is argued and brought to a conclusion.” (40)

Ramus achieved this order and organization by leveraging possibilities for diagrammatic processing and transmission that had not been available to the likes of Cicero and Aristotle. Terms and concepts extracted from texts were arranged and presented in a spatialized, diagrammatic form, in a figure known as “Ramean” or “binary tree.” (Figure 1 shows a Ramean dialectic of Philosophy that diagrams the interrelationship of the various arts; the computational connotations of the term “binary” are not entirely accidental, as we shall see.)

TABVLA ARTIVM, QVA S IN  
hoc Volumine coniunximus.

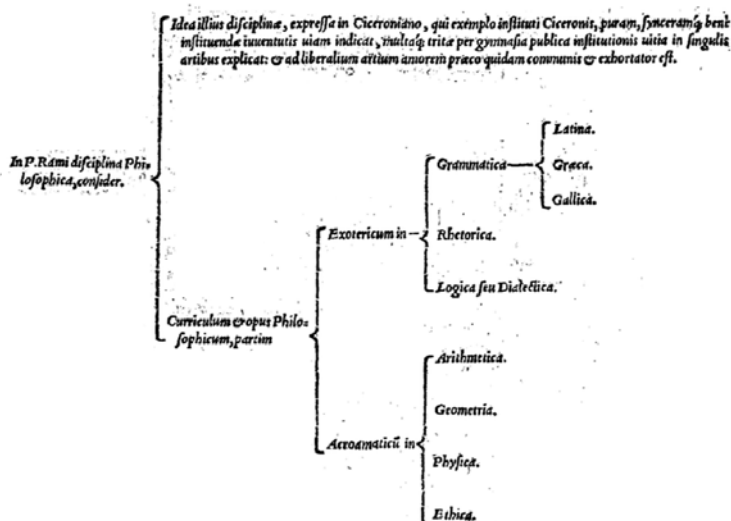


Figure 1: Table of the Arts (from: Thomas Freigius' *Professio Regia* (Basel 1567).

Quoting another recent study of Ramus's work and influence, Triche and McKnight explain:

As a diagram of dichotomized concepts, Ramus's method could be used to present any subject as a visually represented structure that reduced knowledge to the bifurcated 'spatial patterns' of a branching taxonomy... by 'setting out the whole subject on a single side of paper', a student would be able 'to see the subject as a [single] whole'. This visual and graphic process certainly gave the teacher greater control over what subject matter would be handled and mastered. (2004, 47-48)

The reduction of a text, in all of its ambiguity and complexity, to one of these branching trees was constitutive of Ramean method. To subject a text to such a reductive analysis, to "process" it in this way, was to effectively "methodize" it. As Ong puts it, "words which admit of neat diagrammatic or semidiagrammatic presentation are those which are methodized properly" (1971, 185). And the significance of such methodization, indeed of a more general methodized and spatialized "psychology" could, as Ong explains, only be realized in the context of new typographical print technologies:

In principle, every subject properly treated by a Ramist admitted of being diagrammed on bracketed, dichotomized outlines...[But] while such outlines are not unknown in the pretypographical manuscript tradition, in this tradition they do not admit of the ready multiplication which printing makes possible. In manuscripts, diagrams are much more laborious productions than straight text, for manuscript copying only with great difficulty controls the position of material on the page. Typographical reproduction controls it automatically and inevitably. Ramist method is psychologically of a piece with typographical reproduction. (Ong, 1971, 168-169)

It is important that Ramus's method points to the conceptualization of pedagogy itself as a question of technique, as a matter of optimized efficiency, that has flourished from 1900 to the present day.<sup>2</sup> This is not to say, however, that present forms and systems follow directly or unproblematically from Ramean method. It is distinctly premodern in its claims to disciplinary universality (being applicable to "any subject") and admits of none of textual ambiguity that was constitutive of the culturally self-aware "hermeneutic man" of 1800 –and of his "natural" grounding in maternal orality.

