

Traces: Does Traffic Retroact on the Media

Infrastructure?

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Abstract

The dynamics of physical and sign traffic as cultural practices are intertwined with static patterns of infrastructure which enable these practices and at the same time are formed by them. The article examines this mutual dependency with recourse to three concepts that have been invoked in theorizing the relation between processes and structures: The semiotic concept of 'trace,' which mediates between signs, physical causality, and social practices; the psychoanalytical concept of 'facilitation,' which adds quantitative aspects (intensity, repetition); and the idea of a transition of quantity into quality adopted by Friedrich Engels, which overcomes the opposition between nature and culture.

Keywords

media theory – media history – cultural history – semiotics – infrastructures – practices – memory – sign – trace – facilitation – association – dialectics – psychoanalysis – Sigmund Freud – Friedrich Engels

The attempt to understand media processes as 'traffic' is relatively new within media studies. Harold Innis was one well-known trailblazer, who in the 1950s first studied the network of trade routes in Canada before progressing to the 'trade routes of the mind,' the media.

Methodologically speaking, there are several difficulties linked to this approach. For instance, it is initially not entirely clear which metaphorical level underpins the argument. Is a structural parallel concerned? An attempt to draw conclusions from the visible networks of actual traffic for the far less visible symbolic ones? Or is the symbolic traffic of the media actually to be subsumed beneath three-dimensional physical traffic? It was not without reason, albeit just as confusing, that Marx, for example, designated social relationships overall as forms of intercourse.¹

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1 In German, the term *Verkehr* (intercourse) means 'traffic.'

A second difficulty is no doubt that, although traffic infrastructures can be well observed, the traffic itself that occurs on the infrastructures definitely cannot. The hustle and bustle of traffic, irreducibly tied to volumes, initially seems only to submit to a quantitative study. A field in which cultural studies is surely not well-versed.

The observation I wish to make in the following essay elegantly circumnavigates these issues by initially sticking to the basics. I want to present three models that consider the connection between traffic and structure/infrastructure in different terrains. The background to this consideration however is anchored in down-to-earth media studies. For the question is: How can one create a model for media history? What drives media history? What is the driving force, or forces, behind the observable changes in impact?

Within media studies, media history is still largely modelled from the top down, albeit in a wide variety of versions. Frequently, the model moves along a chain of technological inventions and from there investigates the impact on society, e.g., 'television has changed the world.' Or the opposite direction is taken, starting with society (but again top down) and resorting to the great historical phase models outlined by historians or social scientists.

In contrast, approaches that attempt a 'bottom-up' writing of media history encounter more difficulties as regards methodology and content. When cultural studies focus on media usage and people, for instance, it is often processes of reception that are described. It remains a moot point whether they actually reach the 'media' level itself. The decisive question, however, would be whether 'bottom-up' processes are actually capable of spawning new media, for example. Even the term 'usage' is problematic in itself, implying as it does that the medium is primary and the condition precedent, necessarily making its use something secondary...

This all describes the motivation rather than the field I will explore. At first I will invest only in the background, in models and concepts we may need in order to be able at some point to answer questions such as those outlined. Specifically, I will address the metaphor of the trace and priming. In the first section I will focus on the concept of the trace as Sybille Krämer introduced it to the debate in media studies; in the second section I will present certain theories of memory that have a common perspective in trace and priming; and in my third and last section I will, admittedly in a somewhat crude jump, switch to the level of a conceptual generalization.

Overall, my essay will provide tesserae and not a self-contained structure. This seems fitting to me, because I think that any 'science of media traffic' is still in its early infancy.

Trace

I would like to start with a picture (cf. Figure 1). At first glance this picture looks like a Jackson Pollock, but in actual fact is the photo of a flock of sheep in the snow originally published in the German magazine *Stern*. Essentially this photo encapsulates the entire problem discussed below.

There is great interest in the notion of trace at present. Following on from Derrida's *Grammatology* (1967) and Levinas' *The Trace of the Other* (1963), various writers have integrated the concept into their semiotic deliberations and thinking on the theory of the script.

In 2007 German philosopher Sybille Krämer presented a compendium that shines light on the results of this debate and seeks to advance it in a new direction (Krämer, Kogge, and Grube 2007). In addition to Derrida and Levinas, she referenced Sebeok/Umiker-Sebeok, *You Know My Method* (1981), and Ginzburg, *Morelli, Freud and Sherlock Holmes* (1983). With her book, Krämer undertakes an ultimately semiotic project.

Can it be that the occupation with the notion of trace is fertile and fitting for this day and age, because it is able to counter the carefree and



FIGURE 1 *Flock of sheep in the snow.*

PHOTO BY JÜRGEN GEBHARD. © PICTURE PRESS, HAMBURG. PRINTED WITH PERMISSION.

reference-less floating of signs with something grounded in a kind of 'semantics of things'? Indeed, in the context of reading traces activities such as 'representing,' 'reading,' and 'interpreting' assume a significance that does not apply to the self-sufficient sign systems. Thinking about the trace, on the one hand we forge a link to the semiological-representational debate, yet at the same time with reading traces we hold Ariadne's thread in our hand, which leads us out of the 'pure' world of signs and connects us to the world's tangible, physical and material side, which is the *conditio sine qua non* of traces arising and being open to interpretation. Does this mean that traces are the interface at the emergence of meaning and non-meaning?

