# From Discourse Networks to Cultural Mathematics
## An Interview with Friedrich A. Kittler

*John Armitage*

### Discourse Networks

*John Armitage*: Professor Kittler, I would like to begin this interview by asking about your youthful scholarly interests. Were they exclusively concerned with German philosophy? How, for example, did you make your own transition into the academy?

*Friedrich A. Kittler*: My youthful intellectual interests were not wholly involved with German philosophy. However, it is true to say that one of the main reasons why I attended the University of Freiburg was because of my reading of the works of Martin Heidegger and because of his connections with Freiburg. As to my shift into academia, it is perhaps important that your readers know that I was born in East Germany in 1943 and that I still have some dim memories of the Second World War and afterwards when the Red Army was all around. And, of course, in East Germany during the 1940s and 1950s, it was very difficult to obtain a university education under that particular government, especially, as in my case, when one's parents were socially at odds with the regime. That is why my parents left East Germany in 1958, to give me the chance to have the best German university education possible. Moreover, this experience probably explains why I was such a keen student at university and why this separated me to some extent from my many friends, who simply went there on the understanding that it was their right to do so, or as a kind of hobby. For, unlike them, I was really engaged with the university. Yet I am grateful to my father not only for the fact that I began my life in East Germany but also because I was able to enter the university system of West Germany.

*JA*: How would you describe the main thrust of your philosophical work in literary history and criticism today?

*FK*: In recent years I have come to think of myself simply as a philosopher who, nevertheless, is keenly interested in the reality of things, as opposed to a philosopher who reflects on reflection, as it were. As for my interest in literary history and criticism, and particularly in my youth, it began as a way of getting around the difficulty of saying things in my own name. This was because, in Germany in the 1970s and 1980s, one had always to pretend that what one wrote had been written down in some book one had consulted. So my work in literary criticism was not only a pretext but also a historical necessity which, all the same, permitted me to talk about German poets whilst saying things I wanted to state in my own name but did not dare to articulate. You may ask why it was so difficult to say things in my own name. Well, apart from the fact that I am a shy person, it was very hard during that time in Germany to move beyond the study of dialectics and the self's relation to itself. Consequently, I had to cover up all I wanted to say with nice stories about young German poets. In other words, my work in literary history and criticism began as an attempt to find a way of talking about transitive relations between selves, rather than reflexive relations of the self, relations constituted by, for example, fascination or love. As Jacques Lacan in his later years put it, he read great philosophers only for their theory of love. This then was the start of my interest in philosophy, literary history and criticism.

*JA*: Your writings, at least in the English-speaking world, are primarily associated with your conception of *Discourse Networks, 1800/1900* (1990). What are discourse networks and why are they so important?[1]

*FK*: The concept of discourse networks arose out of my work with people at Stanford University and the University of Chicago in the United States. They created the term in response to the problem of translating the original and somewhat idiosyncratic German title of the book, which was *Aufschreibe-systeme 1800/1900*. I took the notion of *Aufschreibesysteme* from a very famous book written by a German madman and former civil servant, Daniel Paul Schreber (1955 [1903]). By appealing to the notion of *Aufschreibe-systeme*, the madman sought to imply that everything he did and said within the asylum was written down or recorded immediately and that there was nothing anyone could do to avoid it being written down, sometimes by good angels and occasionally by bad angels. Naturally, my German university tenure track controllers knew of the madman's text and its context, and also that I had written the book in order to obtain tenure. So my choice of *Aufschreibesysteme 1800/1900* as the title of my book was considered quite unusual at the time, if not a little provocative, since it was not the done thing to take the title of a tenure track book from the text of a madman.

The idea behind discourse networks was very simple at the time I developed it, even though I was later asked to write a methodological After-word to *Discourse Networks, 1800/1900* in order to elucidate its importance. The concept of discourse networks is essentially a free application of Claude E. Shannon's (Weaver and Shannon, 1949) information theory. Hence Shannon's theory, founded on information source, information channel and information receiver, that is, on informational inputs, transmission and outputs, is the engineering or technical model behind my literary experiment. *Discourse Networks, 1800/1900* is, however, also deeply influenced by Michel Foucault. But at the time I was writing my book, and I do not think that this is a mistake, it occurred to me that what is wrong with Foucault's *The Order of Things* (1970) is that it merely describes the *production* of discourses. There are, for example, no descriptions in Foucault's book of the *source* of these discourses, of the *channels* or the *receivers* of discourse in the form of, let's say, readers or consumers. So my idea was very simple. I just thought about the source of two discourse networks and not about any particular discourse networks in history. As a result, my work focused initially on 1800 because it seemed to me as if a certain idea of the mother's mouth, of the mother as principal educator, produced a re-examination of maternal power in 1800 and also a transformation in what I called the materiality of acculturative speech. The new kinds of books that started to emerge and which entrusted mothers initially with the physical and mental education of their children, and then their alphabetization, are evidence of this transformation. This insertion of mothers into the source of discourse was the prerequisite for the production of classical poetry, with the mother being the earliest Other to be appreciated by the philosophers of poetical hermeneutics. But, in 1900, I thought the source of the discourse network was created arbitrarily, as a source of noise. Consequently, the first problem was to filter noise from signals. Obviously, one also has to ask the question as to which people care for this kind of discourse network. But I must admit that I had difficulties in answering this question in terms of constructing some kind of consumer stage at the end of the process. So, desperate as I was, I took some desperate writers and poets from the turn of the 19th and 20th centuries, such as Friedrich Nietzsche and Christian Morgenstern, as my examples of the consumers of the discourse network, or, perhaps more accurately, as the abusers of the discourse network. Yet the idea of discourse *networks* was that of the synchronous relations between institutions. In 1900, for instance, my feeling was that institutions like psychiatry and psycho-analysis were institutions of selection, institutions where the distinction between noise and signal was made in a manner that was simply not the case in 1800. Discourse networks are therefore discourses of institutional power and of selection and it is here that my own writings concur with those of Foucault in *The Order of Things*.

*JA*: Would it be accurate to say, then, that the poststructuralist philosophy of Foucault and perhaps Heidegger's phenomenology are the two main

influences on your own literary history and criticism in *Discourse Networks, 1800/1900* and elsewhere?

