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Geometry of Time

Media, Spatialization, and Reversibility¹

“In order to study the world you have to stop it.”
Hiroshi Sugimoto (photographer)

Media theory describes transmission and storage as two basic media functions that are fundamentally opposed and quite different in quality. There must, however, be a way to think about how they are linked. Can transmission and storage be *functionally* related? Are there concepts that bridge the difference?

A first proposal to address the above questions was made by Harold Innis, who defined the media as overcoming space and time. Not surprisingly, overcoming space corresponds to the notion of transmission. Innis continues by asking about the contribution the media make in forming tradition. In other words, from a technological perspective Innis explores the storage function, which he defines as *Transmission along the Time Axis*, thus rendering transmission the predominant factor – both transmission and storage appear to be types of transmission. However, does this prove to be a satisfactory answer to our questions? The following is an attempt to tackle the problem from a different approach.

1. The Hare and the Hedgehog

Let us begin with a concept that was presented by Bernhard Vief at a conference in 2007.² Vief bases his idea on a fairy tale that enjoys great popularity in Germany, namely *The Hare and the Hedgehog*.³ The plot is briefly summarized as follows: Hare and hedgehog meet in a field. When the hare begins to make fun of the hedgehog for his short legs, the latter will not take it and challenges the hare to a race; the hare accepts, they are each to run in their own furrow. Against all odds it is the hedgehog who wins the race. The unfortunate hare runs but

¹ The title of my presentation *Geometry of Time* has been taken from a text by Bernhard Vief (Id.: Transplantation im Digitalen – Über die anatomische Arbeit der Binärschrift. userpage.fu-berlin.de/~sybkram/medium/vief.html, last accessed on 2/17/07; the page is dated 11/11/1998).

² To date the following texts by Vief are only available in German:
- Vief, Bernhard: Die Inflation der Igel – Versuch über die Medien. In: de Kerckhove, Derrick; Leeker, Martina, Schmidt, Kerstin (ed.): McLuhan neu lesen. Kritische Analysen zu Medien und Kultur im 21. Jahrhundert. Bielefeld 2008, pp. 213-230. Individual theses overlap with earlier works by Vief:
- Id.: Transplantation im Digitalen, l.c.; see particularly Section 5: Geometrie der Zeit.
- Id.: Über die Unschärfe von Zeitschnitten. In: Transit (Hg.): On The Air. Kunst im öffentlichen Datenraum. Wien 1994, pp. 135-158.
- Id.: Digitaler Raum. In: Die Auflösung der Medien im elektronischen Raum. Kunstgespräche 1992, Eremitage in Schwaz/Tirol. transit.tiroler-landesmuseum.at/kunstgespräche/vief.html, last accessed on 12/30/07.

³ Grimm's Fairy Tales [1812]. The English translation of the fairy tale can be obtained on: <http://www.pinkmonkey.com/dl/library1/story068.pdf>, last accessed on 22/02/09.

he does not stand a chance – when he gets to the finish the hedgehog is already there. The race is repeated time and again until the hare – completely exhausted – collapses dead on the ground, never to find out the solution: the hedgehog had positioned his wife at the other end of the furrow.

Vief goes on to explain that in the domain of the media both principles – the hare principle and the hedgehog principle – play a pivotal role. The hare represents transmission. Like a letter, he overcomes geographical constraints by moving his body from A to B. In doing so, he uses time – too much time, in fact, compared with the hedgehog. Telegrams may be relatively faster; however, their transmission still takes time.

The hedgehog represents a principle that is entirely different, namely simultaneity. The fact that there are two of them saves the transport. In terms of the media, this principle is achieved by way of technical reproduction – copying techniques, as it were. If some several thousand copies are produced, they can be made available simultaneously in different places; the same technique is also used by the radio to deliver its message: like the hedgehog, it addresses thousands of receivers in parallel fashion.

Vief generalizes: The principle of transmission is *temporal*. Transmission is bound to time, which is what makes the hare slow even if, in fact, he is quick. However, where pure transmission is concerned, telegraphy is able to operate at the speed of light. In a vacuum this would entail a speed of just below 300,000 kilometers per second. In other words, the hare would be so fast that – within empirical boundaries – we are led to think in terms of simultaneity. According to Vief, however, the problem soon becomes clear if we attempted to talk to a Jupiter spacecraft. Regardless of operating at the speed of light and in a vacuum, our question would still take approximately 20 minutes to arrive in space, implying that we would have to wait some 40 minutes for the answer, thus severely constraining the joys of reciprocal communication or real dialogue.

The printed edition, on the other hand, operates like the hedgehog – it uses the logic not of empirical but of actual simultaneity. It has gone beyond the constraints of time. But – referring back to our initial question – how are the two principles related?

2. Geometry of Time

The prime example to provide in this context, also for Vief, is the written word. Writing systems – at least phonetic, Western writing systems – are based on spoken language that has been translated into script. While oral expressions operate successively – producing a temporal stream of signs – writing is what transforms this temporal successive existence into a *spatial co-existence*. The line is still linear; however, linear not in terms of time but in terms of space. The dimension of time is thus projected onto a spatial axis, in other words, the linearity of the line.

