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The Power of Small Gestures: On the Cultural Technique of Service

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Abstract
Focusing on a subject the author has extensively engaged with over the years (most notably in his 2010 study *Der Diener*), the article develops the notion of service as a cultural technique, and the media-theoretical figure of the servant as its servomechanism. The analysis follows three distinct scenarios that highlight, via different channels of perception (acoustic, optic and haptic), the interplay between corporeal practices and media objects in the production of specific cultural effects. In each of the examples chosen, service implies highly regulated networks of recursive operational chains that regulate in their turn the production and distribution of power and knowledge. Thus, Krajewski argues, despite, or rather, precisely because of their apparent marginality and invisibility, the 'small gestures' of service join the ranks of already established, elementary symbolic techniques such as reading or writing.

Keywords
cultural techniques, information technology, recursion, servants, servomechanisms

What would high culture be without literature? What would a society look like without mathematics and music? Can there be cultural progress without services? Without question, *reading* and *writing* produce cultural effects just like *calculating* and *music-making* do. But *service*? If cultural techniques are designed to carry out an action that develops cultural efficacy in a specific way through the interplay of purposeful bodily gestures and the use of aids such as tools, instruments or other medial objects, then service undoubtedly belongs to this category. However, while it is immediately evident in the case of writing how this elementary

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cultural technique of precisely applied finger and hand movements works in cooperation with a writing utensil (pencil, typewriter, fountain pen, etc.), the interaction in more varied processes such as service remains in need of explanation.

By way of three exemplary scenarios which will be briefly outlined, the cultural technique of service will be explained and subsequently situated within a broader context of cultural productivity and its effects. The history of service is extraordinarily diverse, complex and nearly boundless. As the subordinate's service of his master is based on one of the fundamental social relations between lord and servant, this cultural technique pervades the entirety of history, in time and space, from the earliest records to the present day, and not merely in today's form of Portuguese cleaning women in the industrial nations, but rather extending to the most remote human populations in the Amazon. That being said, the three scenarios all arise from a courtly context and cast their own respective spotlights on the acoustics (*A Courtly Cough*), the optics (*Signals in Sight*), and the haptics (*Regulating Rooms*) of service. In this way, each will bring a channel of perception into focus on to which the servant grafts himself, in the sense of a servomechanism, in order to perform his prescribed actions in careful observation. 'By continuously embracing technologies, we relate ourselves to them as servo-mechanisms' (McLuhan, 1964: 46). Just as the clerk is a underling to his clock, and the Native American to his canoe, according to McLuhan, the servant appears literally as the service mechanism of his respective technique, which manifests itself in the form of the dinner tray, the door to be attended, the message to be relayed (by way of a flag signal, for instance) or through another technical gesture. In the discussion of these scenarios, more fundamental questions will be touched upon in passing, so to speak; namely, what exactly is meant by a cultural technique? Erhard Schüttpelz provides a brilliant analysis of the concept (2006: 88). But first, it is necessary to see the servant in action.

A Courtly Cough

There has long existed a sophisticated communications system at court. Not simply in the optical realm, where the various positions of the courtiers are made recognizable through finely differentiated practices of signification in the form of uniforms, liveries and badges of all kinds (honour key, marshal's baton, etc.), but also in the acoustic realm, the various people are accompanied by corresponding signals that ensure the desired attention. Subaltern communications and their associated actions begin, . . . ahem . . . , with a cough.

> To descend a few more levels, old senior footmen, meal attendants and valets know how to nuance their coughing perfectly. The

> footman who closes the carriage's door clears his throat delicately when a lady-in-waiting who is deep in thought doesn't specify where she wants to go, after which he jumps on the back and often directs the coachman with loud coughing.
>
> The valet in the master's chamber looks at the clock, coughing when a certain hour has arrived, and wakes the porter from his reverie with a loud cough, who almost forgot to have the coach brought around.
>
> Finally, at the table, the court quartermaster directs the entire dinner with an extravagance of the finest and softest coughs, the attendant calls the footman's attention to his foolishness in the same way with expressive coughs, a broken plate or an empty glass, and a young servant recoils with a start and coughs gently before the terrible abyss into which he nearly fell, as he was prepared to present the first chamberlain with a wild pig's head from the right side. (Hackländer, [1854] 1875: 176)

In these scenarios, the servants carry out a variety of instructions and activities, most in direct relation to a technical object like a clock, a coach, a door or a (broken) plate. Sometimes, however, their action takes place without an additional object, as when their task is simply that of waiting for instructions. While all of these actions already contribute to a modest degree to the genesis of a cultural action, for instance through compliance with a courtly code of obedience and rule enforcement, on another more abstract level, they also bear witness to a core characteristic of cultural techniques, namely 'that the same operation is applied to results of the operation' (Schüttpelz, 2006: 95). On the one hand, this means that the respective activities of door service, housekeeping, and chauffeuring arise as an effect of a cough and thus as a result of a subtly expressed instruction from a superior. Instruction reacts to service. On the other hand, this constellation shows that a servant, as executor of this cultural technique, does not act merely in relation to a supreme master but is always integrated into a hierarchically established operational chain of immediately superior servants, who simultaneously act as his surrogate masters, just as he himself can act as advisor to inferior servants. The interweaving of service in recursive patterns proves to be an important criterion of a cultural technique.

Courtly coughing already suggests symptomatically that an act of service rarely stands alone, but instead remains engaged in a recursive network of services which relate to services. Every such action connects with subsequent communications in the form of arriving lordships or plates being served incorrectly (the right, instead of correctly the left side). The

coughing itself fulfils a primarily phatic function, in that it announces or initiates the occurrence of something else. But a signal can also elicit similar signals, like a cough continually passed onward, even over long distances. The second scenario shows such a linking of small gestures.

Signals in Sight

Sometime in 1835, the viceroy of Dahomey ran out of resources. However, Don Francisco Manoel da Silva, called Cobra Verde, didn't lack money or goods. Instead, he lacked ships, needed to transport the many slaves that he hoarded in his fort on the West African coast to Brazil. In his predicament, da Silva 'telegraphed' his blood brother Prince Kankpé in Abomey, in the interior of the country, to obtain his support. Werner Herzog's not particularly realistic 1987 film *Cobra Verde*, based on the novel by Bruce Chatwin, with Klaus Kinski in the lead role, re-enacts this scene in a remarkable way.

One scene shows a young slave in a traditional get-up (bamboo skirt), who is on standby, initially in a kind of break-dance – the film appeared in 1987 – awaiting a signal in consultation with a technical medium, the white signal flag, to then set his own signal in motion. In Figure 2, the small man is still in standby mode, while outside, behind the battlement, the chain of messengers waits at attention to carry the signal forth. The command is finally given after the people in uniforms convince themselves that the chain is intact: the messenger raises up and waves his flag, after which the nearest messenger likewise waves his flag, after which the nearest messenger likewise waves his flag, after which . . ..

The spectators then sees how the signal comes from below, following the coastline, spreading toward the horizon. The sign traverses the messenger chain like a transverse wave, whereby the signal presumably encompasses more than a single prolooooooonged sign. Rather, the messengers do not simply wave once; instead, they seem to use a whole set of signals through different flag positions, like the French dial telegraph invented a few years before by the Chappe brothers under Napoleon. The individual messengers or slaves, respectively, stand shoulder to shoulder, their faces directed toward the sea with its own waves, in order to keep the actions of both of their neighbours to either side in view. This messenger chain is duplicated by a second, more loosely staggered sequence seen to the right of the image. These are the servants who control the servants, armed with a rifle and with a handful of slaves in view, watching over the proper transmission of the communication.

The message to be sent seems to get quite long; or at least the entire messenger chain wags its flags eagerly from the foreground of the image across the savannah to the horizon, while the guards crouch in the grass, considerably more relaxed in their supervisory task. After roughly

three hours, as predicted by da Silva, the answer comes from Abomey, approximately 100 km away as the crow flies, indeed in the same form, only in reverse order. Tightly packed, the individual messengers stand and wave their flags again, until the small slave behind the battlement receives the signal and waves affirmatively. Meanwhile, the servant dressed like a footman in a red uniform decodes the message for da Silva: 'The King sends his brother the great leopard's greeting.' End of message. Even if the content of the message – a brief leopard's greeting rather than assurance of a few ships – may have been cause for irritation for da Silva, the transmission of the message seems to work smoothly.

Apart from its (perhaps involuntary) comedy, this scene illustrates at least three fundamental aspects of a cultural technique. First, and quite conspicuously in its beginning with the flag-break-dance of the young slave, it demonstrates how strongly dependent a cultural technique is on a fusion of bodily techniques and technical media. Without artefacts, whether they be tools, instruments, technical or even human media in a clearly subservient function, no cultural technical action could come about (Maye, 2010: 135). And conversely, every technical medium necessitates a servant as *servo*mechanism. No directed canoe journey without Native Americans, no regulated progress without clerks who ensure the operation of the clock, no culture without servants and their functions. Thus, cultural techniques like the data transmission undertaken here by the servants function exclusively in the context of a hybrid arrangement or collective of bodily techniques and media utilization. Communication can only ensue amid the interplay of a slave's waving motion and a flag (hybrid of man and technical medium), or of a slave and his voice, directed at his neighbour (hybrid of the voice of the knowing messenger and the ear of the subaltern, still-unknowing messenger, acting as an ancillary medium).

Second, this scene illustrates directly what constitutes an operational chain. A slave on foot, out on a limb in the hot savannah, could hardly pass along a message. Only the interconnection of the many messengers into a relay, including its control dispositive through the second row of guards, guarantees the correct transmission of the message. Thus, the operational chain consists to a certain extent of a horizontal component, the row of waving slaves, and of a vertical component, the row of watching slaves, which exercise a recursive function similar to coughing at court, insofar as they apply the same operation of relay formation to the results of this operation. Thus, here it is not the individual servant who constitutes the medium of transmission, but rather the collective, that is to say, the entirety of the slaves and supervisors interconnected into the relay.

And finally, it is not only the pure cultural technical action that is relevant, the *what* of the event, but also the *how*. The opulent image of

the messenger series begs the question of why there are so many slaves integrated into this operational chain. Why is such effort expended, when the servants could just as easily have been positioned comfortably within sight of one another – three instead of three hundred in the first shot from the battlement to the next cliff – or even a single reliable messenger could have been sent on horseback to the capital 100 km away, entirely without the recursive chain of guards? Without question, this transmission process feeds on an excess of human agents, on slaves in their function as servile, flag-bearing elements of transmission, which can claim greater significance in their aesthetic arrangement and their optical overpowering logic than mere functional necessity would require. The power of the ruler is duplicated in his footmen, who ostentatiously flaunt their idleness for him in vicarious inoccupation. In other words, a cultural technique like service also always comprises an aesthetic component, which observes aspects of style beyond pure functionality. Thus, the question would be whether even an eminent cultural technique like writing is a cultural technique per se, or if it is only in linguistic refinement, with its necessarily gradual increments, that a *cultural* added value comes to light that has yet to be produced. In this case, aesthetics and its qualitative classifications gain particular significance. Or, to choose a simpler example: just as you can theoretically criss-cross a field, ploughing through it entirely unsystematically, a farmer nevertheless usually follows a particular pattern of linearity, prescribed by expediency, but also by a certain aesthetics of the continuing, parallel line. Likewise, these aesthetic standards can be transferred to the messenger chain above, led by the thesis that the mere functionality of the transmission could also have been accomplished with far fewer personnel.

Regulating Rooms

In Franz Kafka's short prose work 'A Message from the Emperor' of 1917, originating four months after the death of the penultimate Habsburg emperor Franz Joseph, a message is also being delivered, albeit in this case to a 'wretched subject'. Sent by the dying emperor, here the message is carried onward by a single, human medium. The messenger on the way to his recipient,

> thrusting forward now this arm, now the other, he cleared a path through the crowd; [. . .] he moves forward easily, like no other. But the crowds are so vast; their dwellings know no bounds. [. . .] he is still forcing his way through the chambers of the innermost palace; never will he overcome them; and were he to succeed at this, nothing would be gained: he would have to fight his way down the steps; and were he to succeed at this, nothing would be gained: he would have to cross the courtyard and, after the courtyard, the second enclosing

> outer palace, and again stairways and courtyards, and again a palace, and so on through thousands of years. (Kafka, [1917] 2011: 41)

This largely subjunctive parable, which may also be understood as a companion piece with a reversed direction of motion to the doorkeeper parable 'Before the Law', initially raises a simple question: why doesn't the messenger run away? What actually prevents him from leaving the palace? Even if the text doesn't give any explicit information about this, it seems sensible to relate it to the doorkeeper parable simply because of its architectural arrangement. Both texts work with tiered spatial arrangements, typical of courts and their sophisticated ceremony, determined by the question of how and to whom access to certain rooms is granted. The reason for the imperial messenger's failed attempts to escape the innermost palace lies in the court ceremony and its limitation of access to the individual rooms: the messenger can't exit the palace because he comes across a relay which does not consist of simple messenger servants as in the previous scenario and which doesn't work *with him*, but is actually directed against him. Within a palace, everyone, including the messenger, is set against a cascade of courtiers who oppose them in order to prevent the delivery of the message. The messenger cannot get through, because he is ensnared in the system of power, between the other staff and their stooges. Why is it then that 'a strong, an indefatigable man' (Kafka, [1917] 2011: 41) cannot manage to overcome these hurdles? Because in each of the chambers he is delivered over to another doorkeeper and his respective control of access, who in turn stubbornly adheres to the provisions of his own chain of command or is guided by (excessively high?) bribes.

Thus, what are primarily of interest here are the spatial relations, and their respective regulation of access, with which the imperial messenger had to contend. How are the chambers and the architecture of the palaces constituted, through which the messenger must force his way for 'thousands of years', before he could reach the outermost door (but never, never can this happen)? The classic architecture of authority knows the representative corridor of power, also called *enfilade* thanks to its origin in the Vaux-le-Vicomte palace (see Figure 1), that suite of chambers, antechambers and ante-antechambers into which a normal supplicant would arrive before the law, or an envoy – overcoming doorkeeper after doorkeeper – would ultimately arrive before the sovereign, moving in the opposite direction of Kafka's imperial messenger. With the *enfilade*, the emperor had a system of signs that he could use to administer the labile system of his grace and of his subordinates' access to power, and project them on to a spatial order and logic of access.

In this *enfilade* (see Figure 2), a courtier passes through various instances of power, each controlled by the 'indirect beings' at the doors

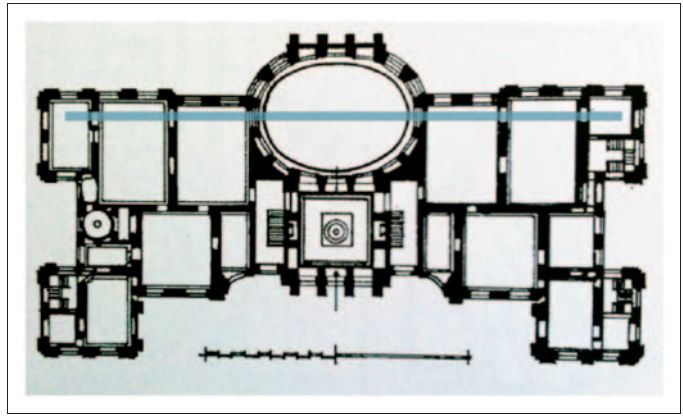

Figure 1. Ground-plan of Vaux-le-Vicomte palace (1656–1658) with suite of rooms.

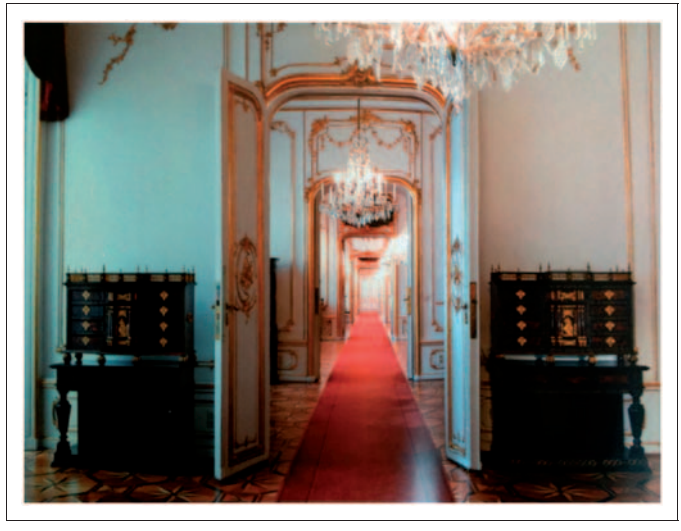

Figure 2. *Enfilade* in the Wiener Hofburg, Leopoldinischer Trakt.

(to borrow from Carl Schmitt, [1954] 2008), that is to say, the palace guards and doorkeepers, who have an abundance of power due to their specific knowledge and thanks to their precise familiarity with the place. In this inverted version of Kafka's other cascade of servants in 'Before the Law', where the way in goes through a series of ever more finely tiered doorkeepers who those seeking entry are able to see just as little as K. got to see the castle in close proximity, the movement is sufficient to shift from the internal to the external. From the centre of power, where the emperor lies wasting away, a view opens up on to an immensely

intricate spatial ensemble of suites, thresholds and detours that one must not just negotiate but even be acquainted with in the first place. A particular local knowledge is necessary to make one's way through a palace. By what logic are these paths constructed, in what way do they reflect courtly ceremony and the associated practices of service and of relations with subordinates? What role does architecture play when it comes to carrying out tasks officiously or giving underlings space for their service activities, whether in a limiting respect or in the form of a particular privilege or secret enabling? The nesting of the palaces makes the penetration of the rooms nearly impossible for the imperial messenger – there seems to be no outside for him to ultimately reach. What first sounds like fiction has its structural counterparts both historically as well as quite objectively in Kafka's time, for instance in the capital of the Habsburg monarchy, in Vienna's *Hofburg* palace, a conglomerate of various palaces from different periods and styles from the Middle Ages to the 20th century, which in addition to nearly endless suites of rooms (see Figure 2), is also complemented behind the scenes by a labyrinthine array of service architecture with its service corridors and backstairs, by which the imperceptible accommodation of the lordship by the subordinates is guaranteed.

But where does the much-touted power of the indirect being manifest itself concretely? In what tasks and gestures are the mechanisms of a cultural technique of service to be found? The subaltern is not generally permitted to enter into his field of activity with such ostentatious visibility as his lordships; rather, he finds himself in a relationship to them that demands servility, obedience and modesty. However, this dictum only relates to the front side, as it were, of that intricate relationship between master and servant, which counts among the basic constants of history. In fact, in the cultural technique of service one must incorporate an extremely important aspect, namely that reverse side of the grand stage, accompanied by a sometimes equally great abundance of power, even if it's not always easy to grasp or to describe. Ultimately, one of the first requirements of the servant consists of remaining invisible, despite physical presence. Thus, a general virtue of the servant lies in controlling the background inconspicuously. These very concrete practices of power express themselves not only in small gestures like opening doors or repelling intruders, attending table, assigning or tacitly taking places, in (self) situating or artificial diminution (through bowing) before the displayed power of the sovereign. Rather, these optimally hidden practices of the subaltern are also based on medial arrangements prescribed and determined by architecture.