*FK*: Foucault has been so influential on my writing because he was a philosopher who ventured beyond the mainstream in order to comment on other philosophers, as in the work of Jacques Derrida. Moreover, Foucault had read all kinds of interesting people on the Sanskrit language, on psychiatry and technology. And this was so important for my work because it helped me to obtain an understanding of reality. But before I discovered Foucault, and I think I was amongst the first in Germany to do so, I should also mention the influence of Jacques Lacan, who remains a significant inspiration and of whom we can speak about later. For me, the import of Foucault and Lacan rests on the fact that their writings are two possible ways of returning to Heidegger without naming him. One has to remember that in Freiburg, that fabulous university town where I grew up and took my first academic steps, there were whole bunches of slightly older people than myself who either hated Heidegger or who loved him too much. Indeed, many of those who loved Heidegger too much never came out of his intellectual shadow in that they simply imitated his language and read and wrote books in a Heideggerian manner. So my idea was to maintain a critical distance from Heidegger so that I could follow my own path. This was in part because there were people that I knew whom Heidegger, who was retired at the time but whose presence and influence were ubiquitous, had broken, if not intentionally. For example, I really knew people who, after an interview with Heidegger of just one hour, never finished their PhD because his questions and answers were so brilliant.

Nevertheless, one difference between Heidegger and Foucault is that Foucault has little to say about the question of technology. Actually, Foucault even said as much in his late birthday conference lecture, a lecture I did not attend but which I did manage to obtain, in the form of a type-written transcription. In that lecture, Foucault comments that Heidegger had for the most part brilliantly handled the relationship between man and singing, and singing in the history of Being in Europe, and especially regarding the increasing technologization of that relationship which continues today. Accordingly, and rightly so in my opinion, Foucault (1997: 223–51) began to turn to the problems associated with 'technologies of the self'. However, it is important to remember that he did so in relation to Heidegger. Foucault's lecture is also interesting, if chronologically inaccurate, because it emphasizes that, while the invention of the personal computer (PC) is an important contemporary development, we should not overlook the invention of the aide-mémoire in the form of a wax tablet, which was an equally significant discovery in ancient times. As to the origins of my own writings, unlike some philosophers, I cannot write purely theoretical papers, that is, papers without any historical content. I need to be able to communicate with my own sleeping ideas, with my intuition, or to have something to look at or some problem to consider.

*JA*: To what extent was the research on *Discourse Networks, 1800/1900* an 'innocent' research programme? Or was it one that explicitly set out to challenge the predominant role of hermeneutics in Germany, with the aim of instituting a kind of post-hermeneutic criticism?

*FK*: The research programme was not so much innocent as it was a manifesto against interpretation, and against those who had tried to persuade me of the value of hermeneutics but who had failed. So this was the reason I turned to Foucault. But in the beginning even Foucault only imagined discourse analysis as a way of mining, of analyzing family systems and history. And, as soon as he discovered that discourse analysis could be used politically, such as describing the university system, for instance, he became afraid. This was also my whole trouble in Freiburg at the time. But when I wrote *Discourse Networks, 1800/1900*, I didn't even recognize that it was an aggressive book. I learnt that afterwards when people told me. My explicit intention was to write a book bottom up rather than top down. For example, I began with a series of quotations that I had typed out. Then I commented on the quotations before bringing both the quotations and my comments together in order to produce a running story out of the whole, using Shannon's model. Yet the idea behind *Discourse Networks, 1800/1900* that was disturbing for some people was that I was the first reader of this material who took everything literally. I had no interest in stating or using metaphors at all. Nor did I wish to pursue an ideological study either against or on behalf of German poets, whether they were Catholics, atheists or Romantics. I was so sick of ideology. It is and has been my belief that my work is not concerned with interpretation because it is not me who is speaking or writing but the texts themselves. For instance, every academic at some time has to give a conference paper but usually one has no idea what to say. But in the case of love and happiness, and at different times in my life, I have had some conception or other about these topics and such ideas can be objectified and can be almost proven, even in the shaggy field of literature. I can explain it to you through the case of the poet Friedrich von Schiller, where I really made various discoveries, and people from the most conservative hermeneutic side afterwards said to me: 'It is very strange that it took 200 years to discover these things in Schiller. But you did it. Why?' I told them that I did not set out to make such discoveries since it is impossible to embark on a journey in this way. As Picasso always said and Lacan quoted him, you can't search for something. Either it is there or it is not. So you can only find it. But the suspicion was strong in me that outside the text there was some relation to the inner text, to the text's inner content, some strong connection that was faraway, objective and historical. In the case of Schiller, for example, I showed him to be someone quite different from his traditional image.

*JA*: An important component of your theoretical work involves a synthesis and development of the poststructuralist texts, not simply of Foucault but also of Lacan and Derrida. What are the connections between your own

philosophical concerns and those of poststructuralist psychoanalysts such
as Lacan or philosophers and literary theorists like Derrida?

*FK*: For me, Lacanian psychoanalysis was a way out of Freudian psycho-
analysis. Yet, to begin with, reading Lacan caused arguments between my
wife and me, as she wished to remain professionally faithful to Freud. But,
like me, she was also fascinated by Lacan's work, and especially after he
visited us once for a weekend (Kittler, 2004: 119–26). This came about
largely because Lacan wanted to be influential in Germany, in the country
of Freud's mother tongue. However, when Lacan saw how very young and
how lacking in influence we were at that time in German intellectual circles,
he was most disappointed. Still, we did our best with friends in Berlin to
promote Lacan's writings and for some time we worked together with him
and against hermeneutical thinking in Germany which gave our work a
political edge. Today, of course, it is hard to grasp how utterly influential
hermeneutical thought was in the Germany of the 1970s and 1980s. So, for
me, Lacan's writings were an important way out of questions of subjectivity
and self-reflection. For his work did not position the ego at the heart of things
and parents as peripheral images as in Freudian psychoanalysis. Rather,
Lacan looked at the parents, what they said to their children and how effec-
tive parental discourses were on their offspring. And it was this kind of
Lacanian perspective that took centre stage both in my PhD (Kittler, 1977)
and in my subsequent work on discourse networks. For example, in
researching *Discourse Networks, 1800/1900*, I looked for a German poet who
had had concrete personal experience of madhouses. Moreover, I not only
found such a poet but also the diaries that his mother wrote about him when
he was a very young child and already possessed of a poetic temperament.
I was also able to corroborate these experiences and diaries, as the family
was very well known and influential in the city of Zurich. So it really was
possible to produce a Lacanian psychoanalytic reading from the poet's work
and from his parents' discourses, discourses that were so badly edited that
no one read them, even though I found them captivating. But of course
Lacan's position nowadays within the German university system has been
tarnished somewhat by his supposed French friends and relations publish-
ing politically oriented and shoddily produced collections of his work.
Hence Lacan's influence has slowly declined in Germany.