“Sounds are temporal and move within the flow of time. They belong in a different dimension from images. Images exist on the plane and – in the case of sculptures – in space. Thus they follow a different order, which, to some degree, is incompatible with a temporal order. What the alphabet achieves therefore goes far beyond the simple translation of sounds into images; rather it projects a temporal event onto a plane – a *Geometry of Time*.”⁴

“Following Heraklit, the stream of time is continuous: 'One cannot enter the same river twice.' The alphabet, however, is based on a different time concept which perceives time to be a separable body that can be divided into time spans and points in time. Any

⁴ Vief, *Transplantation...*, l.c. (translated by: H.W.).

phonetic spelling – which is what the conventional alphabet represents – is based on this condition. Likewise, the possibility of sending bits through copper wires or fiber glass. Plane segments are now assigned to time segments: each phoneme is assigned a letter, each point in time is assigned a point on the plane – literally, as it were, on a piece of paper, on a magnetic disk, on a CD.”⁵

Quite unexpectedly, this leads us directly to the crux of the matter:

“When time is transferred onto the plane, something rather outrageous happens: *time becomes reversible*. In contrast to points in time – and this almost sounds trivial – points on the plane can be actually reversed. This makes it possible to return to them, to access them as required, and to ‘reproduce’ them. Storing and repeating events also allows us to return to certain points in time, albeit superficially. In other words, points in time can be turned into points on the plane which again can be turned into points in time. However, this would also entail that points in time become interchangeable – and their temporal character would be negated.”⁶

The decisive keyword here is *reversibility*. Reversibility represents the promise that it is possible to liberate ourselves from the dictatorship of the time axis. Time is characterized by the fact that it elapses – *irreversibly*. We experience this most profoundly when we experience death, this deep caesura in time that can by no means be inverted or reversed.⁷ In this context, the thesis put forward by Vief – a very substantial thesis – is that reversibility can only be achieved by transferring temporal actions into space. *Technical transformation – technically converting time into space – is the only basis on which reversibility can be achieved at all.*

3. Reversibility, Krämer

The notion of reversibility itself is not entirely new. Reversibility, namely, the possibility of intervening with the time axis, has already been discussed, for example, by Friedrich Kittler. Kittler's book *Discourse Networks* has gained wide recognition also in the United States. In 2004, Sybille Krämer compiled an account of Kittler's lifework, subsumed under the heading ‘The Cultural Techniques of Time Axis Manipulation’.⁸ Below she picks up an idea that is relevant also to Kittler's approach.⁹ What is new, however, is that she perceives this concept to be the central theme underlying Kittler's world of thought.

“Media Technology: The Reversal of Units of Time. This provocative question is precisely the one that leads us to the crux of Kittler's thought, and hence to the aspects of his method of making media history his theme, which bring a new impetus to the approach. In order to answer this question, I will attempt to contextualize the technological within our traditional methods of managing time. Indeed, the explanation of the

⁵ Ibid.

⁶ Ibid. (emphas. H. W.).

⁷ On a sidewalk in Frankfurt/Main in Germany a small crowd has gathered; amidst the people a man is lying on the ground, with two paramedics and a doctor looking after him. In answer to my question of what has happened someone says: “Well, he was dead!”

⁸ Krämer, Sybille: *The Cultural Techniques of Time Axis Manipulation: On Friedrich Kittler's Conception of Media*. In: *Theory, Culture & Society*, No. 23:7-8, 2006, pp. 93-109 (OE., German 2004).

Krämer is one of the most important media theorists in Germany; however, only few of her texts have been translated into English to date: <http://userpage.fu-berlin.de/~sybkram/bibliographie.htm>.

⁹ For example, in the text: Kittler, Friedrich: *Real Time Analysis. Time Axis Manipulation*. In: Id.: *Draculas Vermächtnis. Technische Schritten*. Leipzig 1993, pp. 182-207 (OE.: 1990). And previously in ‘Grammophon, Film. Typewriter’.

technological as a modality of time management is precisely the ‘main point’.”¹⁰

Krämer furthermore illustrates:

“The most basic experience in human existence – and this is relevant because man is, after all, a physical being – is the irreversibility of the flow of time. Technology provides a means of channeling this irreversibility. In media technology, time itself becomes one of several variables that can be manipulated. In the age of writing and of the book, symbolic time, by being fixed in space with linear syntactical structures, becomes repeatable and, to some extent, also moveable. What is unique about the technological era (from the gramophone to the computer) is that these technologies allow one to store ‘real time’ – in other words, those processes that cannot be fixed by syntactical structures and are thus not irreversible, but rather contingent, chaotic, and singular – and, at the same time, to process ‘real time’ as a temporal event. Data processing becomes the process by which temporal order becomes moveable and reversible in the very experience of space.”¹¹

She concludes:

“The only techniques that can be considered data processing are those that use a spatial means to create possibilities of ordering the things differently that are etched into this spatial order. This notion carries specific consequences for Kittler’s concept of storage. Storing is not merely a means of preserving but is also intrinsically connected to spatial order. Wherever something is stored, a temporal process must be materialized as a spatial structure. Creating spatiality becomes the primary operation by which the two remaining functions of data processing – transporting and processing – become possible at all.”¹²

4. Kittler

The above thus leads us back to Kittler and the year 1986 when he suggested the following; the relevant points being somewhat mentioned in passing:

“Prior to the electrification of media [...] there were modest, merely mechanical apparatuses. Unable to amplify or transmit, they nevertheless were the first to store sensory data: silent movies stored sights, and Edison’s phonograph [...] stored sounds. [...] Ever since that epochal change we have been in possession of storage technologies that can record and reproduce the very time flow of acoustic and optical data. [...] What phonographs and cinematographs, whose names not coincidentally derive from writing, were able to store was time: time as a mixture of audio frequencies in the acoustic realm and as the movement of single-image sequences in the optical. Time determines the limit of all art, *which first has to arrest the daily flow in order to turn it into images or signs.*”¹³

“That is precisely the function of audiotapes in sound processing. Editing and interception control make the unmanipulable as manipulable as symbolic chains had been in the arts [...] When the voices of Waters and Gilmour [musicians in the band Pink Floyd] were unable to hit the high notes in ‘Welcome to the Machine,’ they simply

¹⁰ Krämer, *The Cultural Techniques...*, l.c., p. 96.