In addition, this optimally hidden practice of servility encompasses the ability to find passages without being seen and manage arcane knowledge. The highways of power, stretching in the *enfilade*, are filled with careerists of all sorts and lined by indirect beings like the doorkeepers,

and are always doubled by the secret corridors of the underlings, of the lowest of the servants, who attain unforeseen power through their knowledge of hidden interconnections. Because, in the end, a palace does not simply have the official *enfilade*, but always also a vast collection of secret passages, hidden doors and special servants' stairs, through the knowledge of which only the servants maintain true control.

Just as the *enfilade* proves to be an indicator of power, with a metre-by-metre advance constituting the primary endeavour of the courtiers (or a departure, that of the imperial messenger), the supposed goal of this round dance seems to be the royal chambers (or the recipient of the imperial message), long-since abandoned and robbed of its centrality, because power itself is by no means concentrated directly in one person. Rather, it shows itself to be decentralized and distributed to such inconspicuous locations as thresholds with gatekeepers, concealed doors and hidden corridors. Power is splintered, its centre long-since dissolved, and strewn across various stations, delegated to underlings spread across long suites of rooms who each regulate the day-to-day balance of power at court in their own way by opening or closing doors, heating, traversing arcane paths, clearing out closets (and thereby having practical control of things), or more simply by talking or remaining silent at the right time.

Cultural Technique of Service

At the height of Victorianism, in an age when a large portion of the lowly and slightly less lowly tasks rested on the shoulders of domestics and subalterns of all sorts, an insight emerged from an unexpected source that was as modest as it was true: 'No culture without servants', as a Saxon nobleman and member of parliament, otherwise better known for his crude anti-Semitism, announced in 1875 (Treitschke, 1875: 17). What may at first seem to be a thoroughly chauvinistic remark coming from the mouth of Prussia's nationalist court historian Heinrich von Treitschke, professor of history at Berlin University, that he could 'imagine society without servants' just as little as Aristotle could picture his age without slaves, nevertheless proves undoubtedly to be a lucid insight for his time in its simple logic (Bebel, [1892] 1996: 649). What may be seen as commonplace in the mid-20th century[1] could by no means be seen as a self-evident, openly reflected fact shortly after the establishment of the empire. Even if Treitschke hardly intended for his comment to unduly elevate the subaltern class, to outspokenly grant them a significant share in the well-being of the ruling class, it nevertheless expresses unmistakably that it is ultimately the practices of the servants without which no cultural progress can be made.

Here, it is above all the small everyday gestures, the minimal movements, which contribute decisively to the success of the whole.

The practised hand movements of the underlings possess far more potential which evolves nearly imperceptibly. If service doesn't simply mean serving soup and clearing the plates, or organizing the household in every detail and providing for all possible comforts, but rather also consists not only of transmitting messages but filtering them, opening doors to then shut them again (sometimes on their own authority), not only following orders but anticipating them, if service not only means representing the prosperity of the lordship in glamorous liveries or standing in a row nearly naked with a flag in your hand but also carrying out special missions hidden from view in secret passages and hidden doors, then the agents of these trivial acts have more than a (modest) cultural educational function. They have nothing less than a specific agency. The servants are positioned strategically at the hubs of action, for instance at doorways, at which they control access. At the same time, they find themselves at the interfaces of communication, waiting discreetly in the background at dinner or waiting inconspicuously with a silver platter in the study, while policy is made over drinks and cigars. They alone regulate access to the *enfilade*, just as they have exclusive access to the supply channels of the royal residence. Apart from lovesick princes and fugitive queens, it is only the subaltern – and no special imperial envoy – who rush through the hidden corridors and passageways in the castle and the great houses, which form the backbone of the residences.

Aside from their knowledge of arcane paths and their control of these real connecting corridors, the domestics contribute with each imperceptible action to the establishment of a symbolic corridor which houses the real power. 'The process of corridor building which we're discussing here plays out on a daily basis in minimal, infinitesimal approaches, on a large and small scale, wherever people exercise power over one another' (Schmitt, [1954] 2008: 25). Through their actions, such as granting or denying entry, waiting and listening, both in the moments of decision that are wholly within the discretion of the servant, as well as through secret bribery and corruption on all levels of the hierarchy, the subaltern exercise a specific power, even if this power may seem marginal to outsiders. However, their strength lies precisely in this marginality, when unnoticed monitoring of conversations or unobserved observation open up new options for action not covered under their original mandate – i.e. serving as a representative according to the will of their master. It is in these fleeting intermediate stages, which momentarily open up a space for the subaltern to manoeuvre, that their influence lies, elevating them for the moment to free agents. Rejecting an unwanted supplicant at the threshold or letting him in always has consequences for the doorkeeper. Taking good news from a messenger in order to present it to the lordship oneself increases one's own esteem. The infinitesimal act on the periphery, the unassuming, almost imperceptible gesture, gradually adds power to the one who carries it out, becoming a distinct factor of influence

over time. In short, those medial basic operations that a subaltern routinely performs in small gestures are accompanied by a technique of power and domination that turns service into a basal cultural technique. If one cannot possess power, but rather only exercise it momentarily, then it is above all agents like the indirect beings that exercise a 'conduct of conducts' (cf. Foucault, [1982] 2002: 341) in their control of access to the sovereign and to the official representatives of the ruler, in their knowledge of the paths to knowledge and in their marginal dominion over the corridors. By way of their unassuming gestures, with the help of their marginal actions that filter and disseminate information, select and redistribute decisive tips as an everyday medial base operation, the servants regulate and control the corridors of power and thereby power itself.

On the one hand – according to the semi-official reading – the servant is a representative or *proxy* of his master, which degrades him to a subject in the literal sense of the subjugated, or – as with the footman – to a finely outfitted *persona* with no will of his own. The task of the underling consists of fulfilling the desires of his lord without question and straightforwardly executing his orders. He implements the ideas of his master, who in turn assumes responsibility for his deeds (Skrine, 1985: 252). Thus, the relation between lord and master is a basic sociotechnical constant throughout history. On the other hand, through his servile practices like regulating access at the doorway or transmitting, filtering and selecting information, the subaltern possesses an abundance of power, the scope of which he learns to gauge and use to his advantage at his job.

Where does the servant's technique of domination lead – if one may allow such a seemingly paradoxical formulation? A possible intent behind extending his scope of action may be improving his own position through self-empowerment and increasingly becoming a master in his own right. It contributes to the consistent increase in influence of the marginal agents. In contrast to others who are searching for work in general, servants are continually looking for a place made for them – the annual change in duty station sets the rhythm – and not least within the social hierarchy (see Robbins, 1986: 53). Thus, a component of the cultural technique of service consists of continually renegotiating one's current place in the hierarchy and moving it a little further up if possible: repositioning oneself. Improving one's standing. Climbing up. Every cultural refinement is based on this very fundamental mechanism; without it, decay and decline would rule. Such basal behaviours as mimetic processes, surrogacy, rapprochement to the representatives of power and empowerment are the strategies of the subaltern, in order to move imperceptibly but consistently into ever more influential positions. With each new step up the ladder, however small, the subject becomes somewhat more master than servant. Therein lies his own literal progress. This relatedness and arrangement into hierarchies, the constant reassignment of one's own position as well as that of others, is a technique of

culture that the subaltern make use of. Thus, one must count as a cultural technique of service not least positioning oneself (as favourably as possible), in a broad sense, in order to participate in the control of the totality through those countless hand gestures of power and infinitesimal acts. Just as (nearly) every targeted advancement at the forefront has the necessary insinuations, so the practices of service can't get by without a certain measure of servility.

As well as the focus on the obvious techniques that a culture requires in order to develop vital concepts and thus knowledge of itself, which certainly include writing as well as reading, calculating as well as organizing as 'eminent cultural techniques' (Siegert, 2005), it is also important to shift the perspective a bit toward the margins, in order to take into account the more imperceptible practices such as service in its physical, mental and manual activities, obstructing and closing as well as selecting and working invisibly. For out of these small actions of decision, the trivial routine work of the underlings, which in and of themselves would certainly be considered marginal, there emerges during service a sometimes tremendous wealth of opportunities to regulate the lordship. With the everyday hand movements and differentiations that invisible assistants carry out, those medial practices of mastery and construction come into use. Only an analysis decidedly dedicated to these small gestures is capable of achieving a comprehensive notion of culture and its techniques. However, in that such cultural techniques carry out symbolic work, they remain reliant upon media as agents (Macho, 2005: 77; Schüttpelz, 2006: 88). And in the realm of such infinitesimal but nevertheless culture-generating acts, the servant embodies this medium.

How is it that this *marginal man position* can have any epistemological relevance? The subaltern's principal area of activity, acting as inconspicuously as possible in the background amid the paradoxical imperative of persistent invisibility despite physical presence, brings a particular observer's perspective which is extremely helpful in potentially gaining knowledge. Who pays attention to the man serving the cognac? The valet's perspective reviled by Hegel in his *Phenomenology of Spirit* ([1807] 1988: 437) offers a lasting advantage over those entangled in their chief-and-state plays. While the table talk revolves around important discussion points, the attendant domestic can assimilate vital information not intended for his ears. In his function as medium on the margins, the servant proves to be involved while simultaneously unnoticed, present and forgotten. According to plan, he assumes the position of the unseen third party, hardly distinguishing him from a house pet. 'The servant is the eternal "third man" in the private life [. . .] People are as little embarrassed in a servant's presence as they are in the presence of an ass' (Bakhtin, cited in Robbins, 1986: 108).

The domestic who is responsible for the personal needs of the powerful occupies a similarly advantageous position of knowledge. The medial

functions of the indirect beings, who regulate informational access to the lordship, also enable these kinds of advantages in insight within this position of trust. Like the waiter at official events, the *valet*, who controls the direct corridor to power, the last few metres to the royal bedchamber, occupies a privileged perspective. Once again, the valet proves his proximity to the sovereign in that he is not merely available to his lordship as an advisor at any time in matters of personal care or other concerns. Rather, he is the unfiltered, unmediated connection to the ruler, who provides the valet with an exclusive position from which he can observe while remaining unobserved, and make use of varied opportunities to influence decisions. *The servant who shaves the captain controls the ship*, as it goes in Herman Melville's *Benito Cereno* of 1857. It is not for nothing that contemporaries especially fear those people in such positions of trust, like the influence of the flautist Michael Gabriel Fredersdorf on Frederick II, hardly legitimized in any official capacity. It is not by chance that an inscrutable figure like John Brown, Queen Victoria's favourite valet, maintains a political factor that is difficult to assess (see Lamont-Brown, 2000; Marshall, 1949: 26). Its actual historical effect proves to be hard to measure in hindsight, inasmuch as the servant's position of trust moves between two extremes: the position of an actual potentate on the one hand, and on the other hand a relationship with his master that renders him closer to a lapdog: 'many [masters] wished to use such upper servants as footmen and lady's maids as confidantes, accomplices, go-betweens, and pets' (Porter, 1990: 104). Regardless of the distance to their master, this position is distinguished primarily by an epistemologically favourable position of observation. This is the privileged point of observation par excellence from which a special knowledge of power can be attained imperceptibly. Valets and waiters, butlers and footmen can assume this position, because they operate studiously in the background. This demonstrates a technique of refined culture when someone can work in secret while also being in full view. In a certain sense, the servant acts analogously to Edgar Allen Poe's *Purloined Letter*: he is in the room, constitutes the secret heart of the action, and yet no one takes notice of him.

In small gestures, with inconspicuous actions like attending and cleaning up, coughing and signalling, opening and closing, permitting and obstructing, in short: in attending to people and things, a servant connects and bundles various techniques that become cultural techniques through his interlacing actions. The seven characteristics mentioned contribute to the servant's heterogeneous actions being associated with cultural efficacy: (1) the interweaving of service in recursive patterns of action, (2) the connection of the individual servants into a collective and the associated delegation of activities, (3) the resulting dispersed agency passed from the individual to the hybrid collective of people and media, (4) the local knowledge of the subaltern, the familiarity

with the contexts of their activities, (5) the tendency of the servant toward repositioning through his respective activity, which fuels the innovative power of a cultural technique, not least (6) the aesthetic component of a cultural technique, which furnishes the subaltern actions with style beyond pure functionality, and finally (7) the epistemological component, which makes the *marginal man position* into a powerful one with the help of indirect control.

Particularly with the bundling of these characteristics, the subaltern's ability to act accumulates to form a power structure. It is true what the lowest of Kafka's doorkeepers says: 'But note that I am powerful. And I am only the lowest doorkeeper. From hall to hall, keepers stand at every door, one more powerful than the other' (Kafka, [1915] 1995: 23). Service may be based on small gestures that obstruct or enable, permit or exclude. In their interconnection and catenation, in their bundling and accumulation, the various practices by which a servant organizes the life of his master generate power (to act) that is by no means minor. This enables the servant to contribute to the refinement of culture from below, so to speak, from the valet's perspective, with inconspicuous technical manipulations, in infinitesimal gestures. It is the cultural technique of service with its specific characteristics that endows the servomechanism of our things, the servant, with a relevant, highly influential form of action.

Translated by Charles Marcrum

Note

1. '[T]he domestic servant class has a special significance. It was an important agent in the process of cultural change' (Hecht, 1956: 200).

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Zootechnologies: Swarming as a Cultural Technique

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Abstract
This contribution examines the media history of swarm research and the significance of swarming techniques to current socio-technological processes. It explores how the procedures of swarm intelligence should be understood in relation to the concept of cultural techniques. This brings the concept into proximity with recent debates in posthuman (media) theory, animal studies and software studies. Swarms are conceptualized as *zootechnologies* that resist methods of analytical investigation. Synthetic swarms first emerged as operational collective structures by means of the reciprocal computerization of biology and biologization of computer science. In a recursive loop, swarms inspired agent-based modelling, which in turn provided biological researchers with enduring knowledge about dynamic collectives. This conglomerate led to the development of advanced, software-based 'particle systems'. Swarm intelligence has become a fundamental cultural technique related to dynamic processes and an effective metaphor for the collaborative efforts of society.

Keywords
agents, computer simulation, cultural techniques, media, scientific visualization, social swarming, swarms

I. Fish and Chips

In his *Guide to the Study of Fishes*, an expansive reference work published in 1905, the ichthyologist David Starr Jordan posed the following question: 'What is a fish?' A fish, he answered, 'is a back-boned animal which lives in the water and cannot ever live very long anywhere else. Its ancestors have always dwelt in the water, and most likely its descendants will forever follow their example' (1905: 3). At first glance it would be difficult even today to refute this definition, so long as a few obscure exceptions

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are set aside. The ambitions of the seemingly hydrophobic mudskipper *periophthalmus barbarus*, an amphibious goby, come to mind in this regard. A second glance, however, reveals that fish have been seizing dry territory rather energetically for some time. Such land grabs, of course, have not been the result of baffling leaps in evolutionary biology. They rather owe their occurrence to a co-evolution that has taken place in the fields of biology and computer science. Fish, or more precisely schools of fish, have been a source of inspiration to a branch of computer science since the middle of the 1990s. Along with other biological collectives, such as flocks of birds and colonies of insects, schools of fish have inspired a field of research that has come to be known as computational swarm intelligence.

Computer applications of swarm intelligence make use of the effects that are observable in animal collectives. On a global level, the multiple and localized interactions among large numbers of relatively simply constructed 'agents' have yielded interesting potentialities of self-organization. Collectives possess certain abilities that are lacking in their component parts. Whereas an individual member of a swarm commands only a limited understanding of its environment, the collective as a whole is able to adapt nearly flawlessly to the changing conditions of its surroundings. Without recourse to an overriding authority or hierarchy, such collectives organize themselves quickly, adaptively, and uniquely with the help of their distributed control logic. Within swarms, the quantity of local data transmission is converted into new collective qualities.

It is thus possible to conceive of an initial way in which swarming has developed into a novel cultural technique. Swarm intelligence helps to configure an environment that is increasingly confronted with the task of organizing highly engineered and interconnected systems and also with the task of modelling complex correlations. It can be applied wherever there are 'disturbed conditions', wherever imprecisely defined problems present themselves, wherever system parameters are constantly in flux, and wherever solution strategies become blindingly complex. Swarm intelligence, according to one standard work, 'offers an alternative way of designing "intelligent" systems, in which autonomy, emergence, and distributed functioning replace control, preprogramming, and centralization' (Bonabeau et al., 1999: xi). To borrow an often-repeated notion from bionics, humans would do well in this case to learn something from the 'inventiveness' of nature.

There is yet another way in which swarming can be viewed as a burgeoning cultural technique. Since the year 2000, swarms have entered a growing discourse in the form of such expressions as 'smart majorities' (Fisher, 2010; Miller, 2010), 'smart mobs' (Rheingold, 2002), 'swarming in the battlefield' (Arquila and Ronfeldt, 2000), 'the wisdom of crowds' (Surowiecki, 2004), and simply 'multitude' (Hardt and Negri, 2004) – and this is not to mention their role in recent thrillers by Michael Crichton

(2002) and Frank Schätzing (2006). They have become a metaphor for the coordination processes of an engineered present, a present in which the flexible adaptation to ever-changing conditions can be associated with the alleged potential for freedom inherent in 'autonomous individuals'.

With the help of ever more dynamic forms of interconnectedness, as the swarm metaphor suggests, we are able to use an instantaneous infrastructure of decision-making to our own advantage. To achieve certain goals, it is thought, we are thereby able to coordinate temporarily with those of the same mind. This ephemeral and apparently 'grass-roots democratic' conception of collectivity has promised to uncouple political, economic, and social behaviour from the structures of entrenched systems and social organizations such as nations, political parties, and labour unions. Swarming, as a sort of 'network 2.0', has come to be used as a celebrated catchword – for political demonstrations arranged by means of mobile media, for the type of communication that takes place in online collectives, and for the organization and availability of information or 'knowledge'. Over the last 15 years, it seems, swarming has established itself both technologically and socially as a means of collaboration that is far superior to traditional forms of collective organization.

These recent developments are complicated, however, by a closer investigation into the genealogy of swarming intelligence. When, in what follows, I describe swarming as a cultural technique, I will attempt to approach the phenomenon by means of exemplary scenes from the media history of swarm research. It is worth clarifying, in general, the conditions under which swarms had been able to develop into productively deployable figures of knowledge, for traditionally they were associated either with an aura of the chaotic, escalatory, and uncanny (Tarde, 1901; Le Bon, 1896), or with a 'miraculous' and 'divine' power to fascinate (Maeterlinck, 1901). My approach below rests upon three theses, each of which problematizes and adjusts the paths of development, outlined above, that the concept of the swarm has undergone to become a cultural technique.