### 1800: The Mother's Mouth and the Hermeneutic Man

The late eighteenth century marks the coincidence of a number of developments significant enough to warrant the label of "pedagogical century" for the period as a whole (Gudjons, 2008, 81). Pedagogy came into its own at this time specifically as a *Geisteswissenschaft*, literally as a "science of the spirit" –implying, of course, its full separation from the natural and technical sciences. According to Kittler, this ascendancy of pedagogy as a "humanities" subject coincided with strengthened interest on the part of the state in the development of specialized training for bureaucrats, civil servants, and other governmental employees –particularly teachers and professors. Both Napoleon and Frederick the Great, Kittler explains, redefined the pedagogical and political role of higher education in France and Prussia by connecting it very explicitly to the functions of the state:

In France...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 [*Beamte*], 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. (2004, 248)

As is the case with many assertions in Kittler's "Universities: Wet, Hard, Soft, and Harder," these two sentences can be readily expanded into a paragraph, passage or indeed, an entire chapter. In fact, Kittler provides precisely this kind of expansion and explication in the first two chapters of his *Discourse Networks 1800/1900* (1990) and these will be used to explore the pedagogical implications of his assertions here.

For example in the chapter "The Mother's Mouth," Kittler describes the development of a new class of educated "universal bureaucrat" as part of a new model of the state. In France, this bureaucratic class developed in the context of Napoleonic reforms and consolidation; and in Germany, it was situated in the emergence of the Prussian *Kulturstaat*. This was a state in which "cultural production was seen...as the major cohesive factor in the face of political fragmentation" (Winthrop-Young, 2006, 90). Correspondingly, members of this educated civil servant class were seen as advocates and agents of national cultural achievement and unity, rather than as mere cogs in an impersonal administrative apparatus. These cultural servants were described at the time

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<sup>2</sup> "It also provided the dialectical (logical) preconditions underlying the subsequent refinements to method propagated by both Francis Bacon and Renee Descartes (among others), whom curriculum theorists believed to have supplied the foundational scientific and philosophical concepts of method appropriated by modern pedagogues and curricularists." (Triche and McKnight, 41)

as “instructors of mankind” or “education officers” (*Erziehungsbeamte*), and were charged with nothing less than “improving the inner condition of man” (Kittler, 59).<sup>3</sup>

In the pedagogical system or network of 1800, these state-sponsored agents of inner improvement and cultural unification were considered the end product of a careful process of education, formation or *Bildung*. This education, as Kittler has already indicated, is one involving “dialog and hermeneutics,” and it is achieved through the unification of “teaching and research” on an institutional level. Kittler here is referring to two significant developments in the German university (and later on an international level): the “hermeneutic seminar” (e.g., Clark, 1989) on the one hand, and the “Humboldt model” of the university (e.g., Albritton, 2006) on the other. We consider each in turn.

Wilhelm von Humboldt, a Prussian civil servant, was chosen in 1809 “to strengthen and elevate the nation by removing the burdens weighing on it and also through education” (Diesterweg, as quoted in Hohendorf, 2001, 5). To this end, Humboldt combined the humanistic pedagogy of the Swiss educator Johann Heinrich Pestalozzi (who worked with poor children and mothers) together with the principle of the unity of teaching and research, and with an emphatic affirmation of university’s institutional autonomy. Theorizing along idealist-Hegelian lines, Humboldt saw the potential for discovery of the inner subjective life and the outer objective world as being infinite. He envisioned the university as reflecting unending process of discovery:

In the organization of institutions of higher education everything depends upon retaining the principle that knowledge must be considered as something not yet wholly discovered and never entirely discoverable, and that it must incessantly be sought as such. (Humboldt, as quoted in Albritton, 2006, 3)

When this institutionally-grounded, incessant seeking is directed inwards, it becomes hermeneutic. This endless exploration of the “unknown world,” of “the inner powers [that] define the true essence of the individual” (Humboldt, as quoted in Lüth, 1997, p. 50) has its institutional correlative in Kittler’s second point, above: The “dialogic seminars and hermeneutic lectures.” These have been portrayed by other historians of education as part of “a genuine epistemic shift” –one tantamount to the emergence of a “new pedagogic arena,” and ultimately the “father[ing of a] ‘new man’” (Hoskin, 1993, 280, 284).