KRÄMER 2007A, 12f.

In the paradigm of the trace Krämer discerns an opportunity to overcome the sterile juxtaposition of signifier and signified and to escape the established simple, bipolar model of representation. Krämer considers the model of representation problematic, because it is ultimately based on the body-mind dualism, which it extends into the space of media theory. As such the traces project follows on from earlier projects of hers; a number of major studies on performativity, for example, had the same objective, namely to 'ground' the concept of the sign by linking it back to materiality and practices.

This is even more evident as regards poststructuralist discourse. She acknowledges that it has enforced the realization, 'that we have no non-signifying access to the world and reality independent of interpretation' (*ibid.*, 12); at the same time however she accuses it of having entered an uncritical alliance with the development of technology, which in terms such as 'information' and 'immaterialization' possibly even misunderstands itself:

It seems only logical that so-called postmodern thought invokes signs bereft of references and a world that is seamlessly constituted by text: Dematerialization, derealization, disembodiment, computerization, virtualization, the euphoria of simulation – these are just different expressions for the tendency to release signs from all connection with non-signifying elements and thus to posit the world's nature as signs as absolute. *Yet this makes things disappear.*

Ibid.

Here the trace promises a way out, because it is clearly (more clearly than other signs) tied to materiality:

Traces appear before your eyes in concrete form; there is no trace without a physical signature. Traces are the result of touch and thus are certainly 'material': They appear in and through the material. Traces belong to the world of things. Thus only by virtue of a continuum in the material, corporeal and sensors aspect of the world is it possible to leave and read traces.

Ibid., 15

That said, we have a paradox in that traces also stand for something absent.

In the hollow of the impression, with which a movement in time takes shape as a configuration in space, it is apparent that someone or something has passed. The presence of the trace attests to the absence of that which generated it. In the visibility of the trace, that which created it is specifically withdrawn and invisible.

Ibid., 14

It is this tension that especially interests Krämer and which she will consider in her own article in that publication (Krämer 2007b). Now, all of this seems entirely plausible and fruitful for a media theory that always (and here I would agree with Krämer) has to do with the 'materiality of communication.' However, what is noteworthy is that Krämer's definition of the trace omits a very important aspect of it, and not just in the passage quoted, but in all ten attributes she lists for the concept (Krämer 2007a, 14–18). It is the peculiarity *that traces are often not left once, but several times, meaning that they either continually overlap and thus become unrecognizable or, on the contrary, deepen by means of inscription.*

Medieval highways, for instance, were certainly not, as we might think, narrower than today's motorways. Indeed, reconstructions have shown that they were up to 500 metres wide; for the simple reason that the wagon wheels destroyed the generally unpaved roads as they were using them. When the ground had been softened by rain, ever new parallel and detour tracks had to be carved. Consequently, the woods were not traversed by clear lines, but by a complicated network of parallel and ever-dissipating ramifying tracks.

The image of the flock of sheep cited above effortlessly reflects this aspect. The everyday notion of traces at least has a quantitative side. And a privileged reference either to the mass or to the *repetition*. Neither Sebeok/Umiker-Sebeok nor Ginzburg focus on this quantitative side – Krämer borrowed from them the perspective of the hunter who reads and follows traces and tracks. In Krämer's approach the emphasis is again on reading, recognition and

knowledge, and to be more precise, a kind of 'knowledge' initially oriented on the individual case, the individual trace.

Naturally other forms of knowledge are also possible; the trace the flock leaves behind obeys its own laws and poses its own questions. If we were to at least roughly outline them, we could name, e.g., the following:

1. The question of quantities themselves. 'Size does matter' is a realization that imposes itself, yet certainly does not necessarily submit to a description, e.g. with statistical means. All problems of observation become compounded as soon as it is necessary to keep an eye on a greater number of actors.
2. The question as to which pattern(s) emerge in the multitude and in the superimposition of traces. In the above sheep photo it is the privileged aerial view that makes our eyes jump from the level of the sheep to that of the emerging patterns. The traces appear to be rule-based, and at the same time difficult to explain; they seem to be following a strange attractor, strange in that an external reason, a cause, cannot be instantly named.
3. A third question would be: How is the individual action, e.g. the path of a single sheep, related to the emerging overall structure? In the pattern the fact becomes apparent that between the individual actors (sheep) there are mechanisms of coordination or, in more timid/open terms, a connection. Still what this connection looks like, what it actually consists of, is not yet known. And moreover:
4. The question becomes complicated precisely because there are these two levels. Although we would initially ascribe the status of actor to a single sheep, we tend to also model the flock as a kind of collective subject. The extent to which this is justified would surely differ in each case and warrant individual examination.
5. The fifth question concerns the surface or space in which the traces leave their mark. Naturally this is also relevant in the case of individual traces, yet in the case of collective or repeated traces it is dramatic, precisely to the extent to which it concerns, among other things, the creation of an 'overall image.'
6. And finally we needed criteria in order to be able to reliably separate collective phenomena and repetition at all...