First, it can be maintained that the media history of swarm research has been based on a fundamental and gradual *withdrawal from naturalness* that has taken place within engineered environments of observation and experimentation. Analytic approaches and (media-technological) methods of observation have, for decades, been mired in a 'technological morass' (Parrish et al., 1997: 9), because swarms are problematic objects of knowledge: they disrupt the scientific processes of objectification by means of their dynamics in space and time. The only way to overcome this obstacle is to resort to synthetic methods of acquiring knowledge. Such methods are based on the recursive intertwinement of certain processes, namely those of the biologization of computer science, on the one

hand, and those of the computerization of biological research on the other. In this way, swarm-inspired agent-based computer simulation models and the applications of computer graphic imaging, which originated in different places for different purposes, have ultimately gained entry into the field of biological swarm research. Over the course of this development, swarms have become both an object and a principle of agent-based models and their methods of computer graphic imaging. A sociobiological understanding of animal swarms, or of bionic transferences, falls short in its description of the dynamic relations among humans, animals, and machines.

In the case of swarms, it is no longer animals that serve as a model for mankind and its *technē*. What is noteworthy is rather the reciprocal interference of biological principles and the processes of information technology. Swarms should be understood as *zootechnologies*. In contrast to biotechnologies or biomedia (Thacker, 2004a), they derive less from *bios*, the concept of 'animated' life, than they do from *zoē*, the unanimated life of the swarm. *Zoē* manifests itself as a particular type of 'vivacity', for instance as the dynamic flurry of swarming individuals. It is a vivacity that lends itself to technological implementation, for it can be rendered just as well into ordered or disorderly movement. This capacity, in turn, is based on rules of motion and interaction that, once programmed and processed by computer technology, can produce seemingly lifelike behaviour among artificial agents. And thus the conditions of knowledge overlap and entangle as well. Swarm research combines this *zoē* with the experimental epistemology of computer simulation.

A sound understanding of swarms will ultimately emerge where self-organizing processes are applied to processes of self-organization. In such a 'media-emergence', or 'becoming-media' (Vogl, 2007), swarms therefore co-create our knowledge of swarms. Without the specific media technologies of swarm research, 'swarms' do not exist as objects of knowledge, and swarming cannot be regarded as a cultural technique. In the media history of swarm research, the concept of media-emergence and that of cultural techniques intertwine; the development of swarming into a cultural technique could not have taken place outside of specific media cultures.

The second thesis concerns a perspective on the relationship among man, animal, and machine that has redirected the discourse of researchers concerned with cultural techniques. It is no longer a matter of debate whether (human) body techniques can be subsumed under the concept of (human) cultural techniques, or whether cultural techniques derive from the body (Maye, 2010: 122). Likewise, the perspective in question avoids the recent call in the field to make a 'media-anthropological turn' (Schüttpelz, 2006). Nor is it restricted to the representation of reciprocal, recursive, and cyclical mediations among signs, persons, and things (and to their significance to the medial

extension of humans into their environment). Rather, swarming is thought to include animals into the discourse – here as a multitude, as a collective – and thus to address a *zootechnological* relation. Produced between the fields of biology and computer science, a *systems knowledge* of self-organizing collectives assists us, in a way that anthropology cannot, in our treatment of certain problems and regulatory issues that are normally regarded as opaque. To the question concerning the operative interconnections between body techniques and media techniques, swarms contribute an element of 'dynamic collective bodies'.

In this light, a third thesis can be formulated that is of interest to the study of cultural techniques. For, although descriptions of swarms have existed since antiquity, swarming in the sense of a cultural technique did not originate until the media-emergence of swarms as 'intelligent' zoo-technologies. Around the year 1900, swarms were thematized in works of mass psychology to lament the debased treatment of humans as animals. Around the year 2000, however, animal swarms were suddenly serving as models for human 'smart mobs'. What occurred in the meantime is the transformation, based on biological swarm research and new developments in computer science, of swarms into operatively deployable applications. Along with this transformation, however, the concept of swarming was also fundamentally transformed – namely as a consequence of media-technological processes. Only a media-emergence could enable swarming to appear as a cultural technique. As much as possible, moreover, this media-emergence delegated the fundamental cultural techniques of image-making, writing, and calculation to automated and mechanized processes, be it in the form of new object-oriented programming languages or for the sake of presenting transactional data on graphical user interfaces, for example.

Thus, within recursive chains of operation, swarm principles not only participate in their self-description within the field of swarm research but rather they *co-author* processes within our knowledge culture (Vehlken, 2012). They appear in economic simulations and models of financial markets, in simulations of social behaviour, in simulations of crowd evacuations, and in the field of panic studies. They have become essential to epidemiology, to the optimization of logical systems, and to transportation planning. They are used to improve telecommunications and network protocols and to improve image and pattern recognition. They are a component of certain climate models and multi-robot systems, and they play a role in the field of mathematical optimization. What swarming, in its technologized and radicalized form, brings to the field of culture (or cultural techniques) is a fundamental element of culture in general. It is a dynamic structure, a topological system of inter-individual communication, which has deeply permeated the governmentality of the present.

Related below, within the context of these three theses, are scenes from the media history of swarm research that depict the production of

swarms as zootechnologies. In light of these scenes I will examine how it has been possible for swarming to evolve from clouds of data drifts into a concept that is essential to social and cultural techniques.

II. Data Drifts

At the beginning of medial relationships, according to Michel Serres, there is noise (1982: 18–19), and thus noise can be understood to mark the beginning of all media theory (Siegert, 2007: 7). It is not an unhindered exchange between two parties that stands at the onset of every societal and cultural relationship, because a third party is always involved. With the concept of the *parasite*, Serres has identified phenomena of interference and interruption that precede any such interaction. It is therefore characteristic of medial relationships, he notes, that their channels of communication have to be constructed and optimized under the assumption that they will be distorted and interrupted by certain factors. In our efforts to exclude parasitic phenomena, the latter are thereby made a part of our every interaction. It is only through the act of suppressing noise, in other words, that mediality comes into being. The result is a tripartite model in which interference is not accidentally grafted onto existing relationships, but rather in which it is constitutive to the formation of the relationships themselves (Serres, 1982: 73). Serres's concept of the parasite is interesting for the study of cultural techniques because it augments this media-theoretical insight with two additional considerations. First, it contributes a cultural-anthropological dimension that arises from the semantics of the concept itself, based as it is on transcending the difference between humans and animals. Second, it contributes an aspect associated with cultural techniques in the older sense of the term, which was laced with economic and agricultural significance (Siegert, 2011: 102).

With respect to swarming, however, the media-theoretical aspect should be pursued even further, for swarms represent an instructive *object* of Serres's concept as well as a particular exception to it. They operate simultaneously as agents of the materialization of noise and interference, on the one hand, and as processes of the productive revaluation of noise on the other. Animal swarms oscillate on the field of tension between interference and organization.[1] From a distance, what appears to be the precise and coherent macro-dynamic of an admittedly diffuse collective begins to look quite different when examined up close, namely like a seemingly unorganized flurry of innumerable micro-interactions. These interactions surpass not only the capacities of human perception but also the analytic capabilities of technological recording devices. As an event, swarming defies perceptual or medial transference by means of its own transformative properties (Vogl, 2004: 147). The very swarming of swarms baffles our view of the 'swarm' as an object

of knowledge; as a chaos of spatial, temporal, and interactional information, swarming introduces an 'inability to experience objects empirically', something which was captured so well in Alfred Hitchcock's *The Birds* (Vogl, 2004: 145). At the heart of biological swarm research lies the search for adequate media-technological means of studying the interactions and functions of these dynamic animal collectives.

At the beginning of the 20th century, the first attempts to observe swarms of birds in the wild coincided with the emergence of a new field of research known as behavioural biology (Nyhart, 1996). Long before the establishment of professional scientific research practices, amateur ornithologists such as William J. Long and Edmund Selous simply 'went out into the field'. There they attempted to trace the secrets of certain flocks of birds that swarmed together in the air like a single being. Equipped with an ornithological recording system – which consisted of little more than their eyes, a telescope, a pen and some paper, a great deal of patience, and some crude shelters for observation – they assiduously took note of everything they could see (Selous, 1901: 173). Yet the speed of the interactions defied the perceptive capabilities of the observers to such an extent that they were forced to base their findings on super-perceptual 'waves of thought'. For the recording of the latter, unfortunately, no appropriate technology had yet been invented (Selous, 1931). Of course, such ideas have to be situated within their contemporary context. First, they should be evaluated in terms of the popular theories that circulated about the 'psychic lives' of animals and humans (Bouvier, 1922); second, they must be seen in light of new wireless media such as radio and radar, and also in light of the various wave theories that were hotly debated among the physicists of the time (Vines, 2004: 48).

Although short-lived, such swarm theories – along with an intensive biological-philosophical discourse concerning emergent evolution and superorganisms (Morgan, 1923; Wheeler, 1911) – smoothed the way for other avenues of explanation. Whereas decades would pass before technological innovations facilitated the study of flocking birds, those studying schools of fish profited from more accessible experimental conditions and from an elaborate infrastructure of aquaria. The latter infrastructure was supported quite substantially – *mirabile dictu* – by the interests of the fishing industry. And yet these developments resulted in new epistemic fissures, which the biologist William Bateson had identified even before the turn of the century. Although it was now possible, Bateson noted, to enjoy the advantages of 'artificial conditions' within the laboratory, the abiotic influences of such conditions must always be kept in mind (Bateson, 1890: 225–6). Artificial environments represented the best means of approximating the living conditions of the animals under investigation, but only to the extent that new laboratory findings were informed by a sophisticated understanding of aquaria and their

effects (Allen and Harvey, 1928). Even then, however, it remained questionable whether the behaviour observed in aquaria was transferable to schools of fish swimming freely and unobserved in the sea. In addition to peculiar sleeping behaviour – '[a]t night they lie *on the surface* of the water' – Bateson identified three main characteristics of a school of captive grey mullet, namely a tightly-formed collective body (at least during the day), the lack of an explicit leader, and the parallel alignment of individuals in one direction (1890: 249–50).

A good three decades later, researchers such as Albert Parr, Karl von Frisch, and Guy Spooner developed these early observations further, although they conveniently failed to address the issue of sleeping habits. In 1927, Parr conceived of a psycho-mechanical model for schools of fish, according to which the social behaviour of such swarms was neither complicated nor mysterious. According to his theory, this behaviour is rather the result of multiple psycho-mechanical and physio-mechanical reactions within a simple set of rules: an instantaneous attraction among the individuals upon eye contact, a parallel alignment, and the maintenance of equal distance among the individual fish (Parr, 1927). By means of experiments with partitions and mirrors inside aquaria, Spooner (1931) systematically evaluated the extent to which these factors actually came into play during the formations of schools. Frisch investigated the ability of minnows to react to certain repellents and signs of danger. Whereas he boasted of the 'good overview' provided by his aquarium, which allowed for an 'objective execution of protocol [...] with a stopwatch in hand' (Frisch, 1938: 603), Spooner acknowledged the fundamental limitations encountered when dealing with swarms: 'For any given fish it is impossible to predict definitely how it will behave, but it is possible to say how it will most probably behave [...]. But it is not possible to measure this probability [...] accurately' (1931: 444). To Spooner's mind, unambiguous correlations between the reactions of fish and the methods of experimentation were lacking. Yet another difficulty in determining the relevant factors of swarm formation, in other words, involved a level of predictability that could only yield probable correlations. Researchers had to distance themselves from the determined and linear principles of cause and effect. For it was not only the imprecision of physical observation – but also that of the data produced by experimental fumblings, imaginings, and especially *processing* – that led to certain pitfalls.

After the Second World War, the research concerned with schooling fish underwent a media-technological upgrade. D.V. Radakov endeavoured to observe swarms consisting of approximately one hundred individuals, for only swarms of such a critical size could be said to demonstrate any universal patterns of behaviour (1973: 54). To this end he installed a camera above an aquarium, the bottom of which was equipped with a measuring grid. His method also enabled such techniques as replay

and slow motion. Radakov determined the interactions of swarming individuals by examining the changes of their position in frame-by-frame projections or stills – adjusting, of course, for changes of scale. Thus were created maps of the activity of fish schools in two dimensions plus time. Yet this method also entailed certain obscurities, especially because it failed to account for the third dimension of space. The fish overlapped one another from the perspective of the camera, so that it was hardly possible to track them with accuracy throughout the sequences of film. Accordingly, all of the data had to be tediously and manually generated and 'saved' in a tabular form. This process was further complicated, moreover, because school formations would often break apart upon reaching the wall of the aquarium and having to turn around.

In anticipation of this problem, doughnut-shaped aquaria were developed during the 1960s (Shaw, 1962: 130); in these, the polarized individuals of a school can swim constantly in one direction. To this development can be added the so-called 'shadow method', which allowed for schools of fish to be studied in three dimensions. The method required a camera to be flanked by a spotlight, and for the latter to be aimed at a particular angle. By such means, each of the fish under observation cast a clear shadow onto the bottom of the aquarium, and the differences in size between the actual fish and their projected shadows, given the angle of the light and the depth of the water, yielded information about the coordinates of the individuals in three-dimensional space (Cullen et al., 1965). Thus it was possible to map the activity of a moving swarm over a long period of time, though the swarms in question were typically restricted to between 20 and 30 individuals.

A comprehensive analysis of this type was undertaken in the middle of the 1970s by a team under the direction of Brian Partridge (Partridge et al., 1980), and the data accumulated by their four-dimensional measurements remained the standard for many years. Even in the present millennium, according to Julia Parrish, their findings have provided a metric of swarming activity that has influenced the design of certain computer simulations (Parrish and Viscido, 2005: 67). However, even though Partridge was able to implement a partially automated recording system – so that positional data could be read by means of a computer program along with graphical user interfaces, optical fuzziness could be filtered out, and the paths of individual fish could be plotted on coordinates – researchers were still left in despair on account of the immense amount of data at their disposal. Even in the case of small schools observed in laboratory settings, there were '[m]ethod sections from several fish schooling papers [. . .] full of agonizing descriptions of the number of frames analyzed [. . .]. The endless hours of data collection were enough to turn anyone away' (Parrish et al., 1997: 10).

Similar observations can be made about the study of flocking birds. In this field, for instance, Peter Major and Laurence Dill conducted

experiments in the 1970s with stereo-photographic recordings. In order to ensure a stabile camera perspective and uniform photographic details, however, their experiments were only possible in the case of flocks passing above at a leisurely pace, such as those heading to a feeding ground. Even an attack by a predatory bird, which might itself lead to interesting collective dynamics, would overtax the system of observation (Major and Dill, 1978: 122). Ironically enough, these researchers had their best luck at the Vancouver airport, 'where flocks are a particular hazard to turbine-powered aircraft'. This conflict between technology and swarms is likewise valid in the case of their empirical, optical analysis. The media-technologies of swarm research have encountered the greatest difficulties when trying to dissolve the inter-individual movements of individuals from the collective movement of the whole in efforts to reach conclusions about the dynamics of large collectives in time. Attempts to examine individual details, that is, can obscure our understanding of the whole.

The stubbornness of swarms in the face of media-technological patterning processes also manifests itself in complementary fields of research. With the help of radar (in the case of birds) and sonar (in the case of fish), for instance, attempts have been made to analyse the global activity of animal collectives (Heppner, 1997; Gerlotto et al., 1999; Simmonds and MacLennan, 2005; Paramo et al., 2007). These investigations have brought to light another side of medial 'uncertainty principles', namely where technological media are confronted with 'bodies without surfaces'. The act of (electro-) acoustic scanning – and the visualization processes associated with it – must contend with multiple interferences that frustrate its ability to draw accurate conclusions about the inter-individual relations within a given collective. Far more problematic, however, is the failure of such methods to create reproducible testing conditions and to generate data of long-standing significance. The Cartesian procedure of dissolving problems into sub-problems, and thus of analysing collective movement as the sum of segmented individual movements, necessarily fails to explicate scale-variant phenomena such as swarms.

III. Simple Rules

Because of the complications surveyed above, certain researchers sought other approaches to the problem. In connection with Parr's thesis, namely that the dynamics of fish schools can be ascribed to a few simple rules of interaction, efforts were made to 'calculate' swarms, that is, to develop abstract mathematical models of their activity in space and time. This process did not aim to solve, in an analytic manner, the non-linear dynamics of swarms and the factors responsible for their ability to self-organize, but rather to approximate them numerically. In response to an Aristotelian platitude that is often cited in this context, Heinz von Foerster has related a fitting riposte: 'The whole is

greater than the sum of its parts. As one of my colleagues once remarked: "Can't the numbskulls even add?"' (Foerster, 2003: 319). For this is not at all a matter of the summation of parts, but rather of the dynamic relations *among* the component parts of a system. Swarms engender a specific *relational being*, the nature of which has been summarized well by Eugene Thacker: 'The parts are not subservient to the whole – both exist simultaneously and because of each other. [. . .] [A] swarm does not exist at a local or global level, but at a third level, where multiplicity and relation intersect' (Thacker, 2004b).

However, before computer technology enabled the viability of elaborate synthetic approaches, which circumvented the analytic problem of 'fuzzy relations', models of swarming behaviour were at first only possible if the number of variables involved was severely reduced. In the early 1950s, Charles Breder began to calculate the internal relations of swarms by conceptualizing each of its individuals as a physical point of mass with specific powers of attraction and repulsion (Breder, 1954). As far as biology is concerned, models of this sort have been criticized as having little predictive value; however, they do have the advantage of relying on established physical laws and formulas. Geometric models were also developed, the concern of which was either the optimal utilization of space (Breder, 1976) or the formation of aggregates in general (Hamilton, 1971).

Breder and Radakov gradually formulated new concepts, based on information theory, that would supplant the older psychological and psycho-mechanical terminology. They directed their attention, for instance, to the phenomenon of so-called 'waves of agitation'. Radakov described such waves, which are also observable in flocks of birds, as 'a rapidly shifting zone in which the fish react to the actions of their neighbors by changing their position [. . .]. The speed of propagation [. . .] is much higher than the maximum (spurt) speed of forward movement of individual specimens' (Radakov, 1973: 82). They introduced additional environmental factors into their models, which had been overlooked elsewhere, and also filtered out what they considered to be 'unimportant' interference. These adjustments led to significant structural changes and to the optimal reaction of their theoretical swarms to environmental influences. Measured under such influences, swarms came to be understood more and more as infrastructures of information or, more generally, as 'social media' (Schilt and Norris, 1997: 231).