This development occurred through the combination of a number of new genres and mediatic forms and processes, including the student essay or research paper, the research seminar, and the replacement of “recitation and disputation” (vestiges of the medieval dictation and oral performance) with “dialogue and individual interpretation” (Hoskin, 1993, 282) As the art of interpretation, hermeneutics understands the “authority” of a text in ways that are rather different from the anonymous and timeless authorization of the medieval manuscript, or the renaissance valorization of the printed world. The terms of hermeneutic authorization are subjective, concerning the intentionality of the author, and are at the same time objective, concerning the work as a whole and its historical context. Hermeneutics is generally conceived of as a cyclical process –objective to subjective, part to whole– carried out through a figurative “dialogue” with the text, its time, its underlying authorial intentions. Also important are the text’s implications in terms of “philosophical anthropology” –as a study of its

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<sup>3</sup> To the present day, university professors and upper-level school teachers work in Germany as direct employees of the state.

“human” characteristics that remains important in Germany to the present day. In a paper entitled “Education and the Genesis of Disciplinarity” (1993), Hoskin describes the emergence of this kind of education as a “transform[ation of] the kind of knowledge... [that students] produced, as they internalized a new hermeneutic approach to the critical reading of texts” (283). Such a hermeneutics, Kittler stresses, ultimately provided “the interpretive techniques [to] refer interwoven words to a single and universal ‘man’” (Kittler 1990, 159):

the reflexively aware practitioner of hermeneutics, who reads writing as trace and the “objective” as the problematic production of subjectivity, and who thus discovers a meaning that constantly recedes... [He] eventually finds that the truth thus written leads always back toward one’s own self and the hermeneutics of the world within. (Hoskin, 1993, 276)

This type of man, willing to engage in the hermeneutic circle between objective production outside and the subjective world within, was apparently needed not only in Germany, but also in America, where the Humboldt institutional model was emulated by a number of prominent universities, including the University of California at Berkeley, Johns Hopkins University and the University of Chicago.

It is important to note that diagrammatic and visual components are of little epistemological value in charting this inner hermeneutic world. “Letters, ciphers, and diagrams in their threefold combination,” Kittler explains, “proved too alien for humanists” (2004, 248). The “world within,” unsurprisingly, is best sounded out through the multivocality of poetic words, rather than mapped with cartographic visuals. While further underscoring the separation between natural sciences and the *Geisteswissenschaften* (including pedagogy), it is significant that the visual was not completely devalued in humanistic pursuits. It has an important aesthetic, expressive role to play, specifically when it comes to matters sublime, where language and hermeneutics reach their limits.

The significance of graphical illustration is demonstrated via a critical component in the system of textually-based, hermeneutically-focused pedagogy –that of the feminine, or more specifically, the mother (Figure 2). Again inspired by the pedagogy of Pestalozzi, the period around 1800 in Germany (and around 1880 in America) witnessed the publication of numerous instructional books for mothers, offering nursery rhymes or *Koselieder* (literally “caressing songs”) to be sung to children, to strengthen their verbal ability, their knowledge of the alphabet and ultimately their literacy skills.



Figure 2: “Mother Love, Mother Play & Mother Song,” cover illustration from instructional book for mothers by Friedrich Fröbel, published in Boston in 1896.