Far from being able to answer or operationalize even one of these questions, I would instead like to move into different terrain. Indeed, the concept of the trace is to be found in another context, which may be able to bring us closer to the aforementioned.

Memory Theories

This context is that of the *memory theory*. Harald Weinrich showed in an essay in 1964 that the metaphors by which human memory is modelled and understood are grouped around two poles, namely the wax tablet and the storeroom (Weinrich 1964; see Assmann 1991, 13). While the storeroom or warehouse metaphor is based on a relatively simple accumulation of stored content and presumes that it, faithfully preserved, will reappear in due course in identical form, the metaphor of the wax tablet takes a more complicated approach. We find the metaphor itself even in Plato's *Theaetetus* dialogue:

I would have you imagine, then, that there exists in the mind of man a block of wax, which is of different sizes in different men; harder, moister, and having more or less of purity in one than another, and in some of an intermediate quality. [...] Let us say that this tablet is a gift of Memory, the mother of the Muses; and that when we wish to remember so anything which we have seen, or heard, or thought in our own minds, we hold the wax to the perceptions and thoughts, and in that material receive the impression of them as from the seal of a ring; and that we remember and know what is imprinted as long as the image lasts; but when the image is effaced, or cannot be taken, then we forget and do not know.

PLATO 1892, 254f.

In Classical Antiquity, wax tablets were a popular device on which to write things down, thus it is indeed an actual, material media technology that is chosen as an image for the memory here. And starting with Plato, we find the metaphor in a long series of different versions. Various dimensions merge in the metaphor. Firstly, there is proximity to the problem of perception, if we were to speak here quite colloquially (entirely in keeping with the wax tablet metaphor) of 'impressions'; secondly the threat of forgetting is addressed more clearly than in the case of storage; thirdly overlapping and overwriting, a particularly interesting dimension in this context.

As Assmann shows, later overlapping and overwriting are also frequently illustrated with the palimpsest (1991, 19). The wax tablet and palimpsest stand for mutability and the tendency toward the unavailability of the memory; they stand for the 'book with no definite form, the [temporally] dynamized book' (*ibid.*). From here Assmann returns to the trace:

In 19th-century psychology the trace became the central concept in research into memory. Karl Spamer defined it as 'a force exerted on an inanimate object' that retains energy within it. Memory and trace virtually become synonymous: 'One can [...] speak of a memory of all organic material, indeed, material altogether, in the sense that certain influences leave more or less lasting traces on it. Stone itself retains the trace of the hammer that has struck it.'²

ASSMANN 1991, 21

Probably the best-known version of the wax tablet metaphor is Freud's 'mystic writing pad,' which likewise seeks to grasp the interrelationship between perception and permanent traces/memory. Here, interestingly, memory is associated with the unconscious, insofar as the permanent traces on the wax tablet cannot initially be read.

It seems to me, however, that in the present context an earlier text in which Freud explores the concept of *priming* is far more important; the concept of priming is relevant to me because it directly abuts on that of the trace. Freud wrote his 'Project for a Scientific Psychology' as early as 1895 (cf. Freud 1954), in a phase in which he integrated medical-physiological and neurological ideas far more strongly than in his late work and sought to describe mental processes from a dual perspective, the psychological and the physiological/energy-based. This essay likewise addresses the connection between perception and memory, or rather the puzzle that the mental apparatus, on the one hand, is always ready to absorb new information, but, on the other, nonetheless changes with every perception by retaining permanent traces – that is the phenomenon of memory.

One of the chief characteristics of nervous tissue is that of 'memory': that is, speaking generally, a susceptibility to permanent alteration by a single process. This offers a striking contrast to the behaviour of a material that allows a wave-movement to pass through it and then returns to its former condition. Any psychological theory deserving consideration must provide an explanation of memory. Now any such explanation comes up against the difficulty that, on the one hand, it must be assumed that after an excitation neurones are permanently different from what they were before, while, on the other hand, it cannot be denied that, in general, fresh excitations meet with the same conditions of reception as did the

² Assmann quotes Spamer 1877.

earlier ones. Thus the neurones would appear to be both influenced and also unaltered-‘unrepossessed.’ We cannot off-hand imagine an apparatus capable of such complicated functioning.

FREUD 1954, 359f.

Freud’s initial answer is rather unrefined:

The situation is accordingly saved by assigning the characteristic of being permanently influenced by excitation to *one* class of neurones, and the immutability – the characteristic of being fresh for the reception of new excitations – to *another* class.