¹¹ *Ibid.* (last sentence italicized in the original).

¹² *Ibid.*, p. 99.

¹³ Kittler, Friedrich A.: *Grammophon, Film, Typewriter*. Translated, with an introduction, by Geoffrey Winthrop-Young and Michael Wutz. Stanford, Cal. 1999 (orig. published in German in 1986), p. 3 (emphas. H.W.).

resorted to *time axis manipulation*; they dropped the tape down half a semitone while recording and then dropped the line in on the track”¹⁴ “Real Time Analysis”.¹⁵

Subsequently, a text was published in 1990 under the programmatic heading: ‘Real Time Analysis. Time Axis Manipulation.’¹⁶ in which the significance of Kittler’s argument is expressed more forcefully:

“A thesis on information-theoretical materialism could begin as follows: Only what can be switched does in fact exist. Thus spoken language is disregarded from the outset; according to Hegel, who ruthlessly claims that ‘sound exists only when it is going out of existence.’ Admittedly, the spoken word can be learned off by heart in order to say or sing it again. It would be difficult, however, to change the order of those repeated words, for example, beginning at the end without paying much attention to their syntactic structure. *But this is precisely what time axis manipulation refers to – a different reordering of a serial data stream. [...] On the time axis, however, manipulating the notions of ordering and analyzing seems to be different and more complex than in space. [...] First and foremost, time axis manipulation requires real-time serial data streams (to the dismay of many philosophers) to be able to relate to spatial coordinates. [...] It goes without saying that, from a historical perspective, writing systems were the first time manipulation techniques to emerge. This is particularly evident in the alphabet where characters allocate a spatial position to each element of the time-serial discourse chain.*”¹⁷

The fact that the points made at the beginning are easily overlooked only serves to highlight the actual brilliance of Krämer’s analysis. While the majority of readers would simply attribute Kittler’s preference for storage media to his ‘technological determinism’, Krämer provides us with a more sophisticated approach – it is all about processing. Storage is seen to be the systematic basis that renders intervention and manipulation possible in the first place. The intriguing thing, however, is that her reconstruction focuses on processing, not on storage.

This also clarifies the tradition that links the three authors cited here: Kittler’s contribution is to have introduced the argument in the first place (1986). In 1992, Vief takes up the thesis of spatialization again and subsequently integrates it systematically in his own approach; while Krämer, who is very familiar with the Viefian texts,¹⁸ suggests in 2004 to center all of Kittler’s work relating to the notion of spatialization/time axis manipulation.

So what do we gain from Vief? Are not all the elements required for our thesis contained in the work of Kittler already? In my opinion, the difference lies in the fact that Vief – as opposed to Kittler – holds onto the notion of *transmission*, albeit as an antonym. For Vief, time is doubly determined. On the one hand – a view shared by Kittler, Vief and Krämer – we are dealing with time that is ‘spatialized’; the basis for reversing and manipulating data. On the other hand, however, Vief is also interested in the particular time *that transmission requires* as it is only from this viewpoint that the image of the hare and the hedgehog actually makes sense.

Thus the question becomes two-fold, which is why I propose to deal with the two variants of the thesis separately at first. Admittedly, this approach may render the problem more com-

¹⁴ Ibid., p. 109f. (add. & emphasis. H.W.).

¹⁵ Ibid., p. //166f.

¹⁶ K., F.: Real Time Analysis. Time Axis Manipulation. In: Id.: Draculas Vermächtnis. Technische Schriften. Leipzig 1993, pp. 182-207 (OE.: 1990).

¹⁷ Ibid., p. 182f. (transl. & emphasis. H.W.).

¹⁸ Krämer has published one of Vief’s relevant texts on her own web page.

plex; however, we must grant it to Vief that he also takes a more in-depth perspective. Let us begin with the notion of transmission.

5. Spatialization_1: Vief's Hedgehog

Based on the hare, 'space' refers to geographical space, and Vief made the point that overcoming geographical distances takes *time*. The alternative approach can be found in the hedgehog principle: Loss of time can be prevented if – instead of a single one – there are several copies available that can be distributed in several locations. This option is provided by technical reproduction. Instead of focusing on time (transmission) we have shifted our focus to spatial simultaneity; it is in this regard that also the hedgehog principle can be understood as 'spatialization'.

6. Space and Time

In order to expand and systematize this notion, we need to leave the above authors and begin to develop our own thoughts. It seems a good starting point to return to Innis – the reputable specialist for space and time in the media. In the words of Innis, transmission overcomes space – entirely parallel – storage aims to overcome time.

| | | |
|--------------|-----------|--|
| | overcomes | |
| transmission | space | |
| storage | time | |

The hare shows us that transmission takes time:

| | | |
|--------------|-----------|----------|
| | overcomes | consumes |
| transmission | space | time |
| storage | time | |

Consequently, it follows that storage as a kind of spatialization will take up nothing but – space. This result is striking – a crosswise imbricated structure, displayed in the diagram below:

| | | |
|--------------|-----------|----------|
| | overcomes | consumes |
| transmission | space | time |
| storage | time | space |

This diagram is new and I think it offers salient, fresh perspectives.