By providing oral instruction that leads to textual competencies, the mother effectively completes the circuit constitutive of the discourse network of 1900. Kittler explains that maternal instruction presents the means by which *nature* can be seen as “accomplish[ing] a production of discourses” through a kind of dissimulated “primary orality” (1990, 25). The mother would read about the education of children via songs, games and other techniques. Through her “elementary and oral dispensation,” the mother would then lead the child “from natural sounds to language,” and from there to the alphabet (1990, 31). This would then complete the illusion that the child received his linguistic and literary ability from the wellsprings of a natural orality. The discourse network of 1800, despite its thoroughly typographical components, could then be seen as grounded in an emphatically natural source:

A simple and direct shortcircuit characterized pedagogical discourse. Educational tracts and primers written explicitly for mothers obliterated their own textuality for the sake of their addressees. Books disappeared in a Mother’s Mouth whose original self-exploratory experience had been instituted by those very books. (1990, 53)

The result of this elaborate disappearing act, as Kittler describes, is a “male brotherhood of educational bureaucrats” (1990, 170) formed through the instructional

deeds of the mother. And such a fully-formed (*gebildet*) new bureaucratic man is capable of “invok[ing] the feminine producer of discourse” not as a tangible reality, but only as a “thoroughly constructed ideal” (Kittler 1990, 171, 170): “*Das Unbeschreibliche, Hier ist's getan; Das Ewig-Weibliche zieht uns hinan.*”<sup>4</sup>

### Education 1900: Pedagogy as Psychophysical Technique

Education was changing decisively by the end of the 19<sup>th</sup> century, and perhaps nowhere more decisively than in America. Approaches referred to as “physiological psychology” and “psychophysics” appeared simultaneously in Europe and America at this time. However, whereas the influence of these new psychologies on pedagogy in Germany has been limited, in America it has been irrevocable. In Germany, *Bildung* remains a matter of practical interest, whereas in America, comprehensive attempts to cast education as a natural “science” continue to this day. Kittler explains what is at stake in this sudden, simultaneous development:

The victory of psychophysics is a paradigm shift. Instead of the classical question of what people would be capable of if they were adequately and affectionately “cultivated” [*gebildet*] one asks what people have always been capable of when autonomic functions are singly and thoroughly tested... The discourse network of 1900 was the first to establish a treasury of the signifiers [for such testing] whose rules were entirely based on randomness and combinatorics... (1990, 214, 210)

Kittler provides compelling evidence for this by recounting the studies of the autonomic memory function carried out by the German psychologist Hermann Ebbinghaus. Ebbinghaus’ research work focused on the measurement of his own memory capacity, studied “singly and thoroughly” as an isolated, physiological function. Inspired by earlier studies of the *Elements of Psychophysics* by Gustav Fechner, Ebbinghaus began his tests of his own memory capacity by first using the text of Byron’s *Don Juan* (Hoffman et al, 1986, 72). However, he became concerned at the lack of “homogeneity” in this text. Ebbinghaus wanted to ensure that the associative power of its meanings and the mnemonic strength of its cadences would not limit the validity of his findings (Hoffman et al, 1986, 59). Consequently, he elected instead to memorize sequences of terms – words like “fud” “lof” or “zof” – carefully combined to avoid any semblance of meaning and metre. It is from studies based on these terms that Ebbinghaus developed his finding of the “forgetting curve,” an exponential curve tracing the decline of memory over time. The integrity of a nonsense sequence committed to memory, in short, declines by half over regular intervals (days or weeks).