The conceptual informatization and mathematical modelling of biological research may have stimulated the first attempts at individual-based simulation, which were ventured in the 1970s and early 1980s (Kay, 2000). In an article from 1973, Sumiko Sakai provided a mathematical model, based on internal rules, for the behaviour of schooling fish. The novelty of this study was that the paths of motion were calculated by a computer and then, much like the plotted diagrams of empirical

laboratory reports, recorded graphically. Tadashi Inagaki et al. (1976) investigated the coherence of fish schools over long periods of time and developed a mathematical model with the following five variables: 'mutual attractive or repulsive force, mean swimming force, random force, force exerted by the change of circumstances and frictional force of swimming motion'. According to their results, the coherence of a given swarm could only be maintained so long as certain combinations of these parameters were in effect.

Of special interest to the potential of computer simulation was the work of Ko Matuda and Nobuo Sannomiya (1980), which enhanced Sakai's model into an application for modelling fish behaviour in relation to fishing nets. Theirs was the first study to address the reciprocal effects of computer simulation and swarm research. Whereas traditional technologies such as underwater cameras and hydro-acoustic sensors were subject to certain restrictions – underwater visibility, marine conditions, and so on – and were only capable of recording small excerpts of data, computer simulations could be relied upon to compensate for these deficiencies (Matuda and Sannomiya, 1980: 689). Increasingly, swarm research began to distance itself from the influences of psychology and behavioural biology, and 'natural behaviour' came to manifest itself as little more than a function of physical, quantified variables. Swarms were modelled as technical systems of multiple components, each with a set of predetermined characteristics. Models of this sort enabled biological swarm research to expand into an operational and far more general means of describing multitudes composed of homogeneous elements. As a result of this development, the actual 'nature' of these collective systems ultimately became a subordinate issue.

The latter authors conducted computer experiments with virtual schools of fish in which they tested, for instance, their behaviour in response to certain obstacles. However, it was Ichiro Aoki's simulation model of schooling fish, published in 1982, that would become foundational to later research in the field of agent-based modelling. Aoki integrated motion parameters into a zone-based model, composed of concentric circles surrounding individuals, that governed the activation of certain behavioural parameters. The model generated reciprocal dynamics among individuals, and these dynamics depended on the presence of such forces as attraction, repulsion, or alignment, on the velocity of the individuals, and on their trajectories in relation to one another. For some time, this understanding of the organization of swarm dynamics remained inapplicable to other disciplines. The realization of its interdisciplinary potential would require another media-emergence of swarms. What had been lacking, to be precise, was the ability to animate this activity with visualization processes, based on the principles of swarming, in which swarms could ultimately appear to be 'written in their own medium'.

More than half a decade passed before the processes of computer graphic imaging, in the form of Craig Reynolds's boids model (1987), would come into play. Ironically, the latter model has often been cited as an *urtext* of computer-assisted *biological* swarm research. Building upon William Reeves's particle system for the animation of fuzzy objects such as dust, clouds, or fire (Reeves, 1983), Reynolds was not at all interested in realistic variables of behaviour but rather in a performance that was only somewhat true to nature. To some extent, his program was born of laziness, for he wanted to avoid the error-prone and Sisyphean task of separately programming the path of each individual boid within a large collective. Such a program was inflexible, too, for the alteration of a single flight path would entail a commensurate alteration in the flight paths of the other swarming individuals. This difficulty was remedied by the application of object-oriented programming methods. For each boid, Reynolds generated a customized geometric orientation and, much like Aoki, he created an individualized and locally applicable algorithm on the basis of three 'traffic rules'.

In test runs, which Reynolds was (innovatively) able to track on a computer monitor, it came to light that realistic swarm activity would only be produced when the boids oriented themselves toward the locally perceived centre of the flock. Spatially limited knowledge, according to the model, was thus fundamental to the universal operation of a collective. Moreover, each individual boid's capacity for decision-making was also temporally limited, such that changes in their course did not become more time-consuming in response to an increase in neighbouring boids, and the coordinate system did not become increasingly complex as the size of a given flock enlarged. The result was a highly realistic representation of collective movement, along with a few surprises for the animator himself. The boids, for instance, were able to negotiate obstacles independently without the addition of further parameters to the model, and they would also change direction suddenly and abruptly. On account of its simplicity and flexibility, the boid model would soon be employed in the field of special effects, especially for the animation of crowd scenes. Swarms, therefore, were reintroduced to the medium of film not simply as a way of distorting images, as in Hitchcock's *Birds*, but also as an organizational principle of image production.

The use of swarming in scientific simulations represents a culmination point in the media history of the concept. Swarms themselves came to be used as a model, as a potential condition. In computer simulations, experiments were conducted with distributed behaviour parameters, which were then regarded as the simple behavioural rules of biology itself. In short:

> The 'bio' is transformatively mediated by the 'tech' so that the 'bio' reemerges more fully biological. [. . .] The biological and the digital

> domains are no longer rendered ontologically distinct, but instead are seen to inhere in each other; the biological 'informs' the digital, as the digital 'corporealizes' the biological. (Thacker, 2004a: 6–7)

Reynolds's dynamic, computer-graphic visualizations evidenced a new epistemic strategy. They introduced a way of understanding according to which swarming individuals localize, organize, and synchronize themselves independently. The misleading view of observational media with a central perspective was replaced by a topological system that creates its own space for itself. Swarms have to be understood as projects of time and space. They function as a self-organizing swarm-space on the basis of local interactions conducted in parallel and *en masse*. By adapting to external influences, this swarm-space also provides information about the nature of the environment surrounding it. And a constitutive element in this regard is the fourth dimension of time, for it is only in time that swarms come to be. With the help of agent-based modelling and its processes of visualization, swarms could finally be understood in four dimensions.

IV. Cultural Techniques, Opaque Spaces, and Agent-based Modelling

Biological swarm research did not begin to implement agent-based models on a broad scale until the 1990s, that is, until advances in animation technology were made in Hollywood (Macavinta, 2002). In correlation with rapidly increasing data processing speeds, larger and larger swarms could be modelled and more and more variables could be introduced (Reuter and Breckling, 1994; Couzin and Krause, 2003). Thus phenomena such as currents, predatory attacks, different body types, and the variant speeds of individuals could be taken into consideration, while integrated stochastic errors could account for imprecise movements and coincidental environmental disturbances. At first, all of this was carried out graphically, for example with two-dimensional cellular automata (Vabø and Nøttestad, 1997), but soon, and to an increasing extent, such models were designed in real-time 3D with the help of suitable visualization software (Couzin et al., 2002).

Computer experiments conducted with agent-based models are not constrained by the physical interferences encountered by researchers in the sea and in the laboratory. They are rather spaces of potential, in which multiple scenarios can be tested and brought into contact with one another. Thus, agent-based models have established an immaterial culture within the sciences – embedded, of course, in the facticity of the hardware and software on which they run. In such representations, swarms lose their optical and acoustic stubbornness, even while they can be simulated as facets of material culture under the most diverse

conditions. Intermediary steps and spaces for epistemic and technological things or for the capacity of objects to operate in actor-networks, which have been central ideas in the work of Hans-Jörg Rheinberger (1997, 2010) and Bruno Latour (1987, 2005), shrink or disappear within the spacio-temporality of virtual scenarios. In plain terms, the application of agent-based modelling has led to a simultaneous explosion and implosion of epistemic things, something which is characteristic of computer applications in general: an explosion, because more and more new scenarios are allowed to multiply; an implosion, because thus they lose their solidifying character and become fluid, that is, processable.

To some extent, swarms contain a concentration of certain problems that, when addressed by the experimental epistemology of computer science, expand into something like a culture of intransparency or opacity. Computer graphics enable a visual comparison of various universal structures, both with respect to parameter adjustments within the rule sets of agent-based modelling and also in terms of the sporadic, empirical data collected about schooling fish in laboratories and in the open water. Thus it can be determined 'intuitively' whether a chosen combination of parameters produces results that resemble the behaviour of a biological swarm. The base function of this knowledge is the act of 'seeing in time'. In its state of temporal 'thrownness' (*Zeitgeworfenheit*) – or, better, in its state of having been designed in time (*Zeitentworfenheit*) – computer science is able to animate mathematical models, that is, endow them with life in 'run time'. In this way, it does not exhaust itself into a mere expansion of existing epistemological strategies.

Computer science represents more than simply an improvement of numerical calculation methods by means of the processing speed of computers. It can rather be attributed an entirely unique epistemological status of theoretical experimentation. It is here that pragmatic operationality has supplanted the need for precise theoretical foundations. It is here that categorical truth-claims are replaced by provisional knowledge. Here, in other words, 'the performance on the computer is more important than the model's derivation and its accuracy of calculation' (Küppers and Lenhard, 2004: 271). Unlike the case of theories, computer science is less concerned with what is true or false than it is with pragmatic utility (Sigismundo, 1999: 247). The hypothetical character of knowledge in this field is underscored by the different and competing models of swarm simulation; instead of confirming one another's findings and producing certainties, they have instead generated a spectrum of opinions and viewpoints.

Where computer science focuses its attention is on the *relations* that exist within systems. At this point, swarming as an object of knowledge encounters the epistemology of simulation. The relational being of swarms, with its intersections of the microscopic and macroscopic, can only be adequately captured by a technology that itself bisects the distinction between the epistemic and the technological thing, that is, by a

technology that focuses on *knowledge relations*. The knowledge of swarms and that of computer simulation go hand in hand. That which cannot be addressed adequately *in vivo* and *in vitro* can be recorded *in silico*.

The recursive coupling of swarm-inspired agent-based modelling and swarm research, however, entails an even graver consideration. Agent-based models were first implemented by means of object-oriented programming. Both agent-based modelling and object-oriented programming can thus be assigned to the same paradigm, one that Frederick Brooks (1987) subsumed under the concept of 'growing' (in its double sense of 'increase' and 'cultivate'). To a certain extent, control and 'intelligence' are here delegated to a self-regulating system (Parikka, 2010). And within the paradigm of growing, which inclines toward self-organization and procedurality, swarms appear as a digital cultural technique *par excellence*, one that enriches the study of cultural techniques with a zootechnological dimension.

Casey Alt (2011) is even more radical in this regard, for he has identified object-oriented programming to be the material foundation of our entire understanding of computers as media. Alt conceptualizes this medial relation as a 'society of objects' within a computer, the communication of which takes place both among the objects themselves, at the program level, as well as with human users by means of interfaces. Thus the user is likewise conceived of as a programming process, and object-oriented programming begins to structure, more than just metaphorically, our daily lives: 'Object orientation increasingly mediates how we work, play, fight and love' (Alt, 2011: 298) – from video game communities to social networks to the flow of information in modern businesses.

To this list, agent-based modelling contributes the realm of knowledge and science. For, from the media-historical threshold where the epistemic conflation of fish and chips yielded an extensive and novel understanding of the principles of regulation and self-organization that govern swarms, these principles became operable as figures of knowledge in various fields of implementation and for various technological applications. Toward the end of the 1980s, for instance, when experiments were conducted with robot collectives composed of simply designed individuals, the researchers operated according to the following motto: '[U]sing swarms is the same as "getting a bunch of small cheap dumb things to do the same job as an expensive smart thing"' (Corner and Lamont, 2004: 355).

The logic of swarms introduced a new type of economy to technological processes, an economy based on the flexibility of model environments, on a distributed mechanism of control and regulation, on the independent creation of unpredictable solutions, and on high levels of fault tolerance and reliability. Swarms integrated themselves as components of the evolutionary software designs with which mathematical optimizations could be executed – in the form, for instance, of particle swarm optimization (Kennedy and Eberhart, 1995). The latter designs were in

turn implemented for problems of multi-objective optimization, that is, for processes involving multitudes of reciprocal and mutually constraining variables. Their field of application has extended from industrial production processes to logistics planning to the optimization of network protocols (Engelbrecht, 2005). Moreover, the interactional intelligence of swarms can play a role wherever there are time-sensitive problems of coordination and transference between numerous particles; such problems present themselves, for instance, in traffic simulations, social simulations, panic simulations, consumer simulations, epidemic simulations, simulations of animal collectives, in the behaviour of aerosol in climate models, and even in the case of organizing building materials. Swarms create information by means of formation.

Swarms and the algorithmics of their relational being can be called 'intelligent' whenever a matter concerns the (independent) government and planning of interactions in space and time. Their applicability to agent-based computer modelling and to distributed technological collectives is indicative of their effectiveness as a novel cultural technique. As such, swarming is characterized by the fact that it was produced in the area of tension between biology and computer science. Originally regarded as mere interference phenomena, swarms emerged as operational media technologies. As an addressee of this cultural technique, humans were at first only an unintentional part of the equation. Strictly speaking, swarming did not exist as a cultural technique before its media-technological manifestation, that is, before it became applicable in the field of computer science as a novel epistemic process and as a solution configuration for a multitude of complex problems.[2] Moreover, the influence of the cultural technique expanded even further when the 'crowd logic' of its behaviour came to be employed as imitable particles in social simulations. Around the year 2000, at the latest, swarm intelligence and agent-based modelling emerged as a powerful and irreversible element of the current media culture. It is as *zootechnologies* that they have developed into a relevant cultural technique, and as such they have enabled and initiated novel engagements with opaque areas of knowledge, with interference phenomena, and with technological and systemic correlations that otherwise would have been difficult to ascertain.

At the same time, they produce and even demand – like the paradigm of object-oriented programming – a zeitgeist and world view in which cultural processes are characterized more and more by the multiple and dynamic interactions of autonomous and self-optimizing 'agents'. Once aware of the lasting effects of swarming as a cultural technique on our current media and knowledge cultures, at least as described here, one should be quick to distrust the highly touted potential of social swarming and the grass-roots-democratic 'nature' of human techno-collectives. This holds true even despite the elevation of the discourse, in the past few years, to sophisticated media-theoretical levels (see in this regard the

work of Tiziana Terranova, Luciana Parisi, Olga Gurionova, Howard Slater, and the recent issue of *Limn* devoted to 'crowds and clouds').

Ultimately, whoever belittles recent revolutions with the journalistic banalities of swarm logic – 'Facebook revolution', 'Twitter revolution', and so on – deliberately overlooks the extent to which the cultural technique of swarming has come to define our situation. Swarms should no longer be understood simply as advanced manifestations of older forms of collective behaviour. It is much rather the case that they have gained relevance as structures of organization and coordination. These structures have become effective against a backdrop of an opaque culture – one defined by the permanent flexibility of various domains of life – and they have become effective namely as optimization strategies and zootechnological solutions *within* these very domains. At the heart of swarming, as a cultural technique, is thus the governmental constitution (*Verfasstheit*) of the present itself, in which operationalized and optimized multitudes have emerged from the uncontrollable data drift of dynamic collectives. From this there can be no escape.

Translated by Valentine A. Pakis

Notes

1. Here I am limiting myself to 'decentralized' animal collectives such as swarms of birds and schools of fish, the dynamics of which are created in three dimensions of space and by constant motion in time. Insect collectives thus remain beyond the scope of the present discussion.
2. As a term used in mass psychology, or as an obsolete element of military tactics, the concept of swarming was chiefly employed to signify the *dissolution* of order, that is, the act of 'swarming all over'. It was not then conceived of as representing the relational, procedural, and structural intermediary domain between the individual and the collective, namely the very domain that, according to Eugene Thacker, defines the dynamics of swarms.

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From Media History to *Zeitkritik*

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Abstract
Wolfgang Ernst, Professor of Media Theories at the Humboldt University in Berlin, has become known through his work on media archaeology. Hence the inclusion of this translation represents an alternative take on cultural techniques. It places the legacy of cultural studies, or *Kulturwissenschaften*, in an interesting tension with the different epistemological demands that technical media impose. After Vico and Dilthey, argues Ernst, we need to investigate the specific modes of knowledge that technical media propose to cultural techniques. Ernst's media archaeology and the slightly different approach to cultural techniques found in some other contributions in this issue can be seen as two of the most intriguing ways in which current German media studies has been developing in relation to Friedrich Kittler's impact. For Ernst, this has resulted in a more technical focus and also in the development of critiques of temporality that go beyond media history. Ernst argues that media temporality is not to be understood only through the cultural history of media technologies, but also how media technologies produce time. Machines have their own specific temporality, *Eigenzeit*. It is in this context that the article discusses the different approaches to cultural techniques, taking into consideration the specific time-critical and epistemic implications of technical media.

Keywords
cultural history, cultural techniques, epistemology, media, media archaeology, media theory, temporality

The present article does not primarily focus on the alliances and distinctions between cultural theory [*Kulturwissenschaft*] and media studies [*Medienwissenschaft*] as academic disciplines, but rather questions the discursive mode that spans both subjects: the *historical* inquiry into the things that shape culture.[1] Technical media are neither the apex nor the driving force of culture, but rather a constitutive element of its

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history. Consequently, the history of media must be written as a history of cultural techniques. Media are a part of cultural history and culture can be read as a function of media history. Both forms of history share a common focus in the concept of 'cultural techniques'. Epistemologically speaking, this is a rather harmless claim: after all, the humanities have learned to look at matters historically and render them as history(ies) ever since Vico and Dilthey. As long as there is agreement on this point, defining media history in terms of cultural history and cultural history as a media effect will always be mutually implicit. The question still remains whether there is anything about technical media that eludes the realm of history, its narrative model or even, ultimately, culture itself. To a certain extent, it seems obvious that all media innovations are culturally determined – a premise culminating in the *new historicist* view that affirms both the textuality of history and the historicity of texts. But this chiastic historical model calls for a supplement: the assumption of an inner logic of media development that literally introduces a third element to the Promethean dichotomy of culture and nature.

Anything and everything associated with the term 'media' can, of course, be included in the discursive framework of cultural history. That inclusion, however, would jeopardize the accuracy of a term that refuses to label anything and everything as media, but rather seeks to account for discontinuities, in order to grasp media-epistemological escalations (Bachelard, 1974; Canguilhem, 1979). Michel Serres distinguishes between techniques and technologies – a distinction which also applies to the difference between cultural techniques and media technologies. He contrasts the 'hard' machinery of the Industrial Revolution, functioning on the basis of thermodynamics, with the 'soft' negentropy of information technology: 'I therefore reserve the term "technology" for those types of artefacts that negotiate signs – and thus the logos – and contrast them with "techniques", whose energetic scope is 10^{16} times higher' (Serres, 2002: 194).

Speaking of the frequent confusion between the stroboscope and the afterimage effect in the transmission of visual perception, Bernhard Siegert stresses 'how fundamentally the media-theoretical discourse is in need of a media-historical framework of analysis to match media's inherently high physical and mathematical standards' (Siegert, 1996: 8). And, indeed, the history of knowledge and technology serves as a necessary test for all media theories. But media archaeology does not merely reconstruct historical media practices; it also reflects on their time-building, chronopoetic processes – thereby raising a challenge to history.

