SIMILARITY

Hartmut Winkler

Mosaic pieces for a media semiotic 2.0

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1 Introduction

1. Why Similarity?

Anyone who studies everyday culture and media will come across any kind of similarity: fashion ensures that clothes and hairstyles on the street resemble each other; if I select a movie, Netflix suggests other ‘similar’ ones; and some pop music tracks are so similar that they can be technologically copied one upon the other.[1] [2]

Formats, genres, and styles are based on similarity (or are a means of organizing it); one can cite stereotypes and series as examples; reproduction and copy, quotation, imitation, or forgery; and even more generally, ritual, regularities, convention, and habit. All these are forms of similarity; similarity is, in fact, ubiquitous.

And at the same time, there is something uncanny about similarity. Twins irritate our idea of individuality by splitting our gaze and provoking confusion. A stranger sometimes looks back at us from the mirror. Elvis impersonators manage to be more similar to Elvis than Elvis himself. And even industrial mass production can have something uncanny about it. For example, it gets on our nerves when single-family homes are too similar to each other.[3]

[1] ...demonstrated in the video 'Prince Damien – Glücksmoment vs. Stanfour – Hearts Without A Home (DSDS 2016 Melody Comparison)', https://www.youtube.com/watch?v=BcS-2YefLys, all links last accessed: Dec. 16, 2020. The links mentioned in my book can be found in a link list: http://homepages.uni-paderborn.de/winkler/Winkler--Aehnlichkeit--Linkliste.html.

[2] Fig.: © Hans Eijkelboom; many thanks for permitting the reproduction.
Eijkelboom took the pictures all on the same day, on Nov. 22, 2004, between 12 p.m. and 4 p.m. in Rotterdam; Eijkelboom has pursued his project for years and has shown a large number of such series in exhibitions and illustrated books; cf: Eijkelboom, H.: People of the Twenty-First Century. London/NYC: Phaidon 2014.
Vgl.: https://i-d.vice.com/de/article/qvbve7/hans-eijkelboom-people-of-the-twenty-first-century-759.

[3] Illust.: Video: Prestige Life Real Estate: Burj Al Babas Summer View - constructional update - villas in Turkey; https://www.youtube.com/watch?v=LzGqIRGAEUI.

Above all, however, theory has an exceedingly hard time with the subject. "Similarity," writes Nelson Goodman in a famous essay,

> "is insidious. [...] Similarity, ever ready to solve philosophical problems and overcome obstacles, is a pretender, an impostor, a quack. It has, indeed, its place and its uses, but is more often found where it does not belong, professing powers it does not possess."[4] "[S]imilarity [...] is a [...] slippery matter."[5]

And other authors agree with him:

> "We cannot easily imagine a more familiar or fundamental notion than [similarity], or a notion more ubiquitous in its applications. On this score it is like the notions of logic: like identity, negation, alternation, and the rest. *And yet, strangely, there is something logically repugnant about it.*"[6]

> "We already find a critique of resemblance in Bacon [1561-1626]. […] He shows them [similarities], shimmering before our eyes, vanishing as one draws near, then re-forming again a moment later, a little further off."[7]

How does this reservation come about? Above all, how should we understand the contradiction: similarity is so conspicuous, so omnipresent and obviously of great importance for the wheels of culture, yet meets with open rejection in the field of theory? Can it be possible that theorists find similarity uncanny as well?

2. Similarity, Stereotypes, and Schemata

I was confronted with similarity in the context of stereotype research. Images, linguistic expressions, or thought patterns that constitute a stereotype are by no means the same, but just *similar*. Stereotypes have 'fuzzy' boundaries.

And the second important point is that stereotypes do not result from planning. Nobody wants stereotypes to emerge; they form – solely on the basis of similarity – as conglomerations in discourse, yet they have the power to provide orientation by reducing a multitude of heterogeneous individual cases to a few clear schemata.

If one is looking for a theoretical framework that describes all this on a somewhat more general level, *schema theory* suggests itself. In the course of my book, I will show that schemata have all the properties just mentioned and that many phenomena of everyday culture – fashion, formats, genres, styles, ritual, regularities, convention, and habit – can be better understood through the concept of schema. What follows, then, is about similarity and schema. And it will become clear that similarity occupies a systematic position in the functioning of media and everyday culture, but also for theory, where similarity, I argue, actually becomes a pivot.

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[4] Goodman, Nelson: Seven Strictures on Similarity. In: Problems and Projects. Indianapolis/NY: Bobbs-Merrill 1972, pp. 437-447, p. 437 [1970].

[5] Ibid, p. 446.

[6] Quine, Willard Van Orman: Natural Kinds. In: Ontological Relativity and Other Essays. NY: Columbia UP 1968, p. 117 (add. & emphasis H. W.; in the original: this).

[7] Foucault, Michel: The Order of Things. London/NY: Routledge, p. 57 [1966] (add. H. W.).

3. Semiotics

The second framework of my consideration is semiotics. My subject, media studies, has a rather tense relationship to semiotics. Measured against the high claims formulated in the 1960s, semiotics is considered to have largely failed; thus, it has not been possible to develop a concept of sign that is valid across all media; and above all, poststructuralist philosophy, which is radically critical of signs, has dismantled almost all conceptual cornerstones. Today, no one would speak of 'meaning,' 'signifier,' 'representation,' or 'reference' without hesitation.