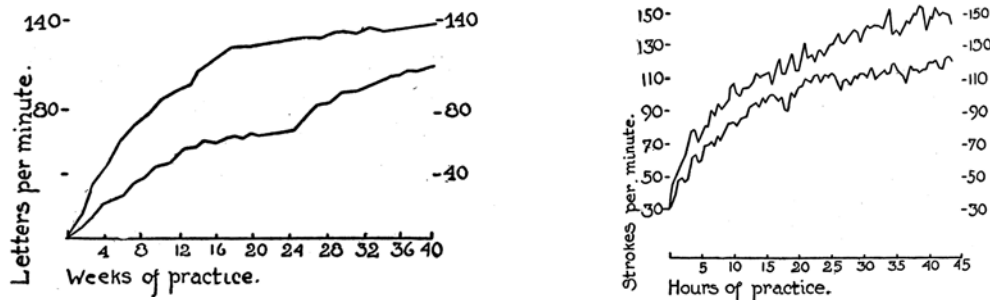
During 1900 in America, a similar exponential curve was discovered to describe findings of a set of experiments very reminiscent of those of Ebbinghaus. The curve was described not as one of forgetting but of *practice*, and was produced in the research of

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<sup>4</sup> “The indescribable, here it is done / The Eternal Feminine draws us on.” The last lines from Goethe’s *Faust Part II*, Walter Arndt’s translation of *Faust*, ed. Cyrus Hamlin (New York: W. W. Norton & Co., 1976), p. 308.

educational psychologist Edward L. Thorndike.<sup>5</sup> The manner in which Thorndike reduced questions of education to a single autonomic function to produce these findings is in some ways more radical than Ebbinghaus. Instead of eliminating subjective associations of meaning and cadence, Thorndike removes the human subject itself – replacing it with the autonomic functions as these can be studied first of all in *animals*. In the inaugural edition of the journal *Educational Psychology*, Thorndike declares that “Psychology is the science of the intellects, characters and behavior of animals...” –adding as if an afterthought “...including man” (1910, 5). In his groundbreaking dissertation research on animal intelligence, Thorndike confined with cats, dogs and other animals to his “puzzle boxes,” timing their repeated attempts to access food by pressing on a lever or pulling on rope. From this, he established the first of a number of his “laws of learning” (Thorndike, 1911, 244-245). This law states that “[responses] accompanied or closely followed by satisfaction to [an] animal will, other things being equal, be more firmly connected with the situation, so that, when it recurs, they will be more likely to recur” (1911, 244).

Human and animal are subject to this same law, and recurrence here is key. Thorndike used the animal’s confinement as a recurring situation, defining it as a function or variable directly related to the rapidity of the animal’s response. Ultimately, these variables of repetition and rapidity were seen to apply to more complex tasks carried out by human animals as well. In *Education: A First Book* (1912) Thorndike refers to studies of “practice at typewriting by the ‘sight’ method” and “reading and tapping out the telegraphic language” (106, 107) to illustrate how the same exponential relation holds for recurrences and rapidity of response (figure 3). Recurrence in this case takes the form of hours or weeks of practice, and rapidity of response corresponds to letters or strokes per minute.



[Figure 3: “Curves of practice” for sending and receiving telegraphic messages (left) and for two individuals “in typewriting by the sight method” (right).]

A number of important elements of the contemporaneous configuration of education and mediation coincide in these “curves of practice.” First, as measures, these curves are based on capabilities (typing and sending and receiving telegraphic messages) that are clearly secondary or tertiary to competencies central in conventional education (e.g. reading, writing, mathematics). But because “letters per minute” and “strokes per minute” can be accurately quantified at discrete points in time, these performances serve as a measure for education or “learning” in a much more general sense. In the age of psychophysics, as Kittler observes, a “subordinate mental function becomes the most fundamental [simply] because it is quantifiable” (1990, 208).

<sup>5</sup> Ebbinghaus is credited as the first to describe the exponential relationship between learning and time that was later referred to as the “learning curve;” Thorndike made it one of the foundations of a psychology of education from his 1898 dissertation onwards.