Cultural History with Media History – A *Liaison Dangereuse*

The field of *Medienwissenschaft* also fulfils, at many universities, the function of *Kulturwissenschaft*, or else works in close cooperation with it (Dotzler, 2005). This privileged proximity is rooted in the fact that both

disciplines (in contrast, for instance, to what is known as 'cultural studies') deal not merely with the discursive software of culture, but also with its material hardware. But while *Kulturwissenschaft* prefers to read media techniques as a function of historical processes, media archaeology takes the opposite perspective: here the model of history itself appears as a function of cultural (symbolic and signal-based) operations.

To this day, the field of *Medienwissenschaft* draws on the resources of cultural history, which emerged in the 19th century both as an academic practice and a research *dispositif*. This is precisely why it is vital to analyse the media-based conditions of such a large-scale, worldwide labour of collecting, archiving or museumizing. So, for example, the postal system (transmission) and the archive (storage) became conjoined when Erich Moritz von Hornbostel ordered Edison cylinders with musical recordings from all over the world for his Berlin phonographic archive, with the idea of developing the field of comparative ethnomusicology (Klotz, 1998). The notion of culture that governed the projects involved in collecting knowledge around 1900 had become identical to the storage media it generated. In its materiality, culture thus reveals itself as an object of research for the study of storage and transmission techniques. Chronology, diplomacy, epigraphy, genealogy, heraldry, numismatics, palaeography, sphragistics, historical cartography: these so-called ancillary disciplines of history, which identify and analyse their objects with regard to their usability as cultural data storage devices, acquire the status of media archaeology *avant la lettre* and are intimately connected with the category of *Kulturwissenschaft*. As a result, culture becomes calculable; it is a function of mnemonic strategies and transmission techniques, as well as their respective institutions.

The analysis of media techniques and material culture is a joint endeavour of *Kulturwissenschaft* and *Medienwissenschaft*. Marshall McLuhan famously analysed the psycho-technical effects of media as operators in the cultural matrix. But what happens if such media technologies no longer operate in the familiar context of culture but form a world in their own right? A notable difference between *Kulturwissenschaft*, on the one hand, and *Medienwissenschaft*, on the other, lies in the fact that the former is primarily interested in discourses, while the latter places a much stronger focus on non-discursive aspects. In contrast to the field of *Kulturwissenschaft*, which tends to interpret experimental arrangements as semantic spaces, media archaeology (much like Gaston Bachelard's epistemology) seeks to maintain spaces of contingency (see also Rheinberger, 2001). The cultural techniques that generate discourses are precisely those that are not already discursive effects. The inquiry into what constitutes 'existential' historical differences – so to speak – sets the study of cultural techniques apart from the kind of cultural research that not only carries 'media' in its name but also engages with media's intrinsic perspective and specific inner temporality

[*Eigenzeit*] in a kind of reverse hermeneutical move. On the one hand, this means programmatically positioning media theories within concrete spaces of cultural practices. However, media archaeology is not to be confused with *Kulturwissenschaft*. Writing, reading, counting, networking and representing are symbolic techniques which generate culture as a recurring and normative formation. They transform a priori concepts of space and time into an analysis of concrete spatial and temporal systems. Media archaeology does not conduct this analysis on the level of macro-cultural production, but rather on the level of micro-technical operativity. In contrast to *Kulturwissenschaft*, which starts from grand narratives (histories of culture, science or even knowledge) to arrive at concrete particulars, media archaeology operates on the assumption that technological media systems can be understood primarily and conclusively on the basis of their elementary, sub-semantic procedures. This type of analysis, which understands material, symbolic and signal-based operators as escalations of classical cultural techniques, requires a theory of genuine media-temporal processes.

Traditional media history and cultural history are in agreement on how 'organ projections' and the *extensions of men* (Ernst Kapp, Marshall McLuhan) have developed into culture's servomechanism. Anthropocentricity thereby turns into a perspective which increasingly views man as codified (or even programmed) by cultural techniques and media technology. To paraphrase Günter Anders, media theory actively pursues the 'antiquation' of man by distancing the subject-centred perspective through apparatus-based *theoría*, that is, through the algorithmic processes of technological media themselves. In traditional cultural history, culture appears as a process of progressive semantification, which produces and reproduces resources of meaning, but which also undermines and destroys them. In this sense, it combines media research with cultural semiotics, which understands culture as a form of poetics (Böhme, 2004: 23). Cultural history thus remains on the symbolic and semantic level. In contrast, media archaeology stresses the syntactic aspect: the processing of signals rather than the signs themselves. The so-called *Medienkulturwissenschaft* (a hybrid of media studies and culture studies) develops theoretical models that understand aesthetic and technological changes as semantic shifts. A study of media time [*Medienzeit*] that is grounded in communications theory, on the other hand, intentionally keeps its distance vis-à-vis historical formations of meaning.

Cultural History with Vico

Media theory tacitly becomes *Kulturwissenschaft* when it is translated into the discourse of history: in other words, when all temporal signs are translated into the kind of history that Giambattista Vico defined as

the realm of humanity – and thus the realm of culture – in his *Scienza Nuova* (Vico, 1948). According to Vico, all historical products are comprehensible to humans precisely because they were produced by humans. Vico's foundation for all studies of culture was written 'in explicit opposition to modern (natural) science' (Kittler, 2000: 16). The new discipline dealing with the common nature of all people contested René Descartes' attempt to elevate the principles of modern mathematics and science to all-encompassing philosophical principles – the attempt to extract the algorithm of the historical development of culture. Vico critiques a mathematical analysis, which increasingly deprives its objects of their embodied corporeality. Yet disembodiment characterizes the current state of information technology. Following the principle of mechanics according to which the geometrical representation of any phenomenon enables its mechanical reconstruction, mechanical physics is called upon to describe natural phenomena based on their mode of production (Fellmann, 1976: 185). In contrast, Vico (1948: 93) assigns human affairs a greater degree of reality than geometrical points, lines, areas and shapes can represent. According to Vico, we can prove geometry, because we produce it. When we can prove the physical realm, we will produce that as well. The basis of modern media is precisely this kind of mathematics, which already constitutes an epistemological step beyond traditional cultural techniques. The Turing machine thus became the first strictly theory-born medium. Engineered as a von Neumann model, this diagrammatic media theory has advanced to an omnipotent medium. Its logic, however, does not belong to this, that is to say, to the historical world.

The question of cultural history literally brings forth its media-archaeological alternative. According to Vico's *Scienzia Nova*, the realm of history is the *autopoiesis* of culture: since the historical world is man-made, its essence can also be found at the level of our own mental transformation. Here, the creator is also the narrator. At first glance, this reads like an argument for rendering media time in terms of cultural history. But upon a closer look, Vico's opposition to Cartesian mathematics no longer applies to those things that can only be *counted*, rather than *recounted*, or those that are themselves limited to the act of counting (the *computer*). The category of cultural techniques bridges this divide. Ernst Kapp's treatise *Grundlinien einer Philosophie der Technik. Zur Entstehungsgeschichte der Cultur aus neuen Gesichtspunkten* (1877) provides a response to Vico's axiom, by aiming to submit technology to a process of 'reflective analysis'. At first glance, with his notion of 'organ projection' Kapp seems to embrace the perspective of cultural anthropology, and yet he ends up calling the steam engine the 'machine of machines'. This is the point that marks the closing of the technological feedback loop: the autopoietic emancipation of technical media from their direct link to a cultural environment. Max Bense calls this cybernetic revolution 'machine metatechnics' (1998: 429) – something that

detaches itself from cultural history on its own terms. Thus media technology gains autonomy from culture. The technological feedback loop (the cybernetic marriage of machine and mathematics) puts forth a mode of knowledge that is no longer subject-centred and therefore also defies historicization. But knowledge that is no longer subject-centred becomes information. Today, information belongs to the sphere of electronic circulation and the coupling of one piece of information to another no longer relies on the guidance of cultural knowledge (Schulte-Sasse, 1988: 451).

Media Time Processes and Their Break from Cultural History

Media archaeology employs an analysis of media communications that is far removed from cultural semantics and concerns itself not only with cultural techniques, but also particularly with technology and technological mathematics; it therefore places an additional focus on non-cultural input. In a segment titled 'Movement and Time', Gustav Deutsch's film *Film ist* [Film Is] (made in Austria 1998) shows medical X-ray footage of a speaking larynx. In this case, the medium speaks for itself, producing the same effect as the invention of the vocal alphabet in ancient Greece, which not only created the possibility to record – and thus store and transfer – oral poetry as a stream of phonetic utterances, but also allowed objects like drinking vessels and tombstones to speak to the reader in the first person via their inscriptions (Ernst and Kittler, 2006). The scientific observation of a speaking larynx in sets of 12 to 24 X-ray images per second is no longer conditioned by the human eye but by the eye of the camera or even that of the X-ray cathode. Only technical media are capable of manipulating, decelerating and accelerating moments such as this in a time-critical manner.

This also explains the title of the film: it announces the media-archaeological level in the existence of the apparatus, which – to paraphrase Foucault – corresponds to a monumental, discrete aesthetic, distinct from the documentary perspective of cultural history. As functions of a process of transmission, technologically generated signals are the messengers of other things; at the same time, however, every electronic image, every electronically (re)produced sound is always also a monument to itself, to its technology and – even more radically – to the computer program which created it. This amounts to media self-reference. Media technology thus emerges from culture as an autonomous entity – a process that manifests itself via the technical feedback loop (the cybernetic paradigm of machine and mathematics). The development of feedback routes – as James Clerk Maxwell's *On Governors* (1868) had already shown prior to all explicit formulations of cybernetics – increasingly separates media systems from the discursive streams of culture. Thus,

automation is defined precisely by the fact that 'human controls have been disabled' (Szameitat, 1959: 316). When in contrast to Vico's self-referentiality of culture and history the field of electronic media is accessed in terms of the electromagnetic field, this distinction places technological media in opposition to traditional cultural practice. To remain within the terminology of electromagnetism: with media, there is only mutual induction. The discovery of electromagnetism – theoretically posited by Faraday, mathematically calculated by Maxwell and ultimately empirically proven by Hertz – overcame the search for a representation of humanity in nature, and instead defined it as a set of processes that open up a new field between physics and culture. 'We must therefore understand the knowledge of electrical phenomena and their application as an exclusive product of the human intellect' (Liesegang, 1891: X). By using electricity, man has surpassed nature, and not simply performed an act of organ projection. 'Once it is possible to animate an automaton that is better constructed than man himself, the world has reached its ultimate purpose' (1891: X). The media processes that are thereby set in motion no longer exclusively belong to either nature or culture. The Greek term *nómos* already implies a departure from *physis*, from nature itself (Vretska, 2001: 503). Faraday taught us to understand this field as a form of independent reality with an intrinsic dynamic, detached from the corporeal realm (Weizsäcker, 1974: 147). In doing so, he opened up a space for temporal and spatial free play (in the sense of Schiller's '*Spielraum*'). If we are destined to face the advent of techno-mathematics and live by its rules, we will certainly find that it derives not from cultural history, but rather from Riemann spaces, where time and space become conflated. The Michelson-Morley experiment from 1887, which famously failed to prove the existence of 'ether wind', was followed by the provocative Lorentz contraction theorem: instruments of measurement expand or contract along with the ether. Although this explanation is considered obsolete today, it still holds the appeal of an alternate model of conceptualizing non-historical time in what is called culture.

There are numerous pleas for media culture studies and for culturally oriented *Medienwissenschaften*. But this inclusion of media knowledge under a cultural horizon proves to be a Trojan horse. When culture no longer operates with primary natural 'media' (air, water) alone and also posits no imaginary substances ('ether'), but rather – as in the case of electromagnetic carrier waves – forms its own media channels that can be both artistically and artificially *modulated*, the combination of media produced by cultural techniques and human speech acts generates the uncanny, siren-like attraction of media technology. Precisely because 'the Sirens, who were only animals . . . could sing as men sing, they made the song so strange that they gave birth in anyone who heard it to a suspicion of the inhumanity of every human song' (Blanchot, 2003: 3).

The temporality of media transmissions induces a similar discomfort. We obviously know that Hitchcock's *Psycho* is a historical film document every time it airs. But in the technical moment of transmission, it is actively present (unlike a painting in a museum) as an electromagnetically induced process that shoots through our sense of time like an electric surge. The result is cognitive dissonance: the subliminal perception of the present, but with the cognitive awareness of an alternate perspective, namely that of the past.

What happens when waves are no longer oceanic matter (as in the *Odyssey*), but rather a matter of high-frequency technology? A study launched at Berlin's Humboldt University in April 2004 proposed to examine Homer's siren motif from the perspective of acoustic media archaeology (see Ernst, 2004: 256–66). Only through the technological act of measuring can the sonic element, as the most fleeting of all cultural goods, re-enter cultural memory. But by the same token, historical recollection is de-historicized and the cultural-historical model is replaced with technical parameters of measurement. On the one hand, media archaeology is an ancillary discipline of cultural memory; yet, on the other hand, in terms of its media-epistemological focus, it is a technology capable of training the visual and acoustic senses for non-cultural objects. Technology is thus no longer an organ projection of nature. As the result of a technological culture, products of nature 'effectively become technological artefacts' (Böhme, 1992: 118) Speaking of the magic produced by the nightingale's song, Kant points out that, in the absence of a bird, it has not been unusual for men 'who knew how to produce this sound exactly like nature' to hide themselves in a bush instead (quoted in Böhme, 1992: 119). Once analytical media have measured the frequencies of sounds, they are able to synthetically subvert the sonic difference between humans and machines. Eduard Rhein (1939) illustrates this point with a radio broadcast of a singing nightingale recorded in nature. When nature itself becomes reproducible, it also becomes technically legible. The age of the baroque cabinets of curiosities had an impartial view on these matters. 'Nature is . . . an infinite resource for artificial machines that surpass all human inventions' (Sulzer, 1750: 39). Radio waves are not unnatural (*para physin* – according to Aristotle's *Physics*); rather, they reproduce the secret of their own wave movement in a generative kind of *mimesis* (Koller, 1954). Artificial nature is media culture: 'The spoon has no original other than the idea in our mind', argues Nicholas of Cusa's treatise *De mente* (quoted in Blumenberg, 1999: 534). 'One can conceive of life forms which only reproduce in constant symbiosis with machines. Under such circumstances, the term "artificial nature" indeed denotes an interstitial phenomenon, a boundary or perhaps even the point of an evolutionary decision' (Böhme, 1992: 196). This is the media-archaeological perspective of the trans-classical machine. According to Siegfried J. Schmidt

(1999), no form of culture can exist devoid of meaning, because culture itself creates meaning. But 'the secondary logic is neither the logic of nature, nor that of the subject.... It produces what it describes' (Holling and Kempin, 1989: 138). Culture has not only created epistemology, but indeed also signal-processing machines, which are then by definition detached from culture: they do not 'count' semantic aspects; they do not view images as icons; they do not perceive sound as music; and they read texts with the aesthetics of a scanner, by Optical Character Recognition (see Pias, 2013).

The Autonomization of Culture and History: The Micro-time of Technical Media

The autonomization of technological processes of media temporality can be illustrated by the emancipation of mechanical time from astronomical time in the early modern age. Mechanical clocks were more than just that: due to the micro-mechanism of escapement they became oscillators, bringing the previously celestially oriented time down to earth (see Ernst, 2012). When the late scholasticist Nicolas d'Oresme compared the movements of the celestial bodies to the rhythms of the mechanical escapement device of a clock in *Le livre du ciel et du monde*, he modelled nature on technical mechanisms instead of modelling technology on organic archetypes. Since 'clockwork rhythms more appropriately define time units than the original rhythms of the heavens' (Taschner, 2005: 56), the mechanical media of time measurement dictate their non-discursive internal temporality to culture and turn the observer himself into their own medium. Galileo suggested that Christiaan Huygens should not use the human heartbeat, but rather mechanical oscillations to measure time. The end result is the atomic clock, which is based on the oscillations of a Caesium isotope. 'Atomic clocks are so precise that they are the ones defining chronological units now, rather than celestial phenomena' (Taschner, 2005: 56). This moment marks the emancipation of the media of measurement from nature within the medium of nature. If time is that which is measured with a clock (the Aristotelian definition of time), then that is media time. Yet the historical temporality of chronology and calendars is nothing but a scaled clock and thus becomes a function of the media of measurement. From this perspective, the category of media history is turned inside out: it becomes a temporal fold.

The autonomization of the technological media sphere from traditional cultural techniques becomes apparent in the detachment of *engineering* from classical *techné* during the Renaissance: 'The foremost achievement of engineers is the complete detachment of technical constructions from the model of nature and from organic modes of operation' (Krohn, 1976: 25). Mathematical instruments and clockwork mechanisms are no longer viewed as human organ extensions, but

rather as 'organisms in their own right or, rather, machines whose operation is only guaranteed by their compliance with their own internal laws and rules that can be verified and controlled' (Moscovici, 1969: 200) – a view that even extends to the algorithm as the literal *method*, the ordered progression, of the machine environment. Humanity perceives its own products as reality (McLuhan and Powers, 1989). This *other* reality is the object of a media-archaeological aesthetics. The intrinsic perspective (*Eigenblick*) and the intrinsic temporality (*Eigenzeit*) of media technology succeed, in their difference from human perception, in telling humanity something about itself. Since the advent of the mechanical clock, the temporal specificities of western society in particular must be analysed as a function of such techniques (Elias, 1991).