7. Temporalization

The prime advantage is that space and time appear to be fully on a par/ symmetrical. Can we therefore assume that the two notions are equivalents that offset each other mutually? Then it would follow that – parallel to ‘spatialization’ – the reciprocal process of ‘temporalization’ would need to be stipulated.

Vief, even though his own argument eventually pursues a different direction,¹⁹ also applies this notion. He illustrates ‘temporalization’ by using the example of image digitalization:

“What happens if [an] image is temporalized? What happens to the image and what happens to time? Firstly, the screen is bit-mapped, then the bits are transferred into a state of succession. This is necessary if I want to send them through a data cable to a different continent on the other side of the globe where they are reassembled to form an image. In other words, I am transmitting points on the plane because the image exists on a plane into something that is not a plane. I transfer it into points in time, namely into a state of succession, one after the other. On the recipient side, I need to do the opposite, i.e. I need to reassemble the points in time into something that is not temporal, namely, points on the plane, in order to create a meaningful image.” “As it stands, binary code for television is already being set up. Like in a conventional film the electronic image must be broken up into image segments and time segments to be able to move.”²⁰

Images (spatial representations) are digitalized by dissecting them into a linear sequence of individual binary signs. In this sense, digitalization is *temporalization*, and it is only by means of temporalization that images can be sent through a cable in the form of a successive data stream.

If it were therefore possible to show that ‘temporalization’ is parallel to ‘spatialization’, I would stipulate – at least for the time being – to view the two of them as equivalents. This would open up the possibility of reinterpreting the media as a whole. It follows that by no means are constraints based entirely on time (which the media do overcome through ‘spatialization’). Obviously, constraints are equally based on space (such as spatial distance) which transmission overcomes by using time.

If this were plausible, the media would need to be defined as machines that cleverly switch back and forth between space and time in order *to overcome the constraints of time by means of space, and the constraints of space by using time.*

¹⁹ “In this context, the concept of image temporalization has manifested itself in media studies. I wish to challenge this concept [...]” (Vief, *Über die Unschärfe...*, l.c., p. 144). The relevant reasons will be discussed below.

²⁰ *Ibid.*, p. 144f., 144 (in the original: the image).

8. Spatialization_2: Storage/Reordering

Convenient generalizations like these must be immediately met with skepticism, however. Is it not the case that in reality, these concepts are still separated by a wide gap? Recalling that Kittler emphasizes the notion of processing rather than storage, we notice that processing has not yet been included in the diagram developed so far.

And are the concepts of space not also different? Are we not applying different criteria to Kittler's storage/ processing on the one hand, and Vief's hedgehog on the other hand, if 'storage' refers to saving data in a particular location, i.e. a local operation, while 'transmission' (hedgehog and hare, respectively) aims to grasp the concept of overcoming geographical distances? Both notions may be related to space, but in what way? (Thirdly: is there a path that would lead us back to the central theme of the hedgehog, i.e. technical reproduction?)

Let us take a closer look. If Kittler is correct in saying that storage/ spatialization is necessary in order to detach data from time and (say, Time Axis Manipulation) to reorder and process them, then spatialization will obviously represent only an initial step towards processing.

The notion of processing itself, however, will need to be regarded as an event. Processing, as the term implies, is a process that, like transmission, *takes time*. However, I can only process something that I have dissolved into a complex of signs, that I have *liquidized*, as it were. It follows that a re-temporalization process will need to take place after storage and spatialization.

On the contrary, the act of storage would be understood intuitively as coming to a halt. All process-related actions are thus suspended in storage – storage itself being stasis, which is why storage is defined here as spatialization that takes up space but not time.²¹

Storage is characterized by the power of persistence. At this point, media technology makes use of the material world's persistence.²² Storages basically are material; thus storage is not merely standstill but *reification*. Only if what is stored is also reified and encapsulated in a thing, or in an object²³, can it resist change. With its power of persistence/ constancy/ monumentality, with its thing-like character, it fights against change, against the process (against entropy), with one exception: The stored information is waiting to be *retrieved*, to be re-liquefied; which in the real world implies renewed transmission or renewed processing.

It follows that both transmission and processing work *against storages*. A new dialectic arises in relation to this discussion: the discussion of change and persistence, *process and stasis*. Media seem to be characterized by the fact that they relate both moments in a complex and ever changing manner.

Contents of the media seem to oscillate between process and stasis, rigid and fluid, storage and transmission/ processing in a regular manner. It now becomes clear that what we have referred to as spatialization/ temporalization are *modalities of transition*, each moving from one towards the other.

²¹ Obviously this is not empirically correct; storage, like transmission and processing, is a process; therefore the attempt to understand storage beginning with the result, i.e. from the stasis of the storage, is an idealization. However, this idealization does make sense. It highlights the fact that a process changes to something that itself is not a process but, quite on the contrary, goes to oppose any processes (given they are interpreted as change).

²² In reality, the situation is of course reversed; we only address something as a thing that is already in possession of this 'natural' power of persistence...

²³ The German expression 'Gegenstand' (lit. that which stands against) already bears the notion of resistance against change in its name.