Ibid., 360

However, he immediately realized he had to modify his response and developed the so-called ‘theory of contact-barriers’:

Thus there are permeable neurones (offering no resistance and retaining nothing) which serve the function of perception, and impermeable neurones (offering resistance and retaining quantity [...]) which are the vehicles of memory and presumably, therefore, of psychical processes in general. [...]. [The neurons of memory] are permanently altered by the course of an excitation [...]; their contact-barriers are brought into a permanently altered condition. [...] [T]his alteration must consist in the contact-barriers becoming more capable of conduction – less impermeable – becoming, that is, more like those of the [...] [system of perception]. We shall describe this condition of the contact-barriers as their degree of *facilitation* [*Bahnung*]. We can then assert that memory is represented by the facilitations existing between the [...] [memory-] neurones.³

Ibid., 360f.

The concept of facilitation, which we now term priming, is a major gain. It moderates the gap between the two types of neurons initially exposed as separate; between perception and memory, and in more general terms between process/actuality and storage/persistence.

Moreover, the concept ties the structure of memory back to perception; memory occurs when current perceptions inscribe themselves – as priming –

3 Emphasis in original, last sentence of the quotation also italicized in original.

in the structure. In addition, the fact that Freud clearly considers his model to have physiological foundations enables a *quantitative* perspective:

Now what does the facilitation in the [...] [memory-] neurones depend on? Psychological experience shows that memory (that is, the persisting force of an experience) depends on a factor that is described as the 'magnitude' of the impression and on the frequency of the recurrence of the same impression. Or, translated into our theory, facilitation depends on the quantity [...] [of excitation] which passes through a neurone in the excitatory process and on the number of repetitions of that process.

Ibid., 361

Thus, Freud says that strong stimuli leave different traces/primings to weak stimuli; and that in addition to the intensity of stimuli, the frequency of their repetition also plays a role. The traces of memory grow stronger with use, which brings us back to the aerial photo of the flock of sheep.

The concept of priming in fact brings all these moments together. Yet the result itself is certainly not counterintuitive or perplexing, but is indeed also connected to everyday ideas. This becomes clear if we switch to the concept of association, which Freud repeatedly used in all kinds of different functions, from treatment techniques, i.e., the instruction to the analysand to freely associate, to the *Psychopathology of Everyday Life*.

Psychoanalysis is able to rely on a finished body of work as regards the doctrine of association, one that is far older and extends from Aristotle's *De Memoria* to Leibniz' *Of the Association of Ideas* (cf. Leibniz 1896, 281ff.), Locke and Hume to Schopenhauer.⁴ In Freud's day, association was one of the new concepts in psychology. The theories of association asked how the various types of mental material – be it ideas, images or concepts – relate to one another; which types of associations can be meaningfully differentiated and how they emerge on both the individual and collective levels.

'Association' is a relational concept that searches for connections between existing entities; where an overall picture emerges, the concept of association frequently transforms into ideas of networks. Individual associations can be fixed or fluid; from a genetic perspective one asked what strengthens

4 'Whoever wishes to call up something in his memory first seeks for a thread with which it is connected by the association of thoughts. [...] Our immediate remembrance of words, that is, our remembrance of them without the assistance of mnemonic contrivances, and with it our whole faculty of speech, ultimately depends upon the direct association of thoughts.' (Schopenhauer 1909, 316, 317)

or weakens them; and one realized that they naturally fade, so to speak, if they are not refreshed in one way or another.⁵

Thus, 'association' also has a structural and a process-related side; this term too systematically mediates between structure and use. What it is usually lacking is the quantitative-physiological element that Freud clearly emphasizes in his concept of facilitation ('priming'); at best in the psychology of learning one has 'understood learning by heart and practicing as the [targeted, H.W.] creation of associations'.⁶

I am able to refer only in passing to another dimension connected to the concept of the trace as inscription; indeed, above all Nietzsche considered memory overall to be dependent on pain, on a painful inscription.⁷ And there are several theories referencing this that draw from the trauma, as a permanent injury to the psyche, far-reaching consequences for the memory overall (see Assmann 1998).

5 'Ideas fade in the memory. – Concerning the several degrees of lasting, wherewith ideas are imprinted on the memory, we may observe, that some of them have been produced in the understanding, by an object affecting the senses once only, and no more than once; others, that have more than once offered themselves to the senses, have yet been little taken notice of; the mind, either heedless as in children, or otherwise employed, as in men, intent only on one thing, not setting the stamp deep into itself. And in some, where they are set on with care and repeated impressions, either through the temper of the body, or some other fault, the memory is very weak; in all these cases, ideas in the mind quickly fade, and often vanish quite out of the understanding, leaving no more footsteps, or remaining characters of themselves, than shadows do flying over fields of corn; and the mind is as void of them, as if they had never been there.

[...] The memory of some men, it is true, is very tenacious, even to a miracle; but yet there seems to be a constant decay of all our ideas, even of those which are struck deepest, and in minds the most retentive; so that if they be not sometimes renewed by repeated exercise of the senses, or reflection on those kind of objects which, at first, occasioned them, the print wears out, and, at last, there remains nothing to be seen. Thus the ideas, as well as children of our youth, often die before us: and our minds represent to us those tombs to which we are approaching' (Locke 1825, 86f.).