A central question for media studies concerns the manner in which the present organizes its knowledge around the media of the past. Its common model is called history; that is, the more or less linear progression of things and the narrative account of their development, their creation and their demise, regardless of how disjointed it may appear. Since the 19th century, historical discourse has borrowed the concept of time's arrow from physical thermodynamics (the theorem of entropy). In contrast, media archaeology views the same collected materials and symbolic archives from a different perspective and chooses a different model to describe the past of media in concrete miniatures. At least temporarily, this kind of media archaeology shrugs off the supremacy of historical discourse, which – disguised as a history of science – tends to absorb all of its epistemological alternatives. The premature inclusion of the analysis of technological media processes in the category of cultural studies robs it of its explosive potential. Like the material-oriented *Kulturwissenschaft* and classical archaeology, media archaeology deals with artefacts, particularly with those that are created only in the process of technological execution; for instance, when a radio receives a broadcast. Regardless of whether this radio is an old or a recent model, the broadcast always takes place in the present. In contrast to media history – that is, the human vantage point (Vico) – media archaeology tentatively adopts the temporal perspective of the apparatus itself – the aesthetics of micro-temporal processes. A different kind of temporality is represented here. The oscillating string of an instrument still forces its sound – and with it its (intrinsic media) temporality – upon our ears. But these ears hear different harmonies in the same sound; they are culturally predetermined. A differentiation of the acoustic (physics), the sonic (cultural conditioning) and the musical (cultural semantics) is in order here. Does the vibrating string sound the history of being to us? Any discovery of string-based octaves always short-circuits historical time (Kittler, 2006: 282). This also means that the human senses not only conform to a seemingly immediate history of being, but also to the instrumental medium itself. These instruments are products of cultural techniques; that is, of a negentropic desire, such as the

repeated acoustic experiment. This, in turn, is inscribed with a 'historical' index (to paraphrase Walter Benjamin), which combines with our perception into a fulgurous constellation – media time, not history, is at work here. What is the relationship between the verisimilitude of a lab experiment and the contingency of discovery? The contingencies in the success of technical discoveries defy narrative logic. The relationship cannot be plausibly described within a classical causal model of history. Oerstedt came upon the effect of electromagnetic induction rather by accident, during a lecture in which the magnetic needle began to twitch in the vicinity of an electrified wire. Here, a micro-temporal process forms the foundation for a media-technological event and thus produces a new form of temporality in competition to the historical event. Sparks produce waves. Heinrich Hertz, a student of Helmholtz, realized accidentally that parallel to a spark, another one forms – a remote effect of electric beams. Hertz describes this phenomenon with the very theory of electromagnetic waves that Faraday and Maxwell contributed to epistemology. Maxwell arrived at the theory of light as electromagnetic waves through pure mathematics; heuristically, however, his very concrete starting point is the media channel of electromagnetic beams. The end point is fixed media – electromagnetic waves (radio): a realm with its own, no longer cultural, laws; media effects that literally exist between nature and culture.

Is the category of resonance between two temporal objects merely taken from acoustics as a metaphor or is it modelled on it directly? Resonance is produced when two tuning forks oscillate in perfect harmony. The vibrations of one fork – even if interrupted – cause the second one to vibrate as well – producing a kind of wireless information transfer (Küllmer, 1986). Does something similar occur in the actual reading of a 'historical' text? If it resonates in the moment of reading, it is no longer historical. Can the ear hear this type of oscillating event? 'What kind of reality is produced in the act of listening to a loudspeaker is a question of cognition' (Supper, 1997: 32). From the perspective of biological computing, Heinz von Foerster describes cognition – analogous to the neurobiological category of memory – as the 'calculation of reality'. Or, more precisely: cognition is the calculation of *one description* of reality (Foerster, cited by Supper, 1997: 32). This results in contractions of (cultural-)historical time.

How Not to Write Media History?

Media time can be written as cultural history, but it is not identical to it. Media also demand another mode of representation of their occurrence in time – a fact which ex-historians understand, even if its positive formulation is for now nothing but a stammer. For cultural and media history, the pressing revolution of knowledge that unsettled the Newtonian world view around 1900, in the form of the physics of Max

Planck and Albert Einstein, is yet to come. When historiography is no longer viewed as the simple relationship between an object and its perception, but rather as mathematically mediated (statistics) and – in terms of a concise media archaeology – as a combination of measured object, measuring apparatus and perception, then historical time will be transformed into an observable in the sense of quantum physics. It is the act of registration (recording) that inscribes this time with a quality of irreversibility. The act of writing – that is, the transition between the continual flow of signals and their discrete recording – thus becomes comprehensible as a strictly media-archaeological moment, based not on its semantics, but on its operative execution. It is only this execution that produces the distinction between the past (factuality) and the future (potentiality). Michel Foucault's *Archaeology of Knowledge* questions statements on the level of their existence, their formation and the conditions of their possibility (the a priori, the archive). Media which do not merely refer to the axis of time (time-based media), but which are capable of manipulating it (time-critical media), represent a new type of temporal statement which media archaeology strives to account for. In contrast, for instance, to historiography and historical monuments, for which time is the object, technical discourse networks are capable of writing time itself. This intrinsic temporality demands another kind of temporal aesthetic – 'the temporality of ergodic art' (Aarseth, 1999). Espen Aarseth aptly proposes this perspective, but does not consider it in accordance with the stringent probability mathematics of Norbert Wiener (see Furtwängler, 2007). Media archaeology (as opposed to media historiography) constitutes an attempt to account for this alternate temporality of media. The linear prediction code – developed in the context of anti-aircraft defence and fire control during the Second World War, but used today as a probability indicator in all aspects of life – provides the model here. It represents the calculations that form the basis of Wiener's time-critical research. Herein lies an analogy to current micro-temporal economies – such as computer games – insofar as their operativity is equally as time-critical as it is (seemingly) infinite in its combinatorics. In essence, this question had already been raised by Leibniz in his fantasy 'Apokatastasis panton', an early version of Poincaré's return on the basis of the combinatorics of all letters in a library. The difference between this and the infinite but static space of 'The Library of Babel' (Jorge Luis Borges' short story from 1942) is the coupling of this thought experiment with media-operative and thus time-critical processes.

While it may not necessarily lead to writer's block, the engagement with time-critical media processes does entail a reluctance to write the modes of execution of media in time simply as media *history*. This provides a convenient model that can be practised with ease by trained scholars of the humanities, cultural studies and media studies. Still, an epistemological turn is taking place in this case as well – one that, in

terms of its ambiguity and uncertainty, can be compared to what quantum physics represented for classical mechanics. At the level of a technologically induced media temporality that can neither be written as cultural nor as media history, media time has long reigned on its own terms. Once more: written as history, media history and cultural history are connected. But wherever non-preconceivable media time processes are concerned – that is, processes which themselves subvert this historical model – the past of media must be written differently as well. It is not history, but at most the incidental nature of cultural existence as affected by the temporal modes of technology. To draw on a concept from Heidegger's '*Kehre*' (turn), it is true that no historical existence (*Dasein*) could have invented the radio, but that – conversely – technological media, such as the radio, determine historical ways of being (*dazusein*). In contrast to Heidegger, however, media archaeology tentatively shrugs off the confines of the historical; not for the sake of a postmodern questioning of temporal processes as such, but in order to approach them from the vantage point of the media operations themselves, rather than allowing itself to be entrapped by musings on origins and metaphysics. Let us try for a moment to suspend the voluntary self-restriction of the human temporal horizon by means of the category of history. Thus, the face of the historical human being does not disappear like a figure drawn in sand at the edge of the sea, but rather like the sand in an hourglass.

Translated by Guido Schenkel

Note

1. This article was previously published as 'Von der Mediengeschichte zur Zeitkritik' in *Kulturgeschichte als Mediengeschichte (oder vice versa?)*, Archiv für Mediengeschichte 6. Edited by Engell L, Siegert B and Vogl J. Weimar: Universitätsverlag, pp. 23–32.

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Afterword: Cultural Techniques and Media Studies

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Abstract
This text reflects cultural techniques in relation to other concepts in cultural and media studies by addressing their relation to selected Anglo-American and French discussions. It also investigates the relation of cultural techniques to more recent material and speculative turns. Suggesting that the cultural techniques approaches introduce their own important material dimension to media-specific analysis of culture, the article argues that cultural techniques should be read in relation to recent post-Fordist political theory and explorations of the post-human in order to develop conceptual hybrids that are able to inject politics into media theoretical accounts, as well as excavate histories of cultural techniques of cognitive capitalism.

Keywords
cognitive capitalism, cultural techniques, Foucault, German cultural studies, Kittler, materiality, media studies, media theory, new materialism

I

What are cultural techniques? The texts in this collection offer several responses, ranging from detailed historical accounts to discussions of the ontological span of the concept. Some address how cultural techniques teach bodies to behave, others are more concerned with the links between human and non-human agencies. In these concluding remarks I would like to tackle cultural techniques from the other end. I am less interested in what went into the concept than what could – potentially – come out of it. That is, in these afterwords I will focus on connectivity rather than genealogy. I want to offer some speculations as to the directions where the notion might theoretically guide us and how we can make productive use of certain similarities between this – in many regards – rather

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German intellectual product and related strands in Anglo-American and French theory habitats. As mentioned at the very beginning of the introduction, this issue itself is meant to be both an archive and a toolbox; in that spirit, we should open up the agenda to some past and contemporary discussions concerning technology, materiality and, for instance, cultural critique of capitalism.

But to start with a point that was highlighted in several contributions: to understand the concept of cultural techniques requires a certain familiarity with the role played by media technologies. Despite the fact that the focus on cultural techniques appears to indicate a move beyond the earlier focus on media, technologies are still part of the picture, though in rather unusual ways. What cultural techniques scholars talk about – doors, servants, animals, law, swarms – are not really media in the sense understood in Anglo-American media studies. The detailed research undertaken by the contributors reframes the question 'what are media studies?'. This is a task that Friedrich A. Kittler (2009) mapped out in his own particular way, though despite its obvious indebtedness to his work, cultural techniques research cannot be reduced to an afterglow of Kittler.

What then *are* media? There is no direct answer to this. Instead, German media studies has been more about expanding the limits of what we understand as media. Such perspectives have wanted to expand the range of disciplinary formations included in media analysis and the areas media studies can tap into. To quote one of the key writers, Bernhard Siegert, much of the early generation of German media theory was guided by a prolonged exercise in carefree trespassing – digging up 'sources that had remained out of bounds to the humanities without worrying about any underlying "concept of media" (an issue nowadays raised by every wiseacre)' (2008a: 28).

Siegert continues with a more warlike metaphor by referring to an invasion of walled and enclosed disciplinary gardens:

> Confronted with insights into the medial conditions of literature, truth, education, human beings, and souls – insights that were beyond the reach of the hermeneutic study of texts – scholars of literature, philosophers, pedagogues, and psychologists were too offended by the sudden invasion of their nicely cultivated gardens to ask for an orderly theoretical justification for the onslaught. (2008a: 28)

The various articles in this issue offer good insights into how cultural techniques relate to the current state of media studies in Germany, which lost one of its internationally most finely tuned pieces of wetware with Kittler's passing in 2011, preceded by Cornelia Vismann's death in 2010. Several scholars have been smuggling in new media analysis

methodologies, but they also offer ideas that resonate with a range of cross-disciplinary approaches that the Anglo-American academic world is interested in: posthumanities, the non-human, questions of materiality and objects, the affective turn, media archaeology, historical methods and archives, as well as the role of anthropology (see Schüttpelz, 2006) in media studies. Theory can be said to have acted as a transatlantic bridge of sorts (Ernst, 2013: 23–31) from French theory to German media studies. This bridging also reminds us of the multiple versions of materiality mobilized in current media and technology theory debates across both sides of the Atlantic (for some recent North American discussions in cultural and media studies see Packer and Wiley, 2011).

However, we can expect the following reaction from cultural studies and cultural history scholars: what is so *new* about cultural techniques? The texts by Geoghegan and Siegert as well as the introduction by Winthrop-Young outline in more detail the relation *Kulturtechniken* have to concepts of culture and civilization, some of which no doubt will be familiar to Anglo-American scholars. As readers of Michel Foucault (technologies of the self), Marcel Mauss (techniques of the body), and British cultural studies (Raymond Williams et al.), we already knew about the close relation between bodily habits, modes of perception and (media) technologies. Foucauldian-inspired governmentality studies have shown a methodology to move from analyses of textuality to institutions and procedures of governance. Besides, we learned from Pierre Bourdieu that the habitus is a 'matrix of perceptions, appreciations, and actions' (Bourdieu, 1977: 83). In short, aren't (German) cultural techniques just like (Anglo-American) cultural practices?[1]

To be sure, there are moments when some of the ideas put forward by our contributors seem almost too familiar. Much of the language and the accompanying conceptual apparatus appear to resemble British cultural studies, recent American contributions to science and technology studies, the cultural histories of the French school (for instance, the massive series *History of Private Life* edited by Philippe Ariès and Georges Duby), and writers such as Bruno Latour. History of the philosophy of technology has long discussions concerning the relations of culture and technology. From Karl Marx's various texts to early 20th-century sociology such as Max Weber (2005), the relations of economy, culture and technology have been debated with differing positions. Instead of just talking about the ways in which Ernst Kapp or Marshall McLuhan influentially modeled the interacting relations between humans and machines, we could turn to Siegfried Giedion's (1969 [1948]) inventive cultural historical take. It is engaged in mapping cultural techniques of modernity, and has been recognized in media archaeology (Huhtamo and Parikka, 2011; see also Darroch, 2010) too. Giedion maps the effects of mechanization in various fields of cultural techniques from crafts to techniques of space to 'comfort' and to agriculture – the same terrain where the earlier

version of 'cultural techniques' comes from. 'Technique' becomes a binding concept across fields of culture from interior design to slaughterhouses. Through techniques we can talk about the material practices that sustain and enable 'culture', which necessarily involves humans and non-humans. Cultural techniques forge links between cultivation of environmental things and cultural realms.

When talking of 'techniques', one cannot bypass the significance of Jacques Ellul. While Ellul is not an essential part of the internal lineage of this particular German intellectual tradition, his work raises additional questions about the perceived novelty of the cultural techniques approach. Ellul, too, tends to emphasize the central role played by techniques and technology at the expense of social and economic forces. He is not happy to admit capitalism as the driving force behind modern social organizations. Instead, what drives culture are *techniques becoming machines*.

> [T[he machine is deeply symptomatic: it represents the ideal toward which technique strives. The machine is solely, exclusively, technique; it is pure technique, one might say. For, wherever a technical factor exists, it results, almost inevitably, in mechanization: technique transforms everything it touches into a machine. (Ellul, 1964: 4)

Ellul's point forces a reconsideration of what we mean by 'technique'. Indeed, it pays attention to the interaction between machine and technique without conflating the two. Ellul also wants to distance himself from Marcel Mauss's notion of bodily techniques, which Mauss had described as a 'group of movements, of actions generally and mostly manual, organized, and traditional, all of which unite to reach a known end, for example, physical, chemical or organic' (1964: 13).

Ellul argues that in the context of technological societies such an attachment to the body produces a theoretical shortcoming. This means that techniques are not only about manual (labor) but also increasingly about intellectual skills and organization. Indeed, despite differences Ellul is after such cultural techniques of the symbolic that are also of interest to various writers in this collection. But Ellul insists that these are especially prevalent in modern organized, rationalized and technological society. Interestingly, he is not dismissing the fact that the emphasis on intellectual labor increases the need for 'secondary manual labor and, furthermore, that the volume of manual operations increases faster than the volume of mechanical operations' (1964: 13). Such a perception – which is of great relevance to a range of current debates on cognitive capitalism to which I will return near the end of this text – is furthermore connected to Ellul's critique of 'tradition' in Mauss's definition. For Ellul, we are experiencing a change in our relation to techniques: we are not solely inheriting habitual modes of behaving and

techniques, but technology has created its own autonomous spheres of actions and expectations that are paralleled by these new techniques. The example of the simple technique of stepping on the pedal to make the car go faster is developed by Ellul, who discusses servo-mechanisms and the notion of feedback. Technology upsets and forces us to continuously be on the lookout and learn new habits and techniques (1964: 14). We do not always clearly perceive the role of techniques as simple causal actions that can be traced back to visible bodies like the foot on the pedal.

The German media-theoretical cultural techniques scholars would probably agree with a lot of this critique of Mauss. Siegert, in fact, raises similar points when discussing Mauss: counting, for instance, is a technique that 'always presupposes technical objects (be it one's own fingers), that predetermine the performance of the operation and thus the concepts derived from that operation' (Siegert, 2011: 15). Not all techniques involve the human body; one has to account for the abstract and mathematical realms as well. This approach is important for recognition of the mixed nature of the media cultural assemblages: when scrutinized more closely they appear to be meshes of human and non-human actors – an important dimension that brings a bit of Latour into German media theory (see Siegert, 2012).

II

The sustained focus on non-human actors in cultural theory is related to the rise of new materialist analyses as well as to methodologies emerging across the social sciences and humanities. For sure, over the last couple of years there has been no shortage of calls for a material and affective turn within cultural theory. New materialism emerged from various directions, including Manuel Delanda's work and feminist theory (Braidotti, 2006; Barad, 2007; Dolphjin and van der Tuin, 2012). Obviously, object-oriented ontology/philosophy (of Graham Harman, Levi Bryant, Ian Bogost and Timothy Morton) has received its share of attention in the past years. It has provided its own way of understanding the ontology of the non-human. In terms of the 'speculative turn', this has been described as follows:

> [In] 'The Speculative Turn', one can detect the hints of something new. By contrast with the repetitive continental focus on texts, discourses, social practices, and human finitude, the new breed of thinkers is turning once more towards reality itself. While it is difficult to find explicit positions common to all the thinkers . . . all have certainly rejected the traditional focus on textual critique . . . all of them, in one way or another, have begun speculating once more about the nature of reality independently of thought and of humans more generally. (Bryant et al., 2011: 3)

Such new perspectives have generated fresh approaches as well as posited their own newness with rhetorical skill. Whereas much of such scholarly creativity accepts the necessity to move beyond the well-established textual paradigm that branded much of cultural studies and media studies, some of the 'speculative turn' neglects the alternative theories and methodologies that early on attended to the materiality of the world and the non-discursive. Indeed, a turn away from signifying practices not only resonates with the 1980s cultural studies discourse advocated, for instance, by Lawrence Grossberg (Wiley, 2005), it also prompts us to investigate whether there are other ways of dealing with the relationship between the textual and the non-discursive. Instead of neglecting the earlier histories of cultural studies, they might be able to provide some important clues to feminist and post-colonial themes. These are something that might provide an additional new direction to cultural techniques too.

Scholars in media studies and cultural techniques have continued the line of thought inherited from the likes of Kittler, who brought a different sort of 'materialism' into play than that on display in some of the current speculative philosophical discussions. This materialism takes into account the historically contingent nature of media technologies in the non-human assemblages. This may turn out to be an important contribution to philosophical discussions that lack sufficient insight into the constitutive role cultural techniques play in their theory formation.

In contrast to some recent philosophical discussions, German media-theoretical accounts start their material investigations from more concrete historical assemblages rather than from an ontological position. As argued in the introduction to this special issue, their approach consists in part of an anti-Platonic move designed to reverse the priority of the ontological to favour the ontic – a move inspired by Heidegger's ontic-ontological distinction. This point was underlined already in Winthrop-Young's introduction and accurately defined as follows: 'the study of cultural techniques provides a kind of flanking manoeuvre by relating the thinking of *Sein* (Being) to the processing and operating of bits and pieces of *Seiendes* (beings)'.

Furthermore, there is a commitment to closely scrutinize the specificity of the material. Sybille Krämer and Horst Bredekamp start their article (originally from 2003) with the following statement: 'For a long time, perhaps for too long, culture was seen only as text'. What then if not text? Krämer and Bredekamp provide meticulous insights into the medial conditions of knowledge and the entanglement of aesthetics and epistemologies of the image. Indeed, while identifying the proximity of cultural techniques to certain cultural practices approaches, we can say that the willingness to fully engage technical cultures and mathematical formalisms is what specifies this as a very 'German' approach. It seems that cultural techniques are cultural practices enriched with mathematics and

a head-on engagement with technical and scientific cultural reality thrown in for good measure.