9. Process and Stasis

If we attempt to understand media processes as oscillating entities between stasis and process, the concepts of transmission, storage and processing will each yield a very different image:

| | stasis | | process, operation | | stasis |
|---------------------|--------------------|---|-----------------------------------|---|------------------------------|
| transmission | data ²⁴ | → | change of place | → | data at a new location |
| storage | | | storage | → | data put down, fixed |
| processing | data | → | change, processing, rearrangement | → | new content, new arrangement |

While transmission and processing constitute processes, it is the result, not the process that is important in storage. This helps us to clearly pinpoint temporalization and spatialization. While temporalization describes the transition from stasis to process, spatialization describes the transition from process to stasis:

| | stasis | | process, operation | | stasis |
|---------------------|--------|------------------------|-------------------------------------|-----------------------|------------------------------|
| transmission | data → | <i>temporalization</i> | change of place → | <i>spatialization</i> | data at a new location |
| storage | | | storage | <i>spatialization</i> | data put down, fixed |
| processing | data → | <i>temporalization</i> | alteration, modif., rearrangement → | <i>spatialization</i> | new content, new arrangement |

(Kittler, who has chosen to use audiotape for the purpose of demonstrating storage/spatialization of time-bound data, represents a special case within this general mechanism):

| | | | | |
|----------------|-------------------|-----------|-----------------------|----------------------|
| storage | (time-bound data) | storage → | <i>spatialization</i> | data put down, fixed |
|----------------|-------------------|-----------|-----------------------|----------------------|

²⁴ ,Data' is certainly an unfortunate term; for what I mean are symbolic products in general...

10 Process Model, Temporal Chain

Secondly, however, the diagram highlights the fact that transmission, storage and processing can by no means be categorically placed side by side. Rather, storage seems to be the only option to move from process to stasis. In this regard, given that transmission and processing culminate in a new state, namely stasis, the storage process is already implied. This means that the two terms are in no way parallel but that they have always appeared to be *temporally linked*:

| | | | | | | | |
|--------|------------------------------|---|--|---|-----------------------------|----------------|--------|
| stasis | | | process, operation | | | | stasis |
| | | ↗ | transmission <small>25</small> | ↘ | | | |
| data | <i>temporal- ization</i> | | | | <i>spatial- ization</i> | storage | data |
| | | ↘ | processing | ↗ | | | |

Only presented in this way does it become obvious that, in fact, we are dealing with a *cycle* that oscillates between process and stasis, spatialization and re-temporalization.

| | | | | | | | |
|-----------------------|--|-----------------------------|----------------|--------|------------------------------|--|-----------------------|
| process, operation | | | | stasis | | | process, operation |
| transmission | | | | | | | transmission |
| | | <i>spacial- ization</i> | storage | data | <i>temporal- ization</i> | | |
| processing | | | | | | | processing |

However, this systematic idea cannot be pursued any further at this point as, in addition to the two concepts mentioned above, a third model of spatialization needs to be considered.

11. Spatialization_3: Reversibility, Trial Action

As already observed in Kittler/Krämer, but most notably in Vief, the thesis of spatialization includes a third dimension. For this reason we need to reconsider the thesis of reversibility, the core of which has been already defined: While temporal processes are *irreversible*, there is after all a possibility of rendering them reversible by using the trick of spatialization. This is precisely what *Time Axis Manipulation* refers to, namely that the time axis becomes manipulable only if it is no longer a time axis but if it has been projected onto a spatial axis, namely a writing system, which can then be rearranged in space at libitum.

Considering this perspective, the notions of time and space, spatialization and temporalization, are by no means equal, as Vief illustrates. Even if an act of a re-temporalization is to follow spatialization (in order, for example, to facilitate product transmission via cable) it will always be the case that the crux of the matter has already occurred – time is no longer the same; it no longer has the same compulsory function than it possessed before; its spell, as it were, *is* broken by the first incident of spatialization.²⁶

²⁵ In its pure form, temporalization as a precondition for transmission only applies to telegraphy; whereas a letter itself would be spatialized as its transmission does not require any data to be temporalized.

²⁶ Vief, *Die Inflation der Igel*, l.c., p. 219f.

This is why Vief regards the notion of spatialization as being essentially privileged. For him, it provides the starting point from which his approach changes profoundly towards a more general theory of the symbolic. Based on de Saussure and his theory of values, it claims to explain the workings of money and, as a consequence, also the workings of the digital world.²⁷

To be honest, neither the method nor the implementation of Vief's approach has fully convinced me.²⁸ I would, however, share the core of his argument or, put differently, its basic intuition. In my opinion, 'spatialization' is not concerned with one individual semiotic operation that competes with other semiotic operations but, ultimately, spatialization deals with the *fundamental principles of the symbolic* itself.

At this point the argument of 'spatialization' culminates in a point that I consider particularly important. As I have suggested elsewhere, the realm of the symbolic can be defined as a domain of *trial actions*.²⁹ Now, trial actions themselves are defined by no less than reversibility. While taking real action will have irreversible consequences, the symbolic creates a space in which actions are systematically decoupled from real-life consequences. In this sense, actions in symbolic space can be *reversed* – the basis to perform temporary, fictional or indeed trial actions within the realm of the symbolic. Consequently, spatialization and reversibility take on a very different quality:

From my point of view, it is reversibility that distinguishes trial action from action, thus separating the realm of the symbolic of the domain of the real world.