    As for Derrida, even he was totally despairing of the fading of Lacan's
academic impact but there was no way for him to fight against it either. The
French appear to have created a global business out of sincere people such
as Lacan and Derrida. And so, unfortunately, poststructuralism has become
for me a kind of worldwide industry. In spite of this, Derrida and I liked each
other very much and he was very helpful to me in my early career when I had
problems in Germany with the publication of *Discourse Networks, 1800/1900*.
In addition, we had a long exchange on the history of copyright, as both
Derrida and I wrote against the idea of intellectual property, an issue that I
believe will only become more dramatic in the European Union in the next

few years. Derrida was, for instance, keenly interested in my writings on the discursive effects of intellectual property and my insistence that it is not just a complete invention, which it is, but, crucially, a very *recent* invention in European history. Indeed, a friend of mine wrote a wonderful unknown book on intellectual property and Derrida helped us with large parts of it.

Nonetheless, although Derrida and I agreed on a great deal in the field of contemporary literary and philosophical history, I found that when it came to discussing ancient Greek history, Derrida had no idea at all about the actual historical or philosophical contexts he considered in his writings. It is for this reason that I have reservations about Derrida's historical interpretations of philosophers such as Plato. For, unlike him, I had a well-founded training in history. It is this deep sense of history that is sometimes lacking in the case of Derrida and which is not lacking in the case of Foucault. In the famous battle between Derrida and Foucault over Descartes, then, I had to be on Foucault's side as he was the historian and Derrida was only an interpreter. Furthermore, in my estimation, Derrida had little awareness of time and space. For example, I have always wondered how different people can be and live in the course of history, in the depths of time and space. Let us say, for instance, that one travels to Sri Lanka and meets there a 10-year-old girl on a country road. One of course tries to speak a kind of gesture language with her, as neither participant is fluent in the other's tongue. But what one senses at that moment is a *total difference* of culture not merely in time but also in space. And, for me, Derrida never realizes this strongly enough. In fact, he writes as though we could talk to Plato if he were here in front of us. Yet the truth is that we would not be able to do so. Thus, the problem is that Derrida sometimes jumps so deeply into the texts he writes about that he misses the most crucial point. He does this, for example, in his long commentary on Rousseau on the voice in *Of Grammatology* (Derrida, 1967) where he fails to spot the most important thing, which is the link Rousseau makes between the voice and melody.

*JA*: Is the most crucial element of your own texts their assumption of exteriority, of a 'thinking of the outside' wherein the object of study is not what the text means but by what means the text is inscribed? Would it be correct to portray this perspective as a sort of 'inscription analysis' focused on materials and marks, mechanisms and technical media?

*FK*: Let me explain. In my writings, one of the most important ideas is that there are no such things as thoughts. There are only words. Literature is not an island but stands in relation to the external field of technical media. And so my research has led me both beyond and back to literature. It is only in my later intellectual existence, for example, that I have recently returned to the study of Greek odes and to Homer in particular. But my aim is to consider how literary thought and poetry began in Europe, as for me this is an important question today. What is it that makes Homer much more beautiful, for instance, than any other poet in the world? This is an issue

that preoccupies me and which has yet to be answered. But to return to your question, I am certainly not against meaning, we all have to cope with meaning. However, if we take a lead from a philosopher like Gottlob Frege, we can begin to distinguish between meaning and significance. For Frege argued that the morning star and the evening star have a different meaning but the same significance. And I liked Frege's illustration from 1905 or at least I did until I discovered that it was none other than Pythagoras who made the identification of the morning star and the evening star being the same star. So if we accept this image of the star literally, we can say that the external aspect is the morning star and the internal aspect is the evening star. Take the case of Schiller's early drama, which I have deciphered. Is it not fundamental that Schiller was born in a particular place, near Stuttgart, and Johann Wolfgang von Goethe was not? Or that Schiller was educated at an elite school founded by a prince? These things are inscribed in Schiller's texts. But no one before me remarked upon these facts (Kittler, 1984: 241–73). Yet surely it is clear that Schiller was produced by means of the institution that was his school and by his teachers. Think of Kittler's or Armitage's school or academic careers and how we were both produced by our schools, by our universities and by our lecturers. We are then the effect of these external or outside discourses. That is not to say that everyone agrees with my perspective. For instance, when I got an invitation to attend a big conference in Berlin a few years ago, an extremely famous literary critic got very angry with me personally for stating that we are literally taught the alphabet through a sort of structural violence. For him, the idea that we are inscribed in this way was unbearable. But I cannot see it otherwise. How else would I have learned the alphabet? I certainly would not have learned it on my own accord. In fact, without being subject to this structural violence, I would still be a 5-year-old boy.

*JA*: Critics of *Discourse Networks, 1800/1900* might say that the idea of 1800/1900 implies a kind of binary thinking. Why are there only two discourse networks and not many? Or is this just the result of what might be termed your declamatory writing style?

*FK*: The fact is that at the time I was writing *Discourse Networks, 1800/1900* I had very limited knowledge of the materials I was working with. But since then I have become much more acquainted with them. Actually, I have discovered the possibility of the development of perhaps hundreds of discourse networks. For example, and taking a totally internal interpretation of the texts, I have over the past year studied some papers written by ancient Greek schoolboys that I stumbled upon. And I have analyzed these papers in exactly the same way as I examined Schiller and so on in *Discourse Networks, 1800/1900*. The end result is that I could now write another *Discourse Networks, 1800/1900* based on these papers of ancient Greek schoolboys and their relationship to Aristotle's (2004) *Poetics*. The interesting and important thing about this research is of course that nobody else

has investigated ancient Greece in this way before. Classical Greek scholars, for instance, do not employ my methodology or think along these lines. Yet for me it is crucial to focus on the basics, on the reality, for instance, that Aristotle had to learn to write and to read and that all this went into his conception of what a word is, what a syllable is, and what a phrase is. So today I could, if I wished, use the papers of these Greek school-boys together with Aristotle's *Poetics* to describe the existence of a discourse network that was functioning over 350 years BC. And this I shall do one day. But I cannot imagine the culture and civilization of antiquity unless I hold the facts, or even the artefacts, in my hands, artefacts and information that can take a long time to search out and acquire. In this sense, I am not interested in divining or imagining the facts of antiquity but in proving things about or in relation to them. On the other hand, your criticism of my work is totally correct. For *Discourse Networks, 1800/1900* is a somewhat messy and idealized text. It was produced in part for the sake of Foucault. My aim was to leave out the whole of the middle of the 19th century in order to be able to distinguish between two separate periods of literary history. Nevertheless, *Discourse Networks, 1800/1900* was a methodological shock both for my readers and for my colleagues. To be sure, some of my colleagues were so deeply sunk into a kind of narcissism focused on the slightest difference between, for example, Goethe and Schiller, that they found my work incomprehensible at first.