A similar move from textuality to materiality is visible in Bernhard Siegert's writings (e.g. Siegert, 2011). Cultural techniques scholars articulate materialities as historically changing sets of practices. This relates to a materialization of the textual, the discursive, social practices and human finitude in relation to non-human agencies. This approach is not interested in 'pure' ontology: that is, in an ontological domain of Being cleansed from any accidental features like weight, colour and other empirical, material facts.[2] In media-oriented cultural techniques there is a persistent interest in the materiality of the world, in which media relate 'to ontological and aesthetic operations that process distinctions (and the blurring of distinctions) which are basic to the sense production of any specific culture' (Siegert, 2011: 14).

Cultural, aesthetic and mediatic operations are approached as historically situated. This also means that textuality is not discarded as an analytical approach but refined in relation to its material conditions. Indeed, for various generations of German media studies, 'writing' never exclusively referred to a signifying and semantic practice but to something altogether different that also connects to computational cultures. It starts with mathematics and programming.

For theorists such as Siegert, the work of Foucault (and, to a certain extent, that of Derrida) is taken only as a starting point rather than a frame of reference. Siegert is striving for much more detailed analyses that reveal an interest in materialities such as paper as well as bibliographic and typographic details like the point/full stop (*Punkt*). His (2003) *Passage des Digitalen* ('Passage of the Digital') is exemplary in providing a rich historical mapping of techniques of inscription. Its approach is both theoretically refined and sensitive to material differences that make a difference without being reduced to representations and signifying chains. This perspective forces us to broaden our understanding of the very notions of meaning and signification. Siegert articulates his cultural techniques approach as historical *ontology*:

> There is no 'man' independent from cultural techniques of hominization, or anthropotechnics; there is no time independent from the cultural techniques of calendars, time measurement and synchronization; there is no space independent from cultural techniques of ruling spaces and so forth. This does not imply, however, that writing the history of cultural techniques is meant to be an anti-ontological project. On the contrary, it implies more than it excludes a historical ontology, which however does not base that which exists in ideas, adequate reasons or an *eidos*, as was common in the tradition of metaphysics, but in media operations, which work as

> conditions of possibility for artefacts, knowledge, the production of political or aesthetic or religious actants. (2011: 15)

In other words, we are dealing with a media-ontological set of tools designed to unravel cultural techniques as material actions, skills, perceptions, and representations. Histories of knowledge, science and media are understood not through semiotic reading of texts but as complex spatial and temporal knowledge systems. The epistemological is entwined with the ontological. Cultural techniques are completely material: understanding them requires that we pay attention to everything from the characteristics of the inscription surface (what kind of paper used) to the wider spatial and temporal infrastructures.

In *Passage des Digitalen*, this task is articulated through a threefold materialization of techniques of the sign:

1. instead of semiotics, a focus on cultural techniques of reading, writing, signs, and counting
2. signs are actually in the world as *res extensa*. They have a material existence and are not ideal objects
3. sign practices are specific to certain institutional spaces.

Siegert is especially interested in the office, the ship, the atelier, the laboratory, and academia. (Siegert, 2003: 14).

Such an approach acknowledges the material and temporal nature of techniques. A reference to media archaeology would be tempting but we need to also pay attention to the differences between Siegert's approach and that of, for instance, Wolfgang Ernst (see Ernst, 2013, and Siegert, 2008b: 9). Siegert argues that the point of difference lies in their relation to signs/signals: for him, the Berlin situated media archaeology of Ernst desires to replace an analysis of signs with that of signals. For sure, Ernst's way of differentiating *Medienwissenschaft* – media sciences – from those of *Kulturwissenschaften* lies in the resolute demand that if we study media, we really need to study their modes of technical epistemology and how they process signals in a channel. Siegert's stance does not neglect the materiality of signals but adds to it a slight modification: we analyse signs as signals[3] and our cultural accounts are embedded in understanding of the physical, engineering and technical aspects of media as techniques.

In terms of signal analysis, Shannon and Weaver's information theory is a constant reference point in these discussions. Siegert and a lot of cultural techniques scholars do not want to *replace* a cultural-based media analysis with information theory, even if they insist on the need to take into account the constitutive, technically engineered parts of reality. This approach resonates with recent discussions elsewhere, including US-based media studies. Duke University Press's new book series 'Sign, Storage, Transmission' is dedicated to exploring this material field of

media culture that still stems from a cultural studies understanding. For instance, Jonathan Sterne's *MP3: The Meaning of a Format* (2012) works its way towards a similar argument to that of cultural techniques scholars by focusing on the entanglement of bodily techniques (such as hearing and movement) with engineering, psychoacoustics and what Sterne calls 'perceptual technics'. When culture itself is conditioned by the engineered scientific, we need to be able to take into account such expansions of what we mean by culture in the age of high technology and science.

As the papers in this collection indicate, the genealogy of cultural techniques leads back through media pedagogy of the 1970s to agriculture in a way that almost parallels the evolution of media ecology since the 1970s and 1980s. In his introduction, Winthrop-Young speaks of the triple entry of cultural techniques. The way in which the concept derives from earlier material agricultural techniques of cultivation combines both the cultural and the natural domain (see for instance Geoghegan's as well as Krämer and Bredekamp's articles). Perhaps there is an interesting connection between the original sense of the term, which connected it closely to environmental engineering, with more recent media-related understanding and use.

It is in this wake where some of the recent animal studies and posthumanities discussions can find 'cultural techniques' a useful way to dig into the soil. In other words, if part of the modern media theory version of cultural techniques, represented for instance in the work of the Hermann von Helmholtz Center for Cultural Techniques in Berlin, was actually taking distance from the agricultural roots of the concept and gearing it towards more directly mediatic forms (see Geoghegan's article), perhaps we can and should reclaim some of those early connotations. In other words: could we envision a media-ecological twist to cultural techniques, which is partly already represented in Sebastian Vehlken's work? Would such an approach be able to talk about such media techniques that have to do with the alternative materialities of, for instance, electronic waste and related to animal studies (see Parikka, 2010, 2011). This does not necessitate going so far as to reinstate media theory as part of the Petzenkirchen Institute for Land and Water Management Research (*Institut für Kulturtechnik und Bodenwasserhaushalt*), but considers the fact that issues of soil, water, waste and pollution are increasingly what we should take into account in a renewed sense of materiality of media theory of technological culture.

III

However, all these links and connections, convergences and divergences do not mean that the cultural techniques approach is without its shortcomings. The most obvious issue is 'the political' (or lack thereof). While it was at times overly – and at times maybe naively – emphasized in

cultural studies, it seemed noticeably absent – and at times deliberately excluded – from German media theory. With its politically rather conservative stance and (especially in the case of the older Kittler) Euro- or Hellenocentric bias, the latter made sure it would not be mistaken for Marxist materialism or its more refined Frankfurt derivative. However, the German media studies approach might prove fertile when it comes to investigating the current practices of advanced capitalism as cultural techniques. The intellectual fertilization could work both ways: German media theory could incorporate recent analyses of post-Fordist production and enculturation techniques, while post-Marxist theories would profit from the historically detailed accounts of how cultural techniques process our aesthetic and ontological distinctions. Could we use the work done in Weimar, Berlin, Lüneburg and Siegen on technical media and image cultures to investigate how they consolidate certain operations and enforced habits of action/perception/memory in relation to capitalism?

Italian scholars such as Maurizio Lazzarato (2004, 2007) have been tracking the relation of forces of contemporary capitalism in relation to cognitive and affective capacities, yet their approach still lacks a nuanced view of the role of media. The elements are there, including the references to contributions by Bergson and Deleuze on media technologies from film to the digital, but they fall short of the accounts of German analysts. More broadly, this emphasis on the political also stems from Gilles Deleuze's notion of control societies, which has had its now well-recognized impact on theories of digital culture. However, Deleuze's initial text was very vague on details and the same vagueness has at times been transported to the subsequent elaborations of the concept, begging the question what exactly are the specific cultural techniques of control in the Deleuzian concept.

Indeed, a range of the approaches in this collection can be read in relation to some discussions concerning the politics of digital culture and devices that are increasingly mediating our relation to ourselves and others via third-party corporations or security mechanisms. Cultural techniques of tracking, mapping and mining are among such examples of cultural techniques of securitized cognitive capitalism. Tracking of gestures becomes a crucial part of the digital surveillance mechanisms in contemporary societies of security; identity mapping (cf. Macho's article in this collection) provides a new mode of inscription for security industries and can easily be monetized through data-mining of the algorithmic identity production of social media. Indeed, such seemingly worn out cultural studies concepts as 'identity' are still actively mobilized, but in a very instrumental way as part of data-based marketing and composition of algorithmic identities (Cheney-Lippold, 2011: 167–8).

Besides the potential for analysing cultural techniques of cognitive capitalism and control societies, we can perhaps find a further radical

side to new cross-breedings of theoretical traditions. Marx's *Grundrisse* (1973) and 'The Fragment on Machines' have become a canonized reference point for recent political theory interested in technological culture and the General Intellect (see for instance Berardi, 2009), but perhaps there is potential in more combinations of media theory and political concepts. Besides analysis of capitalism, there are potentials for the histories of counter-techniques too. How can we map '*minor* techniques' in the manner Deleuze and Guattari wrote about minor languages? Perhaps there is more potential for a radical version of cultural techniques which may expand on the mentioned 'triple entry' of cultural techniques in ways that multiply its potentials.[4]

Notes

1. Siegfried Zielinski (2010) used the notion of cultural technique in his extensive history of the video recorder, which was first published in the mid-1980s. Zielinski's media-theoretical writings have often been perceived as media archaeology, but we can see an interesting early link here already, influenced by the 1970s discussions of cultural techniques of new media ecologies (see Winthrop-Young in this collection). Furthermore, Zielinski represents a link to British cultural studies and the discourse of cultural practices through his theoretical debt to Raymond Williams et al. In general, there would be a lot to be highlighted about the connections of ideas between cultural techniques and even Foucauldian-influenced governmentality studies – and similarly, for instance, to excavate more on this link to Williams as well as Tony Bennett's work in cultural studies. I will also leave out of this essay the bigger question concerning the relations of German media studies and North American media studies (see for example Peters, 2009).
2. Scholars such as Sterne (2006) have reminded us that we need to understand communication as *techné* – where technique and technology are irrevocably tied together. There is no communication situation that does not involve crafts and materials: this sort of simple starting point can be seen as a historical, anthropological and theoretical guideline for humanities research. Such ideas bring situated materiality into theoretical play. Communication studies itself originates in the Aristotelian notion of *techné*: practical as well as embodied art and knowledge.
3. 'Also nicht Signal statt Zeichenanalyse, sondern Zeichenanalyse als Signalanalyse' (Siegert, 2008b: 9).
4. A thank you to Geoffrey Winthrop-Young and the reviewers for their feedback in revising this text.

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Review Article

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Files, Lists, and the Material History of the Law

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Files: Law and Media Technology
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Abstract
This article reviews Cornelia Vismann's 2008 book *Files: Law and Media Technology*. In addition to an overview of Vismann's media materialist approach to the study of the law, it provides both a consideration of her relationship to Friedrich Kittler's media theory and a more focused examination of certain functional writing entities that might extend Vismann's genealogical approach. It is suggested that a closer analysis of one such entity, the list, can offer further insight into the epistemological and ontological questions the book provokes.

Keywords
archive, documentation, law, legal theory, media archaeology, media theory

Cornelia Vismann's magisterial book *Files: Law and Media Technology* offers English readers a wonderful entry point into the challenging and ambitious intellectual project of a scholar whose life was cut tragically short in 2010. The book seeks to rethink the history of the law through a media materialist perspective and is an impressive and stimulating synthesis of media and cultural theory, historiography, philosophy, and legal scholarship. This approach offers an unconventional trajectory for writing the history of the law, focusing not on specific legal case studies nor on the meaning or content of the western legal tradition's documentary apparatus, but rather on the apparatus itself. Files are for Vismann the

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privileged unit or entity of this apparatus, and she follows these entities through an intriguing series of functional histories: from the ancient writing systems to modern literature; from Roman chanceries (and their study in the Renaissance) through the spectacle of traveling archives and registries of imminent monarchical power in the Middle Ages, to the proto-bureaucracy of Maximilian I's imperial court chancery; from the bizarre world of baroque secretaries to the self-administration of the Prussian proto-state; from Goethe's personal archive to Nazi governmentality; from vertical files and binder technology to the Stasi surveillance state and the reclamation by its former subjects of their 'own dossier'. Both the rigour with which each epoch is treated and the general erudition of the book are exceptional.

Files is a book ostensibly about analog and pre-digital technologies, with Vismann devoting only one very brief final chapter to files in the digital world. However, a deeper engagement with the project reveals that by recasting certain oft-elided entities from the world of writing – namely files, but also lists, registries, and archives – in functional, non-representational terms, Vismann is able to tease out their *algorithmic* dimensions. Her intervention thereby amounts to nothing less than a prehistory of the digital computer, which ultimately shows that 'administrative techniques of bygone centuries are inscribed as *stacks, files, compiler* or *registers* in a digital hardware that remains unaware of its historical dimension' (Vismann, 2008: 164). Such a project is one of media archaeology; in the seemingly innocuous administrative writing and documentary practices of earlier historical epochs Vismann unearths certain ontological (pre)conditions of the digital age. These conditions are most observable in the (nonhuman) life-world of files. Thus, while the disappearance of paper files and the emergence of 'files as stylized icons on computer screens' (2008: 163) may *appear* to be ushering in an entirely new immaterial ontology, Vismann shows that such a conclusion would be a misdiagnosis. We may be exiting the time of *paper* files, but this does not entail a clean ontological rupture. Digitization should be seen as both reconfiguration of media-technological conditions and as an extension of certain pre-existing tendencies in the processing, transmission, and storage of data.

The range of sources drawn upon and general erudition of the work make *Files* of interest for readers from a vast array of disciplines, including not just media studies and law but also history, sociology, information science, and communication, to name a few. My hope is that this review essay will serve to expose readers unfamiliar with Vismann to her work, and might help to parse some of the tools that she has bequeathed to those scholars and thinkers interested in the study of the law, the history of writing, and media technology more generally. The essay is organized in three parts: first, I will offer a brief overview of *Files*, focusing in particular on Vismann's unique theoretical framework. Second,

I will explore some of the (dis)connections between Vismann and the German Media Theory tradition out of which she emerged, attempting to situate her in relation to what Geoffrey Winthrop-Young calls the 'Kittler effect' (2011: 143). Finally, a third section will focus on one particular inscription entity that is ever-present throughout the various historical epochs Vismann traverses: the list. It will be argued that there are crucial, functional dimensions of forms such as the list provoked by Vismann's work which themselves prefigure or have a structuring function upon files. The further pursuit of such entities can offer scholars of media technology unique epistemological and ontological insights regarding the constitution of power/knowledge networks, and the material forms through which these are articulated and transmitted.

Overview

Files, for Vismann, resist easy definition. Her concern is not limited to those files most familiar in the contemporary situation, vertical files. Instead she takes a more generative approach that conceptualizes files as non-discrete entities that can 'appear in all shapes and forms: as loose pages, lying in little boxes, wrapped in packing paper, or enclosed in capsules; they may present themselves as bundles tied with a string or assume the shape of vertical folders ready to enfold anything that can fit between two paper covers' (2008: xi). Because a concrete definition of files is both elusive and limiting (to say nothing about translation issues[1]), Vismann's focus remains trained throughout the book on the functional and process-based dimensions of files – that is, on the media-technological conditions in which they exist and by which they are constituted. The specific lens through which this functional dimension is probed is that of 'their largest area of application, the law' (2008: xii). She sees a constitutive dimension of files on the law, and because '[f]iles are the variables in the universe of writing and the law', her approach can investigate 'how files control the formalization and differentiation of the law' (2008: xi–xii). The law, too, is defined broadly, 'not as an instrument or medium for the arbitration of conflicts but as a repository of forms of authoritarian and administrative acts that assume concrete shape in files' (2008: xiii). The law is not an *a priori* constant or singular tradition that is passed from generation to generation unabated, but is a historically specific constellation that is not just conditioned by the media-technological conditions in which it is called to act, but only finds its articulation in and through the corresponding or dominant media forms of these conditions. Therefore, Vismann argues, 'files and the law mutually determine one another' (2008: xiii).

Such a media materialist approach allows Vismann to construct a convincing argument that locates the origins of the law not in a conventional orality/literacy binary but rather within what she calls 'pragmatic'

or administrative forms of writing – files, registers, and records. The orality/literacy binary elides these forms (and others such as tables, charts, lists, diagrams, etc.[2]) because it has no capacity to account for any form of writing that is not simply a duplication or representation of speech.[3] In contrast, Vismann is concerned exclusively 'with how these administrative forms of writing *function* precisely insofar as they are not subject to the logic of speech' (2008: 4). By circumventing the orality/literacy polarity and re-emphasizing such administrative forms, she is able to show that the functional logic of various incarnations and alterations in the documentary apparatus of the law has been formative on the trajectory of the western legal tradition, 'contribut[ing] to the formation of the three major entities on which the law is based: truth, state, and subject' (2008: xii).

The theoretical framework of such an approach is laid out in Chapter 1, in which she intervenes in the famous Lévi-Strauss/Derrida debate regarding the 'writing lesson' in the former's *Tristes Tropiques*.[4] Vismann casts the debate between Lévi-Strauss and Derrida about how to read the situation in familiar terms: the former's privileging of the 'innocent state of pure orality' of the Nambikwara tribe that is invaded by the writing of the white man (2008: 2) is deconstructed by the latter as a 'parable' about the origin and power of writing (2008: 1). She contends, however, that the power of writing grasped by the chief has nothing to do with its ability to transcend oral communication, nor with its capacity for the transmission of meaning or content, but in fact has everything to do with what writing allows the chief to do, and what writing does itself – its ability to administer or to *act*. That is to say, because the chief of the Nambikwara writes lists that regulate the exchange ritual, and which 'do not communicate, but control transfer operations' (2008: 5–6), the writing lesson 'is not about empowerment through an act of writing or the concurrence of meaning, speech, and writing, nor is it about what language philosophy calls a performative act. It is about administration' (2008: 5). What Vismann shows is that neither Lévi-Strauss nor Derrida can account for these administrative forms and acts of writing that are neither communicative nor performative but *functional*. Thus, by recasting the 'so-called' writing lesson as an encounter between writing and the law that exists outside of the conventional orality/literacy polarity, Vismann is able to illuminate dimensions of the relations between writing, power, the law, and information processing that are missed in conventional accounts.