Within media studies, this definition has not gained much support to date,³⁰ however, there are a number of reputable authors on which the argument can be based: A first approach towards the symbolic takes us via the notion of *play*. Huizinga, who essentially defines play by separating it from the seriousness of everyday actions, would be the chief proponent of this approach:³¹

“Play is distinct from ‘ordinary’ life both as to locality and duration. This is the third main characteristic of play: its secludedness, its limitedness. [...] The arena, the card-table, the magic circle, the temple, the stage, the screen [!], the tennis court, the court of justice, etc., are all in form and function play-grounds, i.e. forbidden spots, isolated, hedged round, hallowed, within which special rules obtain. All are temporary worlds

²⁷ Ibid., p. 225ff. Vief has been concerned with the context that is sketched here for some time, variations on which occur in many of his texts (cf. e.g. also: Id.: *Digitales Geld*. In: Rötzer, Florian (ed.): *Digitaler Schein. Ästhetik der elektronischen Medien*. Frankfurt/M. 1991, pp. 117-146).

²⁸ The main objection I raise here is that the spatial difference (transmission, here) is converted far too quickly into the 'pure' difference of Saussurean theory of values and information theory without making the context (including potential inconsistencies) very clear. In addition, I do not share Vief's theory on money, an attempt to describe money, too, in terms of information theory, establishing a closer relation between money and bits – “the bits are purely sign money” – than seems possible to me. (Id.: *Die Inflation der Igel*, p. 229ff.; also Id.: *Digitales Geld...*, l.c.).

²⁹ I made this point for the first time at a conference in 2000 (printed: W., H.: *How to do things with words, signs, machines. Performativität, Medien, Praxen, Computer*. In: Krämer, Sybille (ed.): *Performativität und Medialität*. Munich 2004, pp. 97-112; also see W., H.: *Diskursökonomie*, Frankfurt am Main 2004, pp. 215-230).

³⁰ The main reason seems to be the fact that the definition sketched here collides with the thesis of the *performative* that is currently dominating the field: While the notion of performativity addresses the issue that also symbolic processes do result in actual consequences, now the symbolic is to be characterized by the fact that it is specifically *decoupled* from actual life? (Incidentally, I do not think that the two theses fully contradict each other (Winkler, *How to do things with words...*, l.c.)). Another reason would surely be the fact that, currently, semiotic approaches are not enjoying much popularity in media studies...

³¹ Huizinga, Johan: *Homo Ludens. A study of the play element in culture*. Boston: Beacon 1971 (orig. published: 1938). Making reference to play may appear to be counterintuitive at first – do media processes not form an *integral part* of the seriousness of our everyday life?

within the ordinary world, dedicated to the performance of an act apart.”³²

In 1996, Krämer pursues the same idea with regard to Bateson. She generalizes: “Wherever there is play, we tend to act symbolically”,³³ In 2005 then – completely in line with the definition that is proposed here – she converges play, reversibility and the symbolic:

“What is it that can be encountered by a philosophical reflection of play and what can be revealed by it? It is the phenomenon and the notion of reversibility. [...] It is the symbolic action, particularly the use of linguistic signs that opens up a world of *reversibility* by distinguishing between a thing and its classification (Saussurean concept); first and foremost, however, by using negation, something that is only possible in language.”³⁴

Reversibility plays a pivotal role also for Luhmann who, in his famous essay, addresses the notion of action and the temporal structures that are associated with it.³⁵

Finally, a third approach concerns the concept of trial action itself. Prominently, this concept is discussed in Freud who describes the process of *thinking* as trial action.³⁶ Moving onto

³² Huizinga, *Homo Ludens*, l.c., p. 9f..

³³ Krämer, Sybille: *Die Eigensinnigkeit von Medien* [1996]. <http://www.inf.fu-berlin.de/~ossnkopp/eignsinn.html>, last accessed on 2/20/1998.

³⁴ Krämer, Sybille: *Die Welt, ein Spiel? Über die Spielbewegung als Umkehrbarkeit*. In: Deutsches Hygiene-Museum (ed.): *Spielen. Zwischen Rausch und Regel*. Ostfildern-Ruit 2005, pp. 11-19, here: p. 15 (emphas. H. W.). Krämer continues: “We lead our lives fully aware that our existence is irreversible. Therefore, is the cultural meaning of reversible play worlds in some way related to the existential meaning of the irreversibility of our death? Does the reversibility of life and death as part of play, which is rooted in its repetitive nature, also provide an answer to the fact that our normal everyday lives are practically irreversible? Does this playful irreversibility therefore form a cultural counter world to our irreversible existence?” (Ibid., p. 16). It is important to emphasize this point particularly as Krämer, in many of her publications, accentuates the notion of performativity.

³⁵ L., Niklas: *Temporalstrukturen des Handlungssystems*. In: Id.: *Soziologische Aufklärung III*, Opladen 1981, pp. 126-150 (OE.: 1980). Initially Luhmann discusses the irreversibility of time in relation to the action concept (Ibid., pp. 127ff.) which leads him to the following argument: “It is always possible to take another step if asking the question of *how to have irreversibility at one's disposal*. The actual problem of reversibility/irreversibility is not primarily contributed to any objective processes that can be either reversed or not reversed. Rather, I wish to address a problem that is immanent in all meaningful structures: that it is possible to return to any meaning that has been left behind in the course of experiencing and taking action by focusing on other meanings; in other words, that it is possible to update them again, as it were, in new presents”. [...] “What differentiates reversibility and irreversibility [belongs] in the realm of the order performance that they [the action systems] fulfill. This is precisely what is withdrawn – by means of forming structure – from the transience of the moment and is thus made reversible: it endures, and can therefore be changed. In contrast to what the simple opposition of structure and process would therefore entail, it is precisely the forming of structure that will open up any possibilities of change, while the linking of events appears as a process as soon as it becomes irreversible. Structures *serve the purpose of building up reversibility while processes will generate irreversibility*. Therefore, turning common perception on its head, structures are more dynamic than processes“. (Ibid., p. 132f. (transl. & 2nd emphas. H.W.)).