6 Ritter 1971, 552, s.v. *Assoziation*.

7 "How do you give a memory to the animal, man? How do you impress something upon this partly dull, partly idiotic, inattentive mind, this personification of forgetfulness, so that it will stick?" ... This age-old question was not resolved with gentle solutions and methods, as can be imagined; perhaps there is nothing more terrible and strange in man's prehistory than his technique of mnemonics. 'A thing must be burnt in so that it stays in the memory: only something that continues to hurt stays in the memory' – that is a proposition from the oldest (and unfortunately the longest-lived) psychology on earth. [...] When man decided he had to make a memory for himself, it never happened without blood, torments and sacrifices: the most horrifying sacrifices and forfeits' (Nietzsche 2006, 38).

However succinct my account has been, the above models of memory relate to the initial question as to the 'trace,' the inscription, no doubt a privileged field. They have the major advantage that they rest on quotidian factual evidence and introspection. And the essential features surely would not be contentious: Memory does not seem simply given as an organ, but refers back quite naturally to the process of its creation. Even if we have to assume that memory entails an organic 'capacity,' it is clear that the memory only receives its structure, content, and concrete form in the process of life-long perception/experience, with perception and experience inscribing themselves into the memory. From the opposite perspective the memory represents a kind of *record* of these perceptive and experiential processes; however compressed, warped and distorted, they are 'completely' contained, monumentalized, within its structure.

Even everyday language would ascribe priming, impression, and trace to the memory. In the concept of association the idea of a linear linkage combines with more developed network models; the reference to repetition (e.g. in the mechanism of learning by heart) seems self-evident and forges a link to the quantitative aspect.

Two things are confusing, however. First, the fact that metaphor plays a prominent and not entirely controllable role here. When we are talking about 'trace' and 'priming,' these are of course initially metaphors; i.e., *models*, which structure experience but are by no means directly accessible to experience itself. This also applies to the wax tablet and mystic writing pad. We resort to external media technologies to illustrate something that is precisely not an external process and eludes direct observation. As a technical metaphor, media technology provides the model to understand what remains hidden in the darkness of individuals' heads.

The second confusing element is connected to this. The models mentioned initially refer to one person's memory, which poses the question as to whether equivalent or compatible ideas exist in the intersubjective domain, too. The fact that we use *media technologies* to aid understanding may moderate the jump for they are always and on principle located in the intersubjective realm.

Such a transition is in fact possible. Yet the models in question have the shortcoming of in part resting on a great many presuppositions and can only be considered plausibly with great circumspection. For this reason I wish to limit myself to very short keywords here that can at best allude to the context and name the points in which the question ramifies in certain subsequent discourses. (I find this somewhat easier, since I have voiced my opinion in detail on several of these points elsewhere.)

1. A systematic transition between the problem of memory and the inter-subjective domain appears in the theories on orality, i.e., on those tribal societies that were unable to write, and thus had to entrust all cultural tradition to the wax tablet of personal memory. Constitutive for these theories is the element of ritual repetition; of a collective technique that has the task of relating individual memories to a collective one and synchronizing them; ritually repeated discourse events refresh memories or inscribe the contents in memory. Thus in terms of media technology, the key thing is the transition between the individual and collective memory. The large number of individual memories represents the distributed 'hardware' on which the collective memory runs.
2. On the micro-level of the discursive, phenomena relating to *rhythm* are interesting. In music, in the beating of drums, and in dance steps, repetition, inscription, and structural formation combine; the bodies and the world they inhabit are structured by an external medium. Marie König has shown using particular cave paintings that they are based not on singular, but repeated incisions at the same spot, which likewise forges a link back to the rite and ritual affirmation (cf. König 1973, 64ff.). Archaeologists are constantly finding prehistoric bones with regular incisions; the oldest is approx. 40,000 years old.⁸ Most of them are interpreted as notations of the lunar cycle, i.e., a calendar, meaning that mimetically, as it were, here the rhythms of nature are represented and transferred to cultural structures and rhythms (cf. Leroi-Gourhan 1993, 188).
3. Thirdly, and to jump suddenly to the present day, there are the theories on the formation of stereotypes. These theories, which prove fruitful above all in analysing image media, seem extremely important to me in the present context, because, unlike current semiotic theories, they always emphasize the process of the *formation* of stereotypes. Stereotypes are a prime example of the formation of a structure that none of those involved intend as such. Stereotypes do not emerge in the individual product, but in the larger area between the products; they form behind the backs of those involved, as a by-product of communication processes.
4. Fourthly there are theories on signifier formation, which can be linked to the above-named stereotype theories. The formation of signifiers,

8 The best known is the so-called 'Ishango bone,' found in Uganda/Zaire, which is about 25,000 years old (http://en.wikipedia.org/wiki/Ishango_bone); a mammoth tusk was recently found in Russia's Ural Mountains near the Arctic Circle, also with regular notches, dated at 35,000–40,000 years old.

which constitutes the basis of linguistic meaning, is probably the central enigma of language. For me it seems it can be answered only in the manner outlined here: by (wholly in line with the idea of inscription) assuming a regular connection between the discourse events and the linguistic-semantic structure, in such a way, for example, that the discursive events feed back into the linguistic-semantic structure as if as a 'memory' (cf. Winkler 2004, 110–130).