Regarding what you call my declamatory writing style, this I think is also a hangover from my admiration of Foucault. My style is then quite the opposite of the Oxbridge style where English philosophers always begin by asking questions of themselves and each other, such as, what are we doing when we do philosophy? Unlike mine, therefore, their style is much more that of polite colleagues taking tea with each other in an Oxford college. So, as you have said to me in the past, when I write for instance in the opening words of the Preface to my *Gramophone, Film, Typewriter* (Kittler, 1999: xxxix) that '[m]edia determine our situation', I do so largely for myself. That is, I tend to exaggerate in order to get the point across as well as to induce in myself the courage to write a book! This is because the truth is that I find it terribly hard to start a book whereas I find it incredibly easy to begin an article. But starting a book is so madly difficult.

## The Military-Industrial Complex

*JA*: In addition to discourse networks, another central theme of your theoretical work is associated with the military-industrial complex. Why is the militarization of contemporary culture and society so important for you?

*FK*: There are two reasons for my interest in the military-industrial complex. First, from early childhood, my mother often took me to the site in East Germany where Hitler's V2 rockets were developed during the Second World War. However, what fascinated me most about these sites and rockets was the fact that no one said a word about them. And yet, the traces of this

particular aspect of the German military-industrial complex, which was located on a very romantic and idyllic island in order not to be seen, were everywhere. And so I had to find my own explanation for this hidden part of history. But it was difficult to do so because it was almost forbidden to talk about the military-industrial complex in East Germany or even to speak about the German side of the war effort more generally, and especially anything that touched on the technological side of the war. Consequently, my first motivation was to try to discover something about the time from which I came. For example, although I lived in a very small town far away, I did see the fires over Dresden at night, even if this is a dim memory for me today. Nevertheless, in my official life as a writer, my awareness of the military-industrial complex came rather late. In fact, the second reason for my curiosity about it only arose after I visited California and was confronted by the awesome might of the American computer system, a topic that we can pursue later.

*JA*: In 'Media and Drugs in Pynchon's Second World War' (Kittler, 1997: 101–16) and other essays, your deep concern with the military-industrial complex often appears to coincide with the writings on this topic of Paul Virilio, as in his *War and Cinema* (1989). In what ways, if at all, does your conception of the military-industrial complex correspond with that of Virilio or are there other factors that are equally or more significant for you?

*FK*: The idea of researching the military-industrial complex came to me like a positive shockwave in California, when I arrived in Berkeley, to meet various people I knew but at that stage only through the exchange of letters. And it was in Berkeley that one of the people I met there presented me with a copy of Thomas Pynchon's (1973) *Gravity's Rainbow*, a book which impressed me greatly. This was not just because Pynchon discusses V2 rockets but also because the book lifted a kind of dark veil from my eyes concerning my own childhood experiences with V2s. So it was this event that alerted me to the intellectual significance of the military-industrial complex in addition to its experiential importance for me personally. And Pynchon's book is so marvellous that I still return to it on a regular basis.

As for the connections between my work and that of Virilio, I would say that we are linked more by friendship than we are by singular or mutual influence in our writings. However, it is true to say that Virilio's *War and Cinema* heavily influenced my later work because he obviously knew so much more about the military history of cinema than I did at the time that his book was published. On the other hand, when I first met Virilio, he was 60 years old and I was in my 40s. Moreover, I was writing computer source codes day and night, a form of writing that Virilio has no idea about or has had any experience of. Thus, a key difference between Virilio and myself is that I like to write only about those things that I have actually carried out in practice. But, as you know, Virilio is not alone in this, as, to my despair, many of today's media theorists write lengthy books on computing or on the Internet without any concrete experience of how these things actually work.

With regard to further issues, let me be open and frank about my understanding of the military-industrial complex. For one thing, I am not one of those theorists who despise the German *Wehrmacht* and its military operations. There has, for example, been much talk recently of the brutality of the *Wehrmacht* in the Russian campaign during the Second World War and I understand that. Nonetheless, it is obvious not simply to Virilio but also to me that the real riddle of the Second World War is how was it possible for Hitler's *Blitzkrieg* to conquer the whole of Europe, except Finland, in two years? This to me was an *incredible* event. Then, again, what interests me today is that Hitler's *Blitzkrieg*, the strategy of 'lightning war', is still in use. Many of Israel's recent victories over its neighbours, for instance, are clearly based on the *Wehrmacht* model in terms of their utilization of surprise and speed. Indeed, much the same could also be said of the US war on Iraq in 2003 and the 'shock and awe' attack on Baghdad in particular. As Donald Rumsfeld, the US Secretary of State for Defense, put it, the American assault on Baghdad was the first *Blitzkrieg* in history that actually made it to the enemy's capital. Clearly, Rumsfeld was making an allusion to the fact that, during the Second World War, the German *Wehrmacht* took Kiev and almost took Leningrad but failed to take Moscow. In this sense, the *Blitzkrieg* not only was but also remains a significant historical event.

*JA*: Virilio argues that war is his 'laboratory' and for you too war, it seems, is the 'mother of all technologies'. Yet, unlike Virilio, you are deeply concerned with war as an international mechanism of technology transfer. What, for you, is the significance of, for example, the transfer of technologies such as Nazi Germany's V2 rocket programme to America after the Second World War?

*FK*: What I can tell you is that I believe that war is at least the mother of all high-speed information and communications technologies. Like Pynchon, I am very interested in the topic of technology transfer. The key question for me is, what technologies or which kinds of technology transfer gave rise to the contemporary American Empire? Obviously, the first source of the American Empire is the British Empire which was originally driven by a coal-based fleet system but which has, since the Second World War, been transformed into an oil-based system founded on air power. Naturally, the second source is Nazi Germany, which made great strides in the technological development not merely of the V2 rocket but also of the tank. For instance, by 1939, Nazi Germany was the only country in the world that had a radio in every one of its army's tanks. Otherwise the *Blitzkrieg* simply would not have been possible. Of course, it did not take long for the Americans to adopt this idea and by the end of 1942 there were radios in US tanks. But, as we have discussed before, war also has a way of transferring its language too, as when today's high-technology businesses in particular speak of 'logistics', 'strategy' and even of 'duty officers', terms which all arise from the military-industrial complex. It is for these and other reasons

that I think that US President Dwight Eisenhower spoke brilliantly when he coined the term military-industrial complex, for he saw immediately the connections between war, technology and commerce. However, it is difficult for us Europeans to investigate American military and technoscientific history, a subject that has been well researched by the Americans themselves, as acquiring even declassified documents on the Second World War, and so on is still very hard, as I know from long experience. Yet I must confess that I cannot stand on American soil with much pleasure. In fact, my antipathy to America is one of the main reasons why I often avoid talking about the military-industrial complex since for me to talk about the devil is to talk with the devil. As a good friend of mine said to me lately, we in Germany should not say a word about America's war on Iraq or speak any longer of the seemingly endless necessity of reforming Germany. We should not so much forget all this as not talk about it. Instead, we should focus on changing ourselves and speak about other things. So I asked him what we should discuss as an alternative and he answered that we should talk about love in Europe.