This intervention is the springboard off of which Vismann recasts the history of the law through a grammatological approach to files that is not at all interested with their content or meaning but rather with their mediality, materiality, and functionality; with the acts of transmission, storage, cancellation, modification, and deletion that write the history of the law. She laments the retreat of a minor, media-technological

tradition of studying documents and information processes in such textual terms (including disciplines such as paleography, codicology, and diplomatics), and seeks to resurrect them. Around 1900 these sciences became merely ancillary to factual or narrative historiography – a position from which they have never recovered, despite the fact that they study documents according to 'the material on which they were written, the size of the letters, the composition of the ink, the appearance of seals and stamps, the history of their transmission through time and space – in short, everything that is of interest to present-day media studies' (2008: 39). Vismann resuscitates and redeploys some of the tools from this de-emphasized, minor tradition of media studies (or perhaps better, 'media sciences') to buttress her materialism. Drawing from such traditions also allows her approach to move beyond simply repurposing the theoretical tools developed by the so-called 'father' of German media theory, Friedrich Kittler. Though there is much implicit in Vismann's work that borrows from Kittler, there are also important breaks. Some remarks – admittedly preliminary – about these intersections with Kittler are worth making, not just because Vismann's work is often categorized within the 'Kittlerian' school of *medientechnik* but also because the two enjoyed a close working relationship before Vismann's untimely passing.[5]

The Kittler Effect

Aside from Vismann's at least tacit acceptance of his most famous dictum, that 'media determine our situation' (Kittler, 1999: xxxix), Kittler's influence is most evident on two planes: literature and Lacan. For Kittler, encoded within literature are the characteristics of the discourse network in which it is produced; that is, literary texts express and embody the transmission, processing, and storage capacities of the dominant media-technologies of any epoch. By extension, literature is also expressive of the conditions of thought, imagination, and subjectivity made available to human beings via these media technologies. For instance, during the monopoly enjoyed by writing in the historical period Kittler refers to as 'Discourse Network 1800', language is the only means available for the expression and exploration of human sense perceptions and imaginings. As a result, literature was the only means by which the reader could access proto-phantasmagoric sensory data by means of an inner hallucination generated by text.[6] With the advent of analog storage media, however (namely gramophone, film, and typewriter), new means are made available through which to articulate, process and transmit the imaginings and sense perceptions of human beings. Such tendencies and changes can be uncovered by the astute media archaeologist in the literature of any epoch, as Kittler is often wont to do in his own texts.[7] And so literature has a crucial

methodological function for Kittler's media theory – at least in his 'middle period', the best known to English readers.

Literary texts function for Vismann in a very similar manner. She argues 'literary fictions that deal with administrations highlight those media and realities of the law that nonfictional, scholarly self-presentations of the law and its history tend to overlook or even suppress' (2008: xiii). Readings of two such texts, Kafka's *Before the Law* and Melville's *Bartleby the Scrivener*, are offered early in *Files* to conceptually frame the work. These readings function as a kind of preamble to the historical account of files Vismann develops in subsequent chapters – they are not often explicitly referenced in later chapters but are ever-present ghosts that haunt the text. To elaborate, Vismann shows that legal preambles demonstrate the concerns and historical contexts of a given law, they contain colloquial stories that are not allowed to enter into official legal discourse, and are usually typographically differentiated from the document to which they are appended (2008: 21). Preambles are expressions of the moment in which the legal text is called to act. So too are Kafka's and Melville's stories expressions of the 'world of files' under Vismann's study: Kafka 'offers an access to the world of files, to the world before institutionalizations, to the world before the law' (2008: 15), while Melville's Bartleby 'epitomizes the transition to clerical work devoid of any human factor, that is to say, no *chance*ry in the face of a mechanized bureau' (2008: 33, emphasis in original). Bureaucracy is seen as a machine, and chanceries as the relays of the law. Gates, such as those in *Before the Law,* 'facilitate or deny access, establish or interrupt contact, attract and exclude, mediate, regulate, allow entry, subdivide, transform, block, seduce, bar, ensure transfer . . . [can be] overrun and torn down' (2008: 19). The entrée into such an understanding of files and the law is literature. These texts mark the two poles of the field of functions performed by files in relation to the law: on the one hand secrecy, cancellation, *caesura*, and power (evident in Kafka), on the other hand the machine-like, antihuman, algorithmic dimensions of recording processes (on display in Melville).

As legal preambles have an annunciatory function, granting hermeneutical access to legal texts, so these stories serve to grant the reader of *Files* access into Vismann's conceptualization of the law as a 'repository of acts that assume concrete shape in files' (2008: xiii) and which has no memory of itself (2008: 12). Further, such fictions 'do not merely illustrate the machines and apparatuses of the law, or the logic of bureaucracy driven to its extreme. As narrative residues discarded by the grand tales of the origin and evolution of the law, they stand at the end of a process of differentiation that also entailed a removal of literature from the law' (2008: xiii). They are works of literature, a realm that is barred from entering conventional legal discourse, and their invocation here reminds us this was not always so. Finally, their stylistic or formal

attributes are as differentiated from legalese as a preamble's typographic differentiation is from a legal document. Therefore, as in Kittler's work, literary texts function for Vismann as both historical evidence (as expressions of certain historically specific media-technological conditions) and as important elements of the theoretical armature she constructs in order to explore the law primarily according to its documentary apparatus and processes.

A second plane on which Vismann intersects with Kittler is regarding the latter's importation of the Lacanian concepts of the real, the imaginary, and the symbolic into the study of media technology. Briefly, Kittler understands these concepts as follows: the symbolic is the dimension of code, the syntax through which is constituted and transmitted the communications and information that make up the world. The symbolic for Kittler is 'a syntax purified of all semantics, meaning, degrees of figuration, and thus also every conceivability' which, Kittler proposes, 'could in the end coincide with the concept of information in telecommunications' (2010: 40–1). The imaginary is the realm of figure recognition, the processes of which are 'just as automatic as they are deceitful' (Kittler, 2010: 39), while the real – which cannot be accessed by combinatorial systems and processes of visual perception – is stored, processed, and transmitted (by the symbolic) because it 'has neither a figure, like the imaginary, nor a syntax, like the symbolic' (Kittler, 2010: 40). Importantly – and this is where Vismann follows Kittler in understanding Lacan – the processes or phenomena associated with each category are not understood as primarily (or even fundamentally) psychological, but rather are probed in their material and technical dimensions. For Vismann, conventional understandings of files from disciplines such as linguistics, sociology, and history[8] misunderstand their crucial functional and constitutive dimensions because of an assumption that files capture the real. 'From this phonocentric perspective, files capture everything that other forms of writing no longer contain – all the life, the struggles and speeches that surround decisions' (2008: 10). Vismann shows, however, that what is captured or embodied in files (when viewed in this way) is not the real but a projection of the imaginary, and such conventional approaches to files and archive say more about their practitioners and associated disciplines than the actual entities themselves. In contrast, in the legal world, files are not objects unto themselves, subject to the gaze of the archivist or archaeologist. They are 'the basis for legal work. Their validity resides in their truth value and their everyday operations' (Vismann, 2008: 11). Files stand before the law that is made by them. As such, while the law has no memory of itself (for it could not acknowledge its contingency and hope to be authoritative), its material history exists not *in* but *as* files. Approaching files not as fetishized capturers of the real but rather as procedural entities of the symbolic (which come to be (mis)interpreted by the imaginary),

Vismann's genealogy offers a comprehensive account of the media-technological history of the law.

Lacanian concepts are also crucial to Vismann's reading of Franz Kafka's *Before the Law*. What she teases out of this story of barriers, thresholds, guardians, time, and the law is nothing less than the archive fever of a modernity obsessed with the search for origin. Kafka's central character, the man, is barred from entry to the door of the law. He is assured by the doorkeeper that beyond this door lays another, similarly guarded, and beyond that door is another, and so on. The man is told this but also catches a glimpse of what lies beyond the door. Though he 'sees' only the nothingness of empty space, this glimpse fuels the man's curiosity for what lies beyond the door and, Vismann suggests, binds him to its secret (2008: 15). That is to say, this reading of the story suggests that the modern subject is both barred from and obsessed with the secret of the elusive, endlessly deferred origin – whether of the law, of existence, of history, and so on.

But the story also makes clear that we cannot *know* the law in such terms precisely because such an essence or origin is an endlessly deferred impossibility. Indeed, only the imaginary resides behind the door, while the infinite series of doors suggests a symbolic order 'made up of gates that refer to gates' (Vismann, 2008: 16). Ultimately, 'the legal order consists of nothing other than this chain of references' (2008: 16), and the story's 'whole architecture of entries and barriers testifies above all to the *technologies* of reference adopted by the law' (2008: 17, emphasis in original). Thus all that remains is a received tradition of the law, and 'the very existence of these laws . . . is at most a matter of presumption' (Kafka in Vismann, 2008: 16). Deconstruction and archaeology attempt to uncover the conditions by which these presumptions operate. Vismann's highly original contribution to this tradition is to use it to open up a space in which to think about a law that is governed not by men or by history but by self-regulating, machinic entities such as files. When literature is parsed and Lacan is incorporated to describe the law as a system of relays, signal processing and transfer operations, we are in the realm of Kittler. Vismann offers a rationale for such an approach when she suggests that, regarding 19th-century scholars dedicated to tracing Roman law back to an undisguised *ur*-text, '[w]hether (to allude to Lacan) [their] gaze opens into the real or the imaginary remains undecidable. Both are involved when Roman law emerges from the reconstruction of its transmission. But it is possible to decide upon, specify, and elaborate the media-technological conditions of its transmission' (2008: 41). This is as succinct an encapsulation of the Vismannian project as exists in *Files*.

These brief remarks regarding the relation between Vismann and Kittler are preliminary and exploratory. They are meant to suggest lines of inquiry that may prove fruitful for situating Vismann in relation

to the 'Kittler effect' in media studies. Vismann's reading of Kafka's *Before the Law* is a particularly good example of the two main planes on which the thinkers intersect, literature and Lacan. If we follow Vismann's reading of *Before the Law* as a story about the documentary apparatus of the law a little further, it will also throw into relief an important series of double functions of the law and the files that stand before it. In the story, the law is endlessly announced but continuously deferred. Similarly, files control the formalization *and* differentiation of the law, processing its separation into authority *and* administration (2008: xxi); files first perform the law, and eventually come to service it – that is, files both administer *and* are administered; files also function both to transmit the law *and* store its processes, acts, and traces (2008: xiv). Such a discussion of double-functions of files and information processes echoes Derrida's similar pronouncement regarding the archive as both commencement and commandment (Derrida, 1995: 1–5). Additionally, Vismann shows that the writing down of a file's history and movement through space and time in the form of a list also has a double function: such a list is both imperative (i.e. generating the next command) *and* informational (i.e. noting its own execution) (2008: 8). In the latter example we find an issue with Vismann's definition of files, specifically regarding the relationship she sketches out between files as authorless, process-generated entities and the process generators themselves. One of the latter will be explored specifically in the next section: the list.

Lists

With the advent of writing came the list. Some of the earliest surviving forms of writing, c. 3000 BCE, are the administrative lists of the ancient Sumerians, scrawled on the walls of caves and on pieces of birch bark (Goody, 1977: 78, 82). Such early lists are purely administrative – they document economic transactions, inventories, and other minutiae of day-to-day life in Mesopotamia in this period. As such, they exist between orality and literacy. Not surprisingly, as a functional entity that is present through each of the epochs traversed by *Files*, lists are isolated by Vismann as one of the administrative forms that can allow for the writing of a new history of the law. She maintains that '[l]ists do not communicate, they control transfer operations . . . individual items are not put down in writing for the sake of memorizing spoken words, but in order to regulate goods, things, or people. Lists sort and engender circulation' (2008: 6). She conceptualizes the list as strictly a medium of transfer (as in the Lévi-Strauss writing lesson); its storage capacity is only ever temporary because there is no need, nor any desire, to preserve a list once the act or event that it facilitates has occurred. Therefore the orientation of the list, for Vismann, is always toward the present.

However, there is something of a contradiction, or at least a tension in this view of lists, in that she notes that they are not only important in the world of files but actually prefigure files themselves: 'files are governed by lists . . . Lists with tasks to be performed govern the inside of the file world, from their initial compilation to their final storage' (2008: 7). Files are process-generated algorithmic entities, and the process generators are 'list-shaped control signs' (2008: 7). That is to say, lists prescribe any file's movement through space and time. File notes issue commands for the next movement or event of a file's existence – to where or to whom the file should travel, at what time, by which means, etc. Each executed command triggers the next. Over time these notes accumulate, one after the other, to form a list. They preserve a record of a file's 'life'. In Vismann's own words: 'when, against all intentions, records multiply and chart their own course through official corridors, when they start taking on a life of their own in filing rooms, this is an indication that lists or programs are at work' (2008: 8).

Though she spends considerable time discussing lists (particularly in Chapter 1), their actual importance to the kind of ontological conditions she seeks to map out in *Files* is underemphasized. This is primarily because she does not draw clearly a distinction between registries, lists, and files. A registry (see pp. 79–85) is obviously conceptualized as some kind of list, but what kind? Is a registry also categorized as a file? Does this imply that every list is a file? If so, does that not complicate the idea of lists as purely processed-based entities with no archival capacity? Since, as she notes, lists program the movement of files through space and time (and are therefore different from files at some level), more time could be devoted to parsing these questions and making a sharper differentiation between the three forms, which are often conflated by the category of 'recording device'.

Such a differentiation is important because if lists program the movement and 'life' of files, they in some way prefigure files themselves, and thus must be seen to play an integral role in the emergence of truth, subject, state and the law. As an example, much of the material explored in Chapter 3 focuses on registries as a technology of power: '[t]he rule of kings around 1200 was the rule of registries' (2008: 77). Registries are shown to be lists of items or inventories of mobile imperial archives that serve important double functions for the control by monarchical power over space and time – the registry in this period is about both index and affect, communication and transmission, storage and administration. The registry itself is filled in with information and becomes a template that frames the empire. Further, this 'new writing economy' reduces noise on the page and allows for a system of retrieval that is not sequential but grid-based. As such, a new economy of reading emerges that is left-to-right, top-to-bottom (2008: 80). Meanwhile, single entries can have multiple units – a corresponding date, location,

or other attribute can be noted beside any given entry. Things can thus become ranked or organized according to various other criteria. Vismann shows these developments affect space, time and power – for instance, dates in margins decompose time into discrete, countable units, linking acts to time, and 'the coincidence of the two produces an event' (2008: 81). While these factors or tendencies are not all necessarily *new* in this period, the extent to which they were deployed as technologies of power/knowledge was unprecedented. 'Registries were more than nifty administrative techniques designed to economize on reading and writing; they were nothing less than the media technology for a state as a permanent entity' (Vismann, 2008: 81–2). Importantly for our consideration of the list, Vismann herself shows that these registries actually prefigure the world of files that elsewhere are attributed to be constitutive of the power over time required for the state to come into existence. 'On the basis of this comprehensive chronological register, the state as institutionalized during the reign of Frederick II, became an apparatus of repetitions, a file machine' (Vismann, 2008: 82). It may very well be that Vismann considers registries to be files (and vice versa), but this is unclear (even her earlier open definition implies that files are collections of spatially and materially discrete units rather than simply discrete units in writing). A clearer differentiation is needed precisely because lists and registries are shown to control the movement of files in space and time, and so are obviously at some level ontologically distinct from them.

Vismann's description of lists shows us that they can take on a machine-like character. They streamline, standardize, and help accelerate the processing of information in whatever media-technological network they are functioning (and because of its malleability, the list can function in many such networks). She is correct in emphasizing this administrative and facilitative capacity of the list. But her insistence that the list can only ever be present-based results in an explicit rejection of its capacity as a storage device that is also problematic. Surely the list's indexicality to such file activity as described above – its keeping a *record* of this activity – is demonstrative of an archival capacity that pushes the functionality of the list beyond simply present-based administration? We may not intend or wish to archive our lists, but often they become so preserved.[9] Vismann misses this aspect of lists because, to use the language of Innis (2002), her focus remains trained on the list's *space-bias* – its ability to facilitate the movement of files in the spaces of administration – at the expense of the important fact that a list can also in its archival capacities express a *time*-bias, which in this case preserves the records of the life-world of files. Fine-tuning Vismann's analysis of forms that prefigure files such as lists can build off of her contributions and offer further insight into the kinds of ontological and epistemological questions her work provokes.

Conclusion

Files is a rich text that has much to contribute to the contemporary intellectual landscape. It is an important book, and the intellectual tools Vismann develops in it will only prove more influential as it becomes more widely read. I hope to have suggested some potential lines of inquiry provoked by the book, while exploring some connections to other thinkers that may prove fruitful. In the wake of her tragic death, one is left only to wonder about what further intellectual projects might have emerged out of Vismann's brilliant erudition and scholarship. English readers can only hope that translation efforts of her existing works currently underway continue and expand. Her intellectual legacy remains to be written, but *Files* will undoubtedly prove to be the essential Vismannian text.

Notes

1. She notes that the German word for files, *Akten,* does not differentiate between materiality and function. In English the former is denoted by files, the latter by the term 'records' (corresponding to their function as recording devices) (2008: xii).
2. See Latour (1987) and Rotman (2008).
3. As, for instance, in Ong (1982).
4. Briefly, this episode occurred during a journey of Lévi-Strauss' through the Brazilian jungle with the Nambikwara tribe, and involved the anthropologist presenting members of the tribe with writing utensils and paper. He describes how most Nambikwara quickly lose interest in the materials (not knowing how to use them) with the exception of the chief, who begins to mimic Lévi-Strauss' own writing activity. The chief then proceeds to insert this 'writing' (the wavy lines he draws which bear no communicative function in and of themselves) into a series of complex exchange rituals within the tribe, and between the tribe and Lévi-Strauss' anthropological team (see Vismann, 2008: 2–6).
5. The fruits of which are unfortunately (as yet) unavailable to English readers. See, for instance, Kittler and Vismann (2001).
6. See Kittler (2010: 47–9) and Winthrop-Young (2011: 29–51).
7. For two examples chosen at random, see Kittler's brilliant use of Jean-Marie Guyau to illuminate the effects of the phonograph (1999: 30–3), or his use of Flaubert to discuss the repercussions of infinitely reproducible lithographs in *Optical Media* (2010: 138).
8. Typified by Leopold von Ranke, for whom '[a]rchived records revealed . . . the totality of a present past, and with it the possibility of venturing behind state history to retrieve the life that had been deposited in files' (2008: 8).
9. The Morgan Museum in New York recently devoted an entire exhibit to the lists of famous artists. Over 80 lists with a variety of functions were displayed: practical, aesthetic, archival, autobiographical, etc. (Kerwin, 2011).

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