5. Interestingly, people have repeatedly conceived semantics itself as a *network*.⁹ This idea (and this is where we come full circle to an extent) is in turn based on the principles of the psychology of association; Saussure relates the observable quality of linguistic units (words) to 'associatively' link with others in the memory to that second chain that can be observed as a series/sequence of words, as text, in the outside world. Seen from this perspective, the current text in each case is a trace, which only re-instantiates that which is always already laid out in the associative-paradigmatic chains of the linguistic system; vice versa the linguistic system depends on these updates. Indeed, just as the collective memory of societies based on oral tradition would be lost without ritual re-enactment, the linguistic system and the associations that language regularly organizes would also flounder without the nurture they experience through the current utterance in each case.
6. If we conceive of the semantic system of language as a 'network,' a system of traces, the question arises as to how this 'inner' network behaves towards the external networks along which signs physically run.

As I mentioned, these contexts can only be suggested here. They mark points of transition to discourses that address specific media problems which are interesting and continue to be contested within my field. My theory is that the problem addressed here, i.e. the problem of priming and trace, actually offers a new and possibly unifying perspective on these issues.

Quantity Transforms into Quality

In a third step I now wish to propose a conceptual framework into which the question of the trace, and more generally the link between quantities and

9 'The building blocks of language have by definition – and acquire by use – an indefinite variety of connections, associations, similarities, and affinities: A word is a bundle of connections with a label on it.' (Miller 1991, 90; see also *ibid.*, 103)

structure generation, can potentially be integrated. And here I refer to a book that was relatively well known, but also harshly criticized, and with which most likely hardly anyone would work today, namely Engels' *Dialectics of Nature* (1873–86) (Engels 1987). The German edition from 1973 introduces the text as follows:

A fundamental work of Marxism, in which Friedrich Engels offers a dialectical-materialist generalization of the most important scientific achievements of the mid-19th century, advances materialist dialectics and critically analyses the metaphysical and idealist concepts in science.

ENGELS 1973, 646

Engels' project is to show that dialectics is not solely the work of humankind, but (and this is new and initially completely counterintuitive) also holds in the sphere of nature. In other words, that nature too, and indeed nature itself and not just the knowledge of nature, develops in accordance with dialectical principles.

Firstly Engels reconstructed the background, in terms of scientific history, of his theory: an increased focus on knowledge of nature from the second half of the 15th century; although initially in the sense of a rigid, supratemporal view of nature, still linked to metaphysical elements (cf. Engels 1987, 321f.). It was not until the late 18th century (with Kant, Caspar Friedrich Wolff) that nature was seen as something that had become, that had evolved by itself and according to its own principles. *Darwin* was no doubt a specific impetus for Engels (cf. *ibid.*, 327).

Engels saw the entire 19th century as characterized by the notion of history and development finding a foothold in ever more scientific fields; in his, Engels', day the paradigm had prevailed:

The new outlook on nature was complete in its main features: all rigidity was dissolved, all fixity dissipated, all particularity that had been regarded as eternal became transient, the whole of nature was shown as moving in eternal flux and cyclical course.

Ibid.

Darwin is the shock that triggers the idea. Engels now reverses this shock; he sees the opportunity to forge a link between the social history of humankind (the classic field which he had addressed together with Marx), on the one hand, and natural history or nature theory, on the other.

In terms of Marxist theory (here we must agree with the editors) this project is by no means peripheral; they recall that Marxist social theory considers

itself a *materialist* one, and in the field of society it certainly makes similar claims to validity and objectivity as do otherwise only the natural sciences in the field of knowledge of nature.

Before we smilingly reject this as hypertrophically superior, we should remember that a similar concept exists among modern thinkers too, such as Latour; although they do not share a comparable claim to objectivity, they do have in common the dissatisfaction with the division into an 'objective' world of knowledge of nature and a second, social world, dependent on interpretation. Latour attempts, albeit in an entirely different field, to forge a similar link; and in Krämer (above) we saw that the concept of the trace also mediates between nature and culture.

And even in Engels the basic materialist intuition does not simply transform into determinism. Indeed, as society and nature become dependent on *development* in a radical way, an element of *unpredictability* or *openness* comes into the equation.

Secondly, it is important that Engels does not simply short circuit nature/natural science and society/social science. Instead, he finds the connection he seeks initially on the level of a highly abstract model; on the level of precisely the 'dialectics' that give the work – *Dialectics of Nature* – its title.