*JA*: Yet, in your writings on the military-industrial complex, one cannot help feeling that whilst you seem to deny agency to people, you are quite happy to give agency particularly to military technologies, which you describe as being at war with each other. Would it be correct to say that, in giving agency to military technologies, you secretly enjoy the idea that they will perhaps one day become autonomous?

*FK*: For me, it is not a simple matter of refusing human agency. Rather, I think that it is a good idea, and an idea that I have found to be true, that military and media history can be told, at least partly, as the story of a series of steps of escalation where one innovation in technology really does triumph over its forerunner. Consider, for instance, the case of Hitler's invention of the fast, technologized armoured units of the *Panzer* army that smashed through France's border fortifications, the Maginot Line, during the Second World War. Another way of approaching it would be to take the example of the English mathematician, Alan Turing's groundbreaking work on cryptography at Bletchley Park against German tanks and submarines. Did this work not lead to the next step of escalation, the invention of the computer? So in both these instances I would say that the shift from telegraphy to tank radio to computer and on to the interception of coded radio commands was not a simple story of free human agents fighting against each other but also the story of military technology. From my point of view, people are far too anthropomorphic when it comes to discussing technology. For military and media technologies especially really do overtake each other. What is more, the history of technology is not a history of continuous unfolding but a history of shocks and jumps. As Foucault says ironically somewhere, history is a series of jolts that can usefully be compared with the stroboscopic lighting effects one encounters in a discotheque. Foucault's is

therefore an image I like very much because I enjoy the idea of the sudden flash and then the appearance of a steady state, the latter of which it is obviously not necessary to describe. And so my work on the military-industrial complex is not interested in the details of people's lives or how it really was, for example, in the Weimar Republic as this would take up too much of my writing time. Undoubtedly, the relationship between human agency, technology and autonomy is a complex one. Yet one of Heidegger's most wonderful historical ideas, which no one in Germany except me has taken up, is his proposal that the history of being, the relation between the world and I, is also a history of shocks and jumps. Was not Christianity a surprise for Europe or Rome a technological leap after Greece? As Heidegger wrote in his essay on Parmenides, the ancient Greek philosopher who stimulated his thought on the typewriter, whether or not we personally ever use the typewriter is not important. What is important is that all of us are thrown into the age of typewriting, whether we like it or not. Of course, Heidegger himself preferred to continue his work in his own handwriting.

*JA*: Apart from Heidegger, there are a number of other German conservative revolutionary writers and controversial theorists from the Weimar period who feature in your work on the military-industrial complex such as Ernst Jünger and Carl Schmitt. Why should English-speaking readers consult these authors today? What do they have to tell us about our contemporary cultural, social and political condition, such as the US war on Iraq?

*FK*: Let us begin with Jünger. There is no question that sometimes he was a bad writer but, for me, Jünger was a wonderful person because he was someone who lived through it all, both the worst and the best. As you know, Jünger not only really knew how it was in the trenches of the First World War but also knew most of those very brilliant German generals who were stationed with him in occupied Paris during the Second World War. Besides, Jünger was one of the first people ever to take LSD, and, of course, being Jünger, he took it together with Albert Hofmann, the Swiss inventor of LSD. So, for me, Jünger was first and foremost a very courageous man. And, as I myself am not so courageous, I sometimes look to him for some help in this regard. As to his work on the military, technology and industry, then it would be true to say that I like almost all Jünger's writings on these topics. It is, for example, easy for me to appreciate his work on concepts such as 'total mobilization' (Jünger, 1998: 119–39; Armitage, 2003: 191–213). Also, we should not forget the connections and interconnections between Jünger and Heidegger (1993: 307–41) in terms of their perspective on technology. But in comparison to Heidegger, I have always felt that Jünger is the more superficial of the two when discussing questions of technology. For my part, I have always assumed that Jünger's superficiality regarding technology was a result of his ignorance of the history of philosophy.

But what I would like to convey to you and to your English-speaking readers is that, although I am keen on German conservative theorists like

Jünger, I am equally interested, as I said earlier, in love in Europe. Allow me to be clear. When I speak about love in Europe *I really mean it*. It is something I put into action, something I have written papers on and spoken about at conferences where people liked it very much. And this is a significant difference between, say, Jünger and myself. To give you an example, at present, one of my preoccupations is the fight against all monotheistic Gods which, until recently, were represented in the world by three male warriors: Saddam Hussein, George W. Bush and Ariel Sharon. I fight against these warriors because all three believe not simply in one God but in one *male* God. Thus they refuse to have a female Goddess at their side. Now some may consider that what I am fighting against is mistaken. However, it is for me very important to argue that Aphrodite, the Goddess of love and beauty, is a Goddess for *all* animals, inclusive of men and women. What I am trying to suggest, then, is that, since some English-speaking readers associate theorists like Jünger with Nazism, something that Jünger was *totally* against, it is easy to make the assumption that every German conservative, such as myself, is somehow already a fascist or a friend of Hitler. This distinction between German conservatism and fascism is fundamental for me not merely politically but also because it has affected me deeply in my own personal life. For instance, I am related by marriage to people who were National Socialists. One was even in the *Waffen SS*. Yet whereas my own family was 'arch-conservative' (*stokkonservativ*), as we say in Germany, no one in it as far as I know ever had anything to do with Hitler and his political hordes.