Second, there is the conspicuous role of the typewriter and telegraph in these measures. These (contemporaneously) “new media” are used by Thorndike in a manner similar to Ebbinghaus’s use of nonsense syllable sequences. Both allow for an objective, repeatable quantification of performance in terms of their combinatorial and aleatory characteristics, and through the deliberate exclusion of questions of meaning and metre. As media, both telegraph and typewriter have the same ultimate effect of replacing elements constitutive of the subject –elements such as meaning, the writing hand and the writing body—and replacing them with something as arbitrary as “the spaces between elements in a system” (Kittler, 1999, 15). These include, of course, the spaces separating letters on a keyboard, or spaces between ciphers transmitted along a telegraph line. Writing thus ceases to be “the expression of individuals ...the trace of bodies” or the consequence of their intentionality, and becomes instead the result of formulaic “forms, differences and frequencies” (Kittler, 1999, 16).

Thirdly, Thorndike’s “curves of practice” illustrate the function of graphical and visual representations in the era of psychophysics –one very different from their role in the discourse network of 1800. Images no longer accompany a text to provide aesthetic illumination, or to intimate that which lies beyond verbal description. Instead, Thorndike’s charts delimit –in a manner deliberately eschewing decoration and ambiguity—the simple but universal “truth” of the relationship that connects performance and time: the former increases as a logarithmic function of the latter. The certainty and universality of the truth thus communicated is similar to that schematized in the binary trees of Petrus Ramus. Neither delimit truths that recede ever more deeply into the obscurity of an inner world. Instead, the truths presented in both are manifestly overt, capable of being communicated exhaustively through collections of discrete data points.

Finally, these curves of practice and forgetting are illustrative of education configured in ways that anticipate Kittler’s (2004) vision of the mediatic reunification of the faculties and activities of the university. Understood as the relationship between two (or more) experimental variables, education is no longer separate from natural science; psychology as “the science of the intellects, characters and behavior of animals, including man” provides the basis –in the form of a series of indubitable “laws”—for the deployment of pedagogy as pure technique. Education, as Thorndike himself argues, becomes the handmaiden of experimental psychology: “To an understanding of the material of education,” Thorndike states, “psychology is the chief contributor” (1910, 6). Pedagogy thus becomes a question of creating conditions that are causally related to desired results:

Any problem of education may be put in the form: ‘Given a certain desired change in a man, what situation shall we create to produce it, either directly or by the response which it provokes from him?’” (1912, 55-56).

Education no longer has any relation to subjectivity and interiority; as Kittler says, there is “no universal norm (inwardness, creative imagination...) transcending the particular functions” (2004, 214) whose efficiency are now to be maximized through education.<sup>6</sup>

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<sup>6</sup> Elsewhere, Kittler explains the relationship between physiological studies and subjectivity as follows: “The hard science of physiology did away with the psychological conception that guaranteed humans that they could find their souls through handwriting and rereading. The “I think,” which since Kant ...became obsolete as soon as body and soul advanced to become objects of scientific experiments. The unity of

Education instead becomes a set of techniques for producing desired changes or responses –and such changes or responses, by definition, are those which can be quantified as readily and reliably as possible. As Kittler has already been quoted : “If and when the old humanities deal not with man, their topics are cultural technologies such as writing, reading, counting, singing, dancing, drawing” (2004, 251). And as another old humanities subject, for the case of education, we might well add to Kittler’s list the cultural technologies of typing, telegraphy, and other mediatic contexts of physiological performance.