Indeed, Engels is forced to first develop a suitable concept of dialectics. The form of dialectics at hand, for instance in Hegel, is largely restricted to the human world and human understanding, at least from Engels' perspective, who does not recognize the advancement of the world spirit as an objective-metaphysical movement.¹⁰

Thus if Engels wanted to show that a 'dialectic' prevailed in the processes of nature and in the advancement of natural history, he had to elaborate the concept itself, detach it from humans and translate it into a model that is perhaps also valid beyond human history.

A remark is in order here. For naturally it is only and exclusively this abstraction that makes Engels' idea at all interesting in the present context. Given that I am not considering a knowledge of nature or the link he sought to forge here, I would now like *exclusively* to initially address the level of the model.

And this is precisely where Engels provides a concise, brilliantly clear, and almost irrefutably evident idea, one that seems to me highly useful in clarifying the question addressed here, and which I would like to introduce to the discussion. For Engels maintains, as one of the three laws of his dialectics,

10 'All three are developed by Hegel in his idealist fashion as mere laws of *thought*. [...]. The mistake lies in the fact that these laws are foisted on nature and history as laws of thought, and not deduced from them.' (Engels 1987, 356)

that there is a law-like connection between quantitative processes and the observable evolutionary leaps, the changes in the *structure*, the jump to new *qualities*.

Quantity, this is the theory for which the book became famous, *transforms into quality* (Engels 1987, 356).

The law of the transformation of quantity into quality and vice versa. For our purpose, we can express this by saying that in nature, in a manner exactly fixed for each individual case, qualitative changes can only occur by the quantitative addition or quantitative subtraction of matter or motion (so-called energy). All qualitative differences in nature rest on differences of chemical composition or on different quantities or forms of motion (energy) or, as is almost always the case, on both. Hence it is impossible to alter the quality of a body without addition or subtraction of matter or motion, i.e., without quantitative alteration of the body concerned.

Ibid.

Even if Engels maintains that this is 'even rather obvious,' (ibid.) the notion presents several problems. For example, it is by no means certain whether the necessary condition of a quantitative change includes one that is sufficient; whether the 'chemistry,' which he takes as his example, perhaps unlike energy does not always presuppose qualities; and whether these can in turn be completely traced back to quantities, etc. The subsequent debates, e.g. on the concept of emergence, which likewise seeks to grasp the transformation of quantity into quality, will continue to tussle with questions such as these.

Let us gloss over these problems (that is the privilege of such a rough approximation) for the time being. And the details of Engels' argument, too, which by advancing through numerous scientific fields tends to undermine the credit he first acquired as a layman.¹¹ Models can, at the bright heights of the model-like, also be instructive when the objects selected do not want to submit to them. So let us jump to Engels' strong summation:

Dialectics, so-called objective dialectics, prevails throughout nature, and so-called subjective dialectics, dialectical thought, is only the reflection of the motion through opposites which asserts itself everywhere in nature,

11 'These achievements [of Herrn Dühring's] have compelled me to follow him into a number of spheres in which I can move at best only in the capacity of a dilettante.' (Engels 1987, 337)

and which by the continual conflict of the opposites and their final passage into one another, or into higher forms, determines the life of nature.

ENGELS 1987, 492

What is new in this second purpose is the moment of opposition, of *conflict*. The actual reference here, already established in the concept of dialectics as the interaction between thesis and antithesis, or empirically: thesis and objection, talk and backtalk, is a different one. Indeed, precisely at the moment of conflict Engels returns to Darwin's fundamental ideas:

[F]rom the simple cell onwards the theory of evolution demonstrates how each advance up to the most complicated plant on the one side, and up to man on the other, is effected by the continual conflict between heredity and adaptation. In this connection it becomes evident how little applicable to such forms of development are categories like 'positive' and 'negative': One can conceive of heredity as the positive, conservative side, adaptation as the negative side that continually destroys what has been inherited, but one can just as well take adaptation as the creative, active, positive activity, and heredity as the resisting, passive, negative activity. But just as in history progress makes its appearance as the negation of the existing state of things, so here also – on purely practical grounds – adaptation is better conceived as negative activity. In history, motion through opposites is most markedly exhibited in all critical epochs of the foremost peoples. At such moments a people has only the choice between the two horns of a dilemma [...].¹²

Ibid., 492f.

From today's perspective the easy jump from natural to cultural history seems equally as problematic as, specifically, the short circuit between Darwin and politics (the quotation is specifically intended to show this). Yet again, that is

¹² Interesting in this context is a statement by Marx on Darwin (letter to Engels dated 18.6.1862): 'I'm amused that Darwin, at whom I've been taking another look, should say that he also applies the 'Malthusian' theory to plants and animals, as though in Mr Malthus's case the whole thing didn't lie in its not being applied to plants and animals, but only – with its geometric progression – to humans as against plants and animals. It is remarkable how Darwin rediscovers, among the beasts and plants, the society of England with its division of labour, competition, opening up of new markets, 'inventions' and Malthusian 'struggle for existence'. It is Hobbes' *bellum omnium contra omnes* and is reminiscent of Hegel's *Phenomenology*, in which civil society figures as an 'intellectual animal kingdom,' whereas, in Darwin, the animal kingdom figures as civil society' (Marx 1986)

not the focus of this essay. Anyone versed in cultural studies who fundamentally rejects such transitions is surely right; at the same time he/she should at least hold his/her peace until the range of the argument itself, the move into the *conflict*, is identifiable and has had the chance to possibly look for more adequate objects.