³⁶ “Thinking is an experimental action carried out with small amounts of energy, in the same way as a general shifts small figures about on a map before setting his large bodies of troops in motion.” (Freud, Sigmund: *New Introductory Lectures on Psychoanalysis*. NY/London: Norton 1965, p. 104 (orig. published: 1933) (see also FN 6 on the same page)); or, interestingly, in relation to fantasy and play: “Restraint upon motor discharge (upon action), which then became necessary, was provided by means of the process of thinking, which was developed from the presentation of ideas. Thinking was endowed with characteristics which made it possible for the mental apparatus to tolerate an increased tension of stimulus while the process of discharge was postponed. It is essentially an experimental kind of acting, accompanied by displacement of relatively small quantities of cathexis together with less expenditure (discharge) of them.” “With the introduction of the reality principle one species of thought-activity was split off; it was kept free from reality-testing and remained subordinated to the pleasure principle alone. This activity is phantasying, which begins already in children's play [!], and later, continued as day-dreaming, abandons dependence on real objects.” (Id.: *Formulations on the Two Principles of Mental Functioning*. In: Id.: *Standard Edition*, Vol. 12, London: Hogarth 1973, pp. 210-226, p. 221, 222 (orig.

Piaget who, adopting the Freudian concept, places childlike play – in the form of practical experimenting/trial action – at the heart of his developmental psychology.³⁷ We continue with Bateson who also deals comprehensively with the notion of play,³⁸ and finally Goffman who, based on the limited space of the theater, develops his 'framework' theory of awareness and orientation within everyday life.³⁹

Consequently I argue that reversibility and spatialization require a more in-depth approach. Provided that the symbolic can in fact be determined by the concept of trial action and thus by reversibility, then reversibility no longer remains a characteristic of the written word (as opposed to spoken language) or a technical storage. Rather, it is the decisive characteristic that separates the symbolic from extra-symbolic actions. Thus it is only through reversibility that the specifically reflexive nature of the symbolic can be achieved.

However, are we not diluting our original question by expanding the argument? Is it not the very focus on material storage from which the thesis proposed by Vief, Krämer and Kittler gets its momentum?

12. Technical Reproduction

Let us return to the hedgehog and thus to technical reproduction. The beauty of the approach proposed by Vief was that it seemed to be in a position to integrate technical reproduction – an important category that, peculiarly, stood isolated in media studies up to that point – into the overall conceptual construct.

Within the dialectics addressed here, technical reproduction appears to be a special case. How can it make sense to distribute one thousand, ten thousand or one hundred thousand copies in space only to save the time it would take to transmit a particular piece of information? (Ultimately, for the simple reason to ensure immediate access?) In information theory this would be considered a case of redundant storage, in other words, as breaking the law of economy. Thus this redundancy – like all other redundancies – would tend to be eliminated sooner or later.

In fact, it can be observed in media development that at least the classic solution, namely the filing of material and redundant copies, is becoming less important as an option. To quote an example, let us consider the WWW. At least in principle, the WWW provides any information on a single server where it patiently waits to be accessed by the user (i.e., transmission). And only in exceptional cases will the user also save the downloaded product on his/her own computer (redundant). In terms of media history, transmission has thus replaced storage. It is almost as if – contrary to the fairy tale – it were *the hare* who has won the race after all.

In terms of technology, the WWW is based on telegraphy, a system that 'dematerializes'

published: 1911) (emphas. H.W.)).

³⁷ Piaget, Jean: The origins of intelligence in children. New York: Internat. Univ. Press 1952.

³⁸ "What is characteristic of 'play' is that this is a name for contexts in which the constituent acts have a different sort of relevance and organization from that which they would have had in non-play." (Bateson, Gregory: Mind and Nature. A necessary unity. London: Wildwood House 1979, p. 125. Also see: Id.: The Message 'This is Play'. In: Schaffner, Bertram (Hg.): Group Processes. (Josiah Macy, Jr., Foundation Proceedings, 1955). New York 1956, pp. 145-242.

³⁹ "During visits to the Fleishacker Zoo beginning in 1952, Gregory Bateson observed that otters not only fight with each other but also play fighting." "Make-believe: By this term I mean to refer to activity that participants treat as an avowed, ostensible imitation or running through of less transformed activity, this being done with the knowledge that nothing practical will come of the doing." "Presumably muffing or failure can occur both economically and instructively. What one has here are dry runs, trial sessions, run-throughs – in short, 'practicings.'" (Goffman, Erving: Frame Analysis. An essay on the organization of experience. Boston: Northeastern Univ. Press 1974, p. 40, 48, 59.

products as it were, thus facilitating transmission at a speed that is close to the speed of light. Provided that, as previously commented by Vief, the server is not based on Jupiter, the resistivity of the transmission within empirical boundaries remains low; so low, in fact, that transmission proves to be the superior solution when compared with other solutions that have been established in media history (i.e. the interaction of technical reproduction and redundant storage that is distributed in space).