### **Conclusion: The University made Whole?**

As indicated above, the mediatic paradigm shift represented by the victory of psychophysics on both sides of the Atlantic has the effect of setting the university back on the path to integration on the disciplinary level. Far from being a *Geisteswissenschaft*, education has been redefined as a “learning science.” the study of “the internal mechanisms that govern learning across ages and settings” (Bransford et al, 2000, 212). A similar reunification is evident on the mediatic level as well; and this is illustrated (again) in the use of typewriter and telegraph as examples for Thorndike’s “curves of practice.” If the typewriter, as McLuhan writes, “fuses composition and publication” (1964, 260) then the telegraph can similarly be said to combine dissemination with mediatic encoding and decoding functions. In the case of both telegraph and typewriter, the pedagogical process (i.e. the exercise of techniques of practice to increase performance) is reinscribed into a discourse network of composition, encoding, decoding and dissemination. The student, in other words, is re-installed as a producer and transmitter in a media system, rather than having this production confined to an academic “arena” of the seminar. The student is reintegrated into a position similar to the one he occupied in the pre-Gutenberg university. He is again placed “into the field of book [and information] production in class time,” to quote McLuhan’s description of the medieval student. But instead of functioning as “a copying machine at almost no cost” (Kittler 2004, 252), the present-day student is reinstalled –particularly with newer Web technologies—as a generator and processor of content, writing their own public blog postings or contributing (in an editorial or other capacity) to the open source knowledge repositories such as *Wikipedia*.

If the medieval student’s work as a kind of low-cost “copying machine” placed him in a cloistered scriptorium, then the current mediatic conditions necessitate a comparable confinement for the contemporary student. If education is a question, as Thorndike says, of techniques that would produce desired changes in either human or animal, the student is then best situated where these techniques can be most carefully controlled. Although Thorndike (unlike B.F. Skinner) stopped short of adapting his animal “puzzle boxes” for human use, he presciently understood the role that technology could play in realizing a pedagogy reduced to pure technique:

If, by a miracle of mechanical ingenuity, a book could be so arranged that only to him who had done what was directed on page one would page two become visible, and so on, much that now requires personal instruction could be managed by print. (Thorndike, 1912, 165)

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apperception disintegrated into a large number of subroutines, which, as such, physiologists could localize in different centers of the brain and engineers could reconstruct in multiple machines” (1999, 16).

This miracle of mechanical ingenuity –one that would closely control a student’s progress based on their performance– was realized first in Sydney Pressey’s machine for “drill and practice,” and later in B.F. Skinner’s “teaching machine.” In each case, the student is positioned in front of a machine –an instrument sometimes compared to a typewriter—placed on the desk before him or her. The student would scroll through and answer questions, with each answer being recorded, and serving as a basis for controlling the student’s subsequent interaction with the machine. Still later, digital technologies allowed even more elaborate means of controlling the “situation” of the student –often by means of sophisticated branching structures effectively representing “executable” Ramean trees. In these scenarios, the computer (or other device) presents a means for carefully controlling conditions presented to the student as surely as any cage or puzzle box.

The mediatic reintegration of the university –and a kind of return to Ramean method– is also presaged in Thorndike and Ebbinghaus’s use of visual and diagrammatic representation in the form of “curves” of practice and forgetting. Like the student whose learning is installed in the network of transmission, reproduction and generation, new media for charting learning are able to generate and transmit this information endogeneously within the system. Updatable in real time, these “live” visualizations of learning performance have the potential to be transmitted directly to the student, allowing him or her to maximize performance efficiency on the spot. Writing on Internet technology and school reform in *Educational Psychology* almost one hundred years after Thorndike, one researcher imagines:

Data generated as learners use [specialized networked software] ...can be analyzed, aggregated within and across episodes and learners, and reported back to all parties engaged in school reform with a very short delay. In the same way as my stock portfolio can be updated every 20 min[utes], learners, teachers, and researchers can have data upon which to make on-the-spot adaptations. (Winne, 2006, 14)

Computers and their multimedia capabilities allow the student to not only see how their practice may have improved over time, but also to chart it as they perform, closing the systemic loop by providing a kind of adaptive and instantaneous bio-feedback.

The university as a media system has indeed come full circle: it is now progressing towards a kind of reintegration, on a disciplinary and technological level, through a gradual historical movement of alienation, contradiction and reconciliation, following not the necessity of spirit, but the situation as it is determined by media. The question, of course, is whether the resulting whole is the truth, or whether, with Adorno, we may wonder whether “the whole is the untrue” (1983, 57).

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