As for the current Schmittian revival, well, as you know, his work and in particular Schmitt's (1996) distinction between 'friend and foe' fascinated even Derrida. And perhaps Derrida is the reason as to why Schmitt is now a controversial yet rising star both in the English and French-speaking worlds. But, to my mind, the real reason for the renewal of interest in writers such as Schmitt is very simple. For whenever we European intellectuals attempt to analyze the ideology of the American Empire we are always in need of a strong antidote against the US shallow and often rather silly talk about the virtues of American democracy. Let us examine, as you propose, the case of the US ongoing war on Iraq. Is it not obvious that the American Empire, at present in a critical economic situation, would want to control the second biggest oil field on the planet? So, for me, the US war on Iraq is mostly about oil, even if a good part of it is also about helping America's friend, Israel, to pursue its goals in the Middle East. All the same, from my standpoint, the problems now facing the US stem from the Nixon era in the 1970s, when America proclaimed to the world that it was abandoning the gold standard. But what the US did not broadcast was that it was silently exchanging the gold standard for the Saudi Arabian-backed oil standard. And now, unsurprisingly, both the values of the dollar and America's oil reserves are dwindling rapidly. Accordingly, the near future is highly problematic for the American war machine because it is based largely on oil, with only one or two of its aircraft carriers being driven by atomic power. So there is something almost Jüngerian, almost

too natural or Darwinian, about the American war machine, founded on oil, making its way back, little by little, to the very source of its own power. Thus, we Europeans must be very clear about what we will and what we will not accept from the American Empire and its war machine. In fact, I have recently written a paper which discusses Bush's State of the Union address from 2002, in which he declared that the three core American values were freedom, democracy and something called 'entrepreneurial freedom'. And I wrote that while I do not disagree with the values of freedom and democracy, I do disagree with the so-called 'value' of 'entrepreneurial freedom' as for me it is one value too many. For what Bush means by 'entrepreneurial freedom' is the imposition by the US of Coca-Cola and denim jeans on every citizen of the world, an idea that I have not been able to bear for as long as I have been a conscious human being.

**Technology**

*JA*: A continuing element of your work is associated with a particular conception of modern cultural technologies such as the gramophone, film and the typewriter as well as postmodern information and communications technologies like the computer. How did you initially become intrigued by questions of technology? Was it, for example, due to your reading of other theorists of technology? Or did it arise from a consideration of the nature of specific technologies?

*FK*: My writings are concerned with both modern and postmodern technologies, with the latter being distinguished from the former for me simply on the basis of the invention of the computer during the Second World War and the subsequent development by Turing and Shannon of digitization. As to my interest in technology generally, I can only say that I simply observed my own actions in everyday life, actions that made me realize that I really loved my gramophone and my Super 8mm camera. What is more, I simply could not have written my PhD without the aid of a typewriter. My curiosity about technology thus arose from my daily experiences, for instance, from putting Pink Floyd on the gramophone and, not being fully preoccupied, suddenly asking myself what I was actually doing at that precise moment and for whom and for what? I am therefore fascinated by the machine and by its functions. Regarding other theorists, as you have said to me before, there is a nebulous connection here between Jean Baudrillard's (1990) work on the seductive qualities of technology and my own. Yet, although I met Baudrillard rather late in my life, and he is a very nice person, the fact is that I had been thinking about technology and seduction long before I encountered Baudrillard. Nevertheless, others have also remarked on the relationship between Baudrillard's writings and my own on the subject of technology. However, a most important difference between Baudrillard's work on technology and mine is that he is somewhat uninformed of the historical 'when' and 'where' of technology whereas my research is founded on an in-depth historical approach.

Concerning the specificities of particular technologies, let us take the case of the typewriter. What captivated me about the typewriter was not that there exist several high-quality monographs on the history of this technology. Rather, it was that what shows up so totally clearly from these monographs is that the introduction of young unmarried women into the production of discourses was an immediate consequence of the invention of the typewriter at the end of the 19th century. And yet so few people, inclusive of numerous female cultural historians, noticed this, while, for me, the creation of the typewriter was a Foucauldian caesura or a break of huge magnitude. For example, when my wife became a professional person, she had no option but to learn how to type, something she had always previously been against. In fact, she usually left the typewriting to me! So in order to become a professional, one must learn how to type. Now I realize that this is a simple and obvious statement. But, at the time I was writing *Gramophone, Film, Typewriter*, almost everyone I knew in the field of literary theory and cultural studies was concerned with the social conditions surrounding assorted literary figures. Nonetheless, not one of them, in confronting the question of technology in Goethe's (1969, 2004) *Faust*, for instance, considered the introduction of young women into German universities in the 19th century as being connected to the development of the typewriter. Hence despite my colleagues' talk of the importance of the socio-historical conditions of the production of literature, I was the only one who considered the history of the typewriter. It was, then, a kind of sociology of literature that needed to be done, even if few people realized it at the time.

*JA*: How does your work on the social history of technical media relate, if at all, to the 'media archeology' of Wolfgang Ernst (2002), who is also based here at Humboldt University? For example, is the centre of your concern, like Ernst's, non-linear historical and technological development? Or are you more involved with the social analysis of the appearance and disappearance of specific media technologies?

*FK*: I must say that as an approach to the social history of technical media it took me a long time to understand what the term media archaeology means and the exact nature of Wolfgang's project. But now that I do understand it, it is important to stress that his writings have not arisen from my own. Yet there are similarities in the sense that Wolfgang, like many others today, is trying to get out of narrative approaches to history, a project that I accept and like very much. Nevertheless, Wolfgang's concerns are not my concerns. Do not misunderstand me. I like history. Actually, I am crazy about history and have read it ever since I was a very small boy. However, what I have learned, in part from Wolfgang, is that we have to stop narrating the history of writing, computing, mathematics or music as linear history. So this is what I have been attempting for some time now, as in the essay 'Global Algorithm: The History of Communication Media' (Kittler, 1996: 1–16). Consequently, my feeling is that rather than focusing on linear history, we should instead

think about what I call 'recursive history', where the same issue is taken up again and again at regular intervals but with different connotations and results.

Take the case of the sirens, those ancient Greek sea nymphs whose seductive singing was understood to lure sailors to obliteration on the rocks they occupied. Is it not true that whenever we Europeans take up the non-linear history of music or acoustics, that is, when there is a technological jump in this field, the sirens are conjured up once more either in memory or as a kind of mutation? In early Christianity, for instance, the sirens returned as horrifying monsters. Then again, in the high Middle Ages, as is documented in manuscripts at the University of Oxford, written in Old French, the siren returned as an amphibious being, as a mermaid, living both in and out of water, a characteristic that was absent from the original Greek myth. And then, in 1819, a young French engineer invented the modern technical siren that emits a loud wailing sound. He named it a siren precisely because it functions both in and out of water. Additionally, the technical siren has been an important component of the modern theory of sound, chiefly in the second half of the 19th century, when it was used in experiments on the extremities of human hearing and others concerning the invention and development of radio. Accordingly, for me, the siren is a good example of recursive history because it comes back to us again and again.