Furthermore, it can be argued that technical reproduction certainly does not replace any processes that occur during transmission. Rather, any reproduced copies must be transmitted to different locations in space before they can be accessed in their spatial distribution. Only then will direct (timeless) access also become a feasible advantage. This argument also supports the assumption that, in each incidence, we are dealing with a process chain, namely with the interaction of transmission and storage.

It all culminates in the question of how the relationship between transmission, storage and processing can be ultimately perceived. Is it possible to draw some kind of conclusion from what has been said above?

13. Conclusion

The particular spatialization that constitutes the symbolic is basal, in my opinion. In this point, I agree with Vief: Any other operations that may subsequently occur can only apply to material that has been snatched from the continuum of time and that is therefore available for such an operation. All other operations that are to follow will take place using symbolic material and *within* the realm of the symbolic. In this sense, spatialization wins the crown, because there is no kind of temporalization which has a similar effect. As previously mentioned, the time axis is disempowered – symbolic processes may still be processes (and thus take time); however, this does not compare to the dramatic irreversibility of time that is located outside of the symbolic realm.

Within the realm of the symbolic, temporalization and spatialization appear to be reciprocal processes that are related to one another. Integrated into a cycle, they are dependent on one another, while the cycle itself oscillates between process and stasis, transmission/processing and storage/persistence.

This cycle is the real machine that we need to comprehend. It turns spatialization/temporalization and transmission/storage/processing into dependent concepts whose relationship requires to be clarified *functionally* as well as in relation to one another.

Firstly, and this would be the first act of ordering, the cycle links these concepts to form a sequence; they represent *phases* that are connected in a specified manner and thus follow a predetermined sequence. Spatialization *aims at* stasis while temporalization aims at transmission or processing; considering the overall process, however, each consolidation/liquidation appears to be only a single step.

Secondly, we should reconsider the crosswise imbricated structure. Transmission overcomes space and takes time, while storage overcomes time and takes up space. Space being defined in a dual meaning: On the one hand, the space overcome by transmission is a large, geographical space; on the other hand, the space used by storage (ideally) is small and local. In technical reproduction the two variants seem related: while copies are distributed across the geographical space, the single copy at a particular location functions as a local storage.

Thirdly, we need to address substitution. *Transmission, storage and processing seem able to substitute one another mutually*, even if, at first sight, this substitution appears counter-intuitive as it initially contradicts their interlinking structure (shown in the phase model). This became clear in the example of the WWW where transmission (the hare) was able to leave

behind the hedgehog of technological reproduction. Both space and time are limited resources; depending on which is subject to greater limitations, a technological solution can always switch to the resource that is less constrained.⁴⁰ The thesis of substitution is interesting particularly because it contradicts the assumption that the parameters of transmission, storage and processing are to be interpreted as irreducible categories that differ in *quality*, as mechanisms that – with regard to both technology and content follow different rules entirely.

Finally, it should have become clear in the course of this argument that it is impossible to reduce the idea of spatialization to a single and coherent thesis; rather it will be worthwhile to distinguish between its different variants. Thus I propose that this thesis will become truly meaningful only before the background of systematization as it has been attempted here, in other words, if the conceptual trilogy is traced back to the dialectics of process and stasis. It is only at this point that the crucial structures will be revealed.

I must admit that, initially, this proposal will be able to illuminate only some of the connections that are relevant to the field in question. What is new, however, is the field itself that is opening up before us – surprising indeed since we are dealing with *fundamental concepts of the discipline*.

⁴⁰ Another example from the world of media technology clarifies the point further: The MPEG standard was developed for the transmission of music and moving images on the internet. It would have been too expensive to create the relevant network capacities which would have been enormous. In this case, a compression algorithm provided the solution: The data are highly compressed on the broadcaster's page. This process requires that the computer of the user calculates them back on site and in real time. Thus the CPU performance has substituted transmission capacity.

Owen illustrates this correlation by showing that also in other cases using storage/ buffer can replace CPU performance or transmission capacity. For further clarification, Owen has designed a three- dimensional chart:

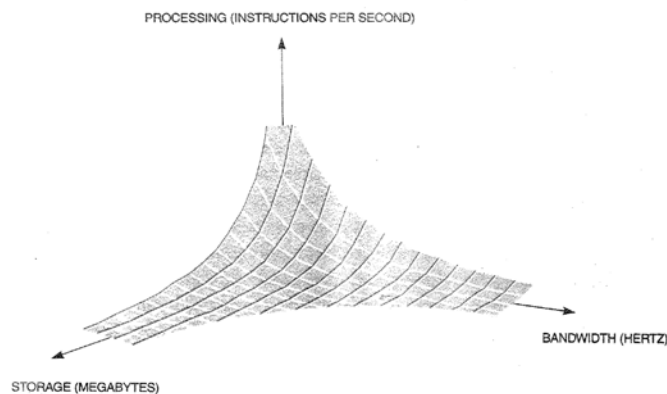


Figure 2.1 Bandwidth-storage-compression tradeoff

The curved chart describes the space in which, dependent on particular circumstances, the optimum technological solution can be found; thus assuming that the three parameters – transmission, storage and processing – are interchangeable and replaceable.

(Owen, Bruce M.: *The Internet Challenge to Television* Cambridge (Mass.)/London: Harvard UP 2000, p. 24).