So let us stick to the consideration this side of nature, namely society. Is it not evident at least here that for example in the mechanism of the market antagonism, conflict, returns as a driving force and law of motion? Even if we possibly have to do without Darwin, it seems that up to Schumpeter's 'creative destruction' that which Engels describes, in a relatively terse manner, as a 'dialectics'¹³ takes effect at least in the economy.

This may be motivation to also take Engels' last point into consideration. For the decisive step of his theorem has still to be taken. Indeed, the radicalness with which he foregrounds the dynamic element is quite stunning, to the extent that it undermines the stability of that which exists, the identity of the given things. *Identity*, as evident as it seems, is made dependent on the process of its creation.

Abstract identity ('a = a'; and negatively, 'a cannot be simultaneously equal and unequal to a') is likewise inapplicable in organic nature. The plant, the animal, every cell is at every moment of its life identical with itself and yet becoming distinct from itself, by absorption and excretion of substances, by respiration, by cell formation and death of cells, by the process of circulation taking place, in short, by a sum of incessant molecular changes which make up life and the sum-total of whose results is evident to our eyes in the phases of life – embryonic life, youth, sexual maturity, process of reproduction, old age, death. The further physiology develops, the more important for it become these incessant, infinitely small changes, and hence the more important for it also the consideration of difference within identity, and the old abstract formal identity standpoint, that an organic being is to be treated as something simply identical with itself, as something constant, becomes out of date.¹⁴

The argument perhaps nonetheless becomes clear even though formulated in biological terms. That which appears as an existing structure, as stable and identical to itself, is made dependent on the process of its creation and (Darwin's influence again) on the environment in which it must through

13 I myself presented this argument in Winkler 2006.

14 Engels 1987, 495; inverted commas within the parentheses added, H.W.

conflict assert itself and with which it is linked in metabolism. 'Identity' virtually dissolves in this process.

And this seems to me to be the key thrust of Engels' essay: *It concerns a model of structural emergence*. The transformation from quantity into quality binds structure back to process, stable to liquid, and seemingly irreducible qualities to something gradable and quantitative. The moment of *conflict* that Engels takes from dialectics, and for which Darwin's struggle for existence among species, is perhaps just a kind of ostensible reference, seeks to pinpoint the *engine*, the driving force behind the process.

Thirdly, the seemingly stable identity of present things is liquefied not simply into (contingent) history (which would perhaps find wider approval), but into circulation and process.

Methodologically speaking, it is important that Engels was focusing on a kind of mechanism, an abstract law behind the concrete phenomena. And it is only abstraction that enables him to transition from objects of nature to those of culture (or actually vice versa, insofar as dialectics would surely be less contested in the field of culture). Simultaneously, this is no doubt the most disputable point.

And finally I find it important what has already been said, namely that we are not concerned here with a deterministic model. Rather, Engels emphasizes that what he describes is always and necessarily unpredictable and open as far as the outcome is concerned. Here Engels anticipates in a certain way the Poststructuralists' objection to the Structuralist concept of structure; and perhaps it is no coincidence that, at a remove from dialectics, conflict and opposition also reappear in Lyotard's work (cf. Lyotard 1988).

Conclusion

So what is the result of the above considerations? Is addressing such heterogeneous models, and the jump from priming and trace, which are perhaps metaphorical, but at least clear, to Engels not too far, too risky? Essentially I want to show what Engels actually gains with his abstraction.

That sheep leave behind traces would surely be just as incontestable as the fact that the latter overlap, and form patterns as they do so. At best, the status of the patterns themselves could be contested, and that is what interests me. Only when I understand that it is new qualities that emerge in the formation of patterns, only when I reverse the perspective and wonder, starting with the patterns, about the mechanisms of their creation, when I am no longer satisfied with the information that it was sheep that brought the patterns into the

world as a secondary effect, only then do Engels and his transformation of quantity into quality become interesting.

The crucial point is that ultimately Engels does not make the patterns dependent on the sheep, but the sheep dependent on the patterns. If the identity of the nodes in the network (and the actors in the network) is not already existent, but itself an effect of the pattern creation (as in Engels/Darwin the identity of the species is an effect of their interaction with the ecological niche) then the metaphor of the sheep that leave traces is blown wide open. In my view this is precisely where the question addressed here begins.

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Traffic

Media as Infrastructures and Cultural Practices

Edited by

Marion Näser-Lather
Christoph Neubert



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