With regard to the appearance and disappearance of particular media technologies, my answer is as follows. First, in Germany at the present time, it is fashionable amongst professors to talk of the Internet as if it were a technical medium that has been forged out of other media, which are themselves still present and which will be present forever. In spite of this, my suspicion is that in saying these things such professors are really stating that they hope that their professorships will be there forever as they have a vested interest in making sure that technical media as an area of study does not disappear. Thus, I am very sceptical of the idea that technical media that appear do not also disappear from history. For example, consider the ancient system of writing whole volumes on scrolled paper. Paper, of course, is still being produced, and we see it all around us even in our day. On the other hand, would anyone argue that writing on scrolled paper has survived? I do not think so. For it was the invention of the codex that signified the shift from the scroll to the manuscript. And the codex was so inventive and so victorious that it remains with us. Besides, everything in the writings of antiquity shows that it was Christianity that took the historical chance, the technological leap, from the medium of scrolled paper to that of the codex. For instance, to my knowledge, it is forbidden up to this very day to transcribe the Jewish Torah, Judaism's religious teachings, from its scroll to a codex. And, in this respect, it can be argued that it was Christianity that played the successful modernizing role in the technological battles of late antiquity whereas Judaism took a technologically conservative path. This is obviously a very simple explanation. But what I think it shows is that even as media technologies continue

to appear and only a small number disappear, it is nevertheless also accurate to say that media technologies can and do become obsolete.

*JA*: May I inquire into your work in progress on music and mathematics as cultural and social influences and especially their relationship to technology? How, for example, does your recent research correspond with contemporary cultural and social theory? Is it a development of your previous writings or a departure from them?

*FK*: Yes, I am at present writing a book on music and mathematics that draws, partly, on discoveries in musical theory concerning harmony and tonality. Certainly, what initially fascinated me about these topics was that they were all components of a larger event in the 18th century, which was the discovery that music, harmony and tonality are all based on mathematics. And so, for my present state of being, the relationship between music and mathematics is very important as it is one of the most exciting things that has happened to me here in Berlin. We have even founded a little centre, where one of our most famous mathematicians is the Director and I am the Vice-Director, thank God. But what we are concerned with is mathematics as a cultural force. For instance, we are currently investigating such issues as the invention of calculus by Isaac Newton in England and related work by Gottfried Wilhelm von Leibniz in continental Europe. Engaging in this work has been tremendously stimulating for me. For I realized that, without the discovery of partial differentiation equations, no single modern ship or radio receiver or transmitter could either be conceived or constructed. Yet the problem is that mathematics is too difficult to explain to people and probably not worthwhile in the long run. It is for this reason that I chose the example of music as a kind of cultural mathematics. Consider a musical instrument such as the harp. Is this instrument not only a musical one but also a mathematically designed technological tool, which is so precise that, as has been proven, it is attuned to every human ear inclusive of that of children? To some extent, then, we can hear mathematics. This was an important discovery of the Pythagoreans, who sensed that the world is structured mathematically, a world where every octave is heard by every ear as either pure or impure or flat immediately. Consequently, for me, as for philosopher-mathematicians like Leibniz, music has always been a challenge to mathematics and remains one to this very day.

I am not so sure that I can answer how my book on music and mathematics relates to present-day cultural or social theory since it is quite an abstract work. Besides, it is also, shall we say, more 'hidden' than my previous writings. As a matter of fact, in looking back at books such as *Gramophone, Film, Typewriter*, I get the feeling that I was a little bit too enthralled by bricolage, by engineering and by men like Thomas Alva Edison. Edison, for example, is both an interesting and a quite silly figure in some ways. It is for instance not too difficult to explain his invention of the gramophone. But it is very hard to put in plain words the idea of the

sine wave, the mathematical model behind the gramophone. Thus, I have become more and more interested in issues concerning musical tones, a subject that can be a little unnerving when one tries to explain them to people for two hours at a time as I have done! So I have moved on from bricolage and from thinking about heroic inventors like Edison and begun to think about sine waves and harmonics instead. For without the existence of these concepts, concepts produced by mathematicians, one cannot even begin to conceive of the idea of the gramophone. It is also at this point that I must reveal my small disappointment with Heidegger as he remained convinced throughout his life that any event in the history of being is naturally the province only of thinkers such as Parmenides and Plato, Aristotle and Thomas Aquinas. Indeed, for Heidegger, it was these and other philosophers and not mathematicians who were the only relevant people to any discussion of the history of the world in which we live. That is why, like Foucault, I am less interested nowadays in commenting on Hegel or whoever than I am in considering the work of relatively unknown figures in the history of musical and mathematical thought. In particular, I am devoted to dispelling the widespread myth that Greek mathematics was developed for its own sake. For nothing could be further from the truth. Mathematics was invented for music.

*JA*: Finally, I want to ask whether your current concern with music and cultural mathematics signifies a rising indifference to issues relating to new information and communications technologies like the Internet? Or are there, for example, other individual cultural and social theorists of technology whose work you have a high regard for?

*FK*: I am far from indifferent to technology. But concerning postmodern developments such as the Internet, I must say that one thing that I find terrible nowadays is that people continue to imagine that the Internet is the means by which they themselves are linked to others world-wide. For the fact is that it is their computers that are globally linked to other computers. Hence the real connection is not between people but between machines. However, all these American-dominated discussions about the Internet tend to obscure this simple fact. Take the case of Linux, which was developed as an operating system for the Internet. Is Linux not one of the most brilliant outcomes of the Internet over the last ten years or so? Yet, as we all know, Linus Torvalds started out merely as a single person who put his source code onto the Internet for others to read, something that I can also do. All the same, the most remarkable thing about Linux for me is how other people just keep coming along to embellish Torvalds' source code, making it more and more powerful every day. And so as far as I am concerned the Internet is at its best when it is operating as a self-reflection of computer systems, when it furthers the evolution of technology. This is also why, as we have discussed before, I do not believe that human beings are becoming cyborgs. Indeed, for me, the development of the Internet has much more to

do with human beings becoming a reflection of their technologies, of reacting or responding to the demands of the machine. After all, it is we who adapt to the machine. The machine does not adapt to us. Thus, I am not at all convinced that the computer industry's top design project is to connect our bodies to their machines, machines which are so clearly separate from us. If it was the case that computer technologies were intended to be cyborgian, that is, intended to be connected to the human body, then surely the development of the computer over the past 50 years would have taken the opposite direction to the one it has. Besides, pursuing the cyborgian vision would have also meant that the incredible speed of Moore's Law, that computing power doubles every 18 months or so, would have been impossible to accomplish. So, in my view, the computing industry is less interested in the development of cyborgs than it is in the development of software.

In respect of other cultural and social theorists of technology, I can only say that the control of the Internet by the Americans only serves to make me ever more nervous. Without a doubt, to my mind, the Americans not only already have too much influence over the world's young people but are also continuing their policy of imperialism through the flooding of the entire planet with their jeans and their particular brand of individualism. In spite of this, there are a few people in America who are working on similar topics and in comparable ways to the way I work and who approach questions of technology from a related standpoint. The most obvious of these is Timothy Lenoir (1998) at Stanford University, who has written some very good papers on the history of technology and mathematics. Another theorist I think highly of is Avital Ronell. I like *The Telephone Book: Technology, Schizophrenia, Electric Speech* (Ronell, 1991) very much. Moreover, Avital is someone who I have been close to for many years, despite the fact that she is much younger than I am. I think it is also probably true to say that I contributed more to her work than she did to mine but she was a very close friend to me until she became very ill. As a matter of fact, *The Telephone Book* was translated into German because I wished it so. Nonetheless, even here there are significant differences between us as Avital's writings are more 'schizophrenic' than my own, largely because her research draws on Gilles Deleuze and Félix Guattari's anti-psychiatry. That is why Avital's work is rather more metaphorical than mine is but she has in my estimation produced some wonderful books. Then again, as you know, Deleuze and Guattari are not really to my taste at all. I like their *A Thousand Plateaus: Capitalism and Schizophrenia* (Deleuze and Guattari, 1988). But I am not partial to their *Anti-Oedipus: Capitalism and Schizophrenia* (Deleuze and Guattari, 1984) for the simple reason that it is so anti-Lacan. So, you see, I have never wavered from my belief that Lacan was right when he said that human beings are structurally formed by their unconscious and not just by events, and so on. In truth, I really believe that there is something like fate and it is this that separates me from the dream world of Deleuze and Guattari where freedom is always just around the corner. Consequently, I do not subscribe to their position at all. On the other hand, this is not because I

consider myself a happy person who is content to live without the idea of freedom but because it is one of my most deeply held beliefs that it is not the task of books to produce unnecessary hope. On the contrary, I think it is the job of books to make things even worse than they are, that is, if you like, to pit hate against hate. And this is why, for me, the single most important thing to do at the present time is to tell the story of how love has been forbidden from the time of ancient Greece to this very day.

*Notes*

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1. Some readers may be unfamiliar with Kittler's term 'discourse networks' or *Aufschreibesysteme*. Primarily, this concept relates to the writings of the famous paranoid, Daniel Paul Schreber (1842–1911), contained in his *Memoirs of My Nervous Illness* (1955 [1903]), and Foreword to the idea of 'inscription systems'. In the 'Afterword to the Second Printing' of his *Discourse Networks, 1800/1900*, for example, Kittler (1990: 369) defines discourse networks as 'the network of technologies and institutions that allow a given culture to select, store, and process relevant data'. The original term *Aufschreibesysteme* was first used by Schreber in his *Memoirs of My Nervous Illness* to designate how strange heavenly powers were tracking and recording his every move. In his analysis of Schreber's book in *Discourse Networks, 1800/1900* (1990: 290–311), Kittler relates Schreber's vision to the emergence of new media technology. However, the German term *Aufschreibesysteme* better translates as 'notational systems' or, literally, as 'writing-down systems'. As Holub (1992: 98) has perceptively remarked, Kittler's project 'can be best understood as falling somewhere between the German and the English title'.

*References*

Aristotle (2004) *Poetics*. London: Penguin.

Armitage, J. (2003) 'On Ernst Jünger's "Total Mobilization": A Re-evaluation in the Era of the War on Terrorism', *Body & Society* 9(4): 191–213.

Baudrillard, J. (1990) *Seduction*. London: Macmillan.

Deleuze, G. and F. Guattari (1984) *Anti-Oedipus: Capitalism and Schizophrenia*. London: Athlone.

Deleuze, G. and F. Guattari (1988) *A Thousand Plateaus: Capitalism and Schizophrenia*. London: Athlone.

Derrida, J. (1967) *Of Grammatology*. Baltimore, MD: Johns Hopkins University Press.

Ernst, W. (2002) *Das Rumoren der Archive*. Berlin: Merve Verlag.

Foucault, M. (1970) *The Order of Things: An Archeology of the Human Sciences*. New York: Pantheon Books.

Foucault, M. (1997) 'Technologies of the Self', pp. 223–51 in *Ethics*, vol. 1 of the *Essential Works of Foucault 1954–84*, ed. by Paul Rabinow. London: Penguin.

Goethe, J.W. (1969) *Faust*, Part 2. London: Penguin.

Goethe, J.W. (2004) *Faust*, Part 1. London: Penguin.

Heidegger, M. (1993) 'The Question Concerning Technology', pp. 307–41 in David Farrel Krell (ed.) *Basic Writings: Martin Heidegger*. London: Routledge.

Holub, R. (1992) *Crossing Borders: Reception Theory, Poststructuralism, Deconstruction*. Madison: University of Wisconsin Press.

Jünger, E. (1998) 'Total Mobilization', pp. 119–39 in Richard Wolin (ed.) *The Heidegger Controversy: A Critical Reader*. Cambridge, MA: MIT Press.

Kittler, F. (1977) *Der Traum und die Rede. Eine Analyse der Kommunikationssituation Conrad Ferdinand Meyers*. Bern: Francke.

Kittler, F. (1984) 'Carlos als Carlsschuler', pp. 241–73 in W. Barner et al. (eds) *Unser Commercium: Goethes und Schillers Literarurpolitik*. Stuttgart: Cotta.

Kittler, F. (1990) *Discourse Networks, 1800/1900*. Stanford, CA: Stanford University Press.

Kittler, F. (1996) 'Global Algorithm: The History of Communication Media', *Ctheory*, http://www.ctheory.net/printer.asp?id=45: 1–16.

Kittler, F. (1997) 'Media and Drugs in Pynchon's Second World War', pp. 101–16 in John Johnston (ed.) *Literature Media: Information Systems*. Amsterdam: G+B Arts International.

Kittler, F. (1999) *Gramophone, Film, Typewriter*. Stanford, CA: Stanford University Press.

Kittler, F. (2004) *Unsterbliche. Nachrufe, Erinnerungen, Geistergespräche*. Munich: Fink.

Lenoir, T. (ed.) (1998) *Inscribing Science: Scientific Texts and the Materiality of Communication*. Stanford, CA: Stanford University Press.

Pynchon, T. (1973) *Gravity's Rainbow*. New York: Vintage.

Ronell, A. (1991) *The Telephone Book: Technology, Schizophrenia, Electric Speech*. Lincoln: University of Nebraska Press.

Schmitt, C. (1996) *The Concept of the Political*. Chicago: Chicago University Press.

Schreber, D.P. (1955 [1903]) *Memoirs of My Nervous Illness*. London: no publisher cited.

Virilio, P. (1989) *War and Cinema: The Logistics of Perception*. London: Verso.

Weaver, W. and C.E. Shannon (1949) *The Mathematical Theory of Communication*. Urbana: University of Illinois Press.

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