For media studies, however, this is a disaster. For even if there is no consensus on how – in response to the criticism – the level of the symbolic should now be conceptualized and what status it has within a more general concept of media, no one would say that semiotic considerations are simply dispensable for media studies. The question, then, has outlived all answers and remains open. Impossible as it is to solve the issue with ease, one must value every piece of the mosaic that can contribute to a solution.

Schema theory and similarity can help on this front, as well; in what way will be explained step by step. My project is to sketch out a semiotic consideration which initially omits or bypasses the concept of the sign and aims solely at clarifying the interplay between similarity and schema formation, and only when this has been done, to provide a sketch of what a 'sign' could be in relation to schema and similarity.

The problems of semiotics are too old and too serious, too profound, too ramified, and too diverse to even begin to address them. Nevertheless, I think it can at least arise the idea that with a changed approach, a changed semiotics – a semiotics to which media studies could actually connect – can accrue. And if this were to succeed, it would be a lot.

4. The Program of my Book

My consideration of similarity will be strictly limited to media and everyday culture. In a narrower sense, I thus exclude philosophical considerations. I have not written a chapter on Deleuze, even though he is repeatedly and reflexively mentioned in the context, simply because his conception of difference may be philosophically interesting, but, in my opinion, is not useful in media studies.

Likewise, contrary to what one might expect, there will be no consideration of imitation and mimesis.[8] Mimesis, of course, is highly relevant with regard to similarity and is also important for the analysis of media. At the same time, it marks a field of its own, which would be more than challenging in its own right[9] and which, moreover, lies relatively far from the path I have chosen. For this reason, I also exclude mimesis.[10]

The same applies to other fields that would certainly be interesting in this context, as, for example, the recommendation systems on the internet mentioned at the beginning, which manage to bring similarity into the form of algorithms. There will be no consideration of technical reproduction and seriality, although both of these virtually obtrude when similarity and media are concerned; nothing on the problem of 'iconicity,' which is usually understood as a 'similarity' between sign and referent; and nothing on forgery, which is certainly one of the most

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[8] "Mimesis […] from Greek μιμεῖσθαι, to represent, to express with the connotatio to make similar, to imitate." (Ritter, Joachim (ed.): Historisches Wörterbuch der Philosophie: Mimesis. Vol. 5, Basel: WBG 1980, p. 1396 (transl. H. W.)).

[9] Cf. currently, for example, the DFG research group 'Media and Mimesis' in Weimar and Bochum. https://www.fg-mimesis.de/info/.

[10] A brief consideration that at least bridges the gap to mimesis can be found in my last chapter.

suggestive forms of similarity. Least of all do I wish to write a book on the 'total complex of similarity.'

But what then? The essential points have already been mentioned. Starting from the fact that similarity is *ubiquitous,* I would like to examine its theoretical significance. It simply cannot be acceptable that a phenomenon that so conspicuously defines media and everyday culture has no theoretically modelable meaning. My hypothesis, therefore, is that similarity takes over a certain function in the mechanics of media, everyday culture, and discourse.

Inquiring after a function or a 'mechanics' assumes that there are regularities, an interplay of factors which are coupled together in a regular way, which structure the field in question beyond the 'contents' and the visible surfaces.

Cultural theory is challenged to describe this interplay (while always being aware that 'mechanics' is a metaphor and that the interplay is, of course, not a mechanical one). It follows from this that the ideas we have about the thing change, as do concepts and analytical tools. The goal, accordingly, is not to see similarity but the workings of media as a whole a little more clearly.

I have already mentioned the main theoretical references. Starting from similarity, I rely mainly on schema theory in order to build a bridge from there to semiotics. The interest and perspective of my investigation are semiotic, even if this will only gradually come to the fore in the course of my text. Since I have been dealing with media, I have struggled with the problem that I consider the project and the questions of semiotics absolutely essential for any understanding of media, while I see the terms semiotics offers as quite predominantly counterintuitive, even inadequate. From the professional debate, I know that many colleagues see this similarly, if they have not shelved semiotics altogether. My text is thus, among other things, an attempt to reduce this cognitive dissonance.

Finally, I would like to say something about the structure of the book. In addition to the present one, there are three other chapters that possess an introductory character: the second and third start with the fact that dealing with similarity is – quite obviously – characterized by a specific mixture of disgust and fascination; the fourth outlines my actual thesis in the field of media studies.

This fourth, the ninth, and the final chapter are especially recommended to readers in a hurry: the fourth because it introduces the concept of schema, which the ninth then picks up and pursues, and the final chapter because here, the results are brought together.

I have formulated the actual core of my argument in the tenth and eleventh chapters. Although reading it requires some care, I think here one can find the actual innovation that my book offers. The remaining parts each explore individual aspects, and at various points I include visuals, primarily to evoke associations even in unexpected directions.

Of course, my project can only come to a preliminary conclusion; if similarity is *'logically repugnant'* and yet ubiquitous in popular culture, abhorrent to theory and nevertheless fascinating, then there is far more to ponder than a single book can encompass.

[…]

4 First Sketch:

Similarity and Schema Formation in Different Media [1]

1. Intro

I would now like to turn to media and take up what I have already discussed in the previous chapter: There I argued, with regard to language and visual media, that similarity undermines all too clear notions of 'identity' as well as of 'difference.' I would now like to turn this into a positive thing.

Because parallel to this, one can show that similarity itself takes on a function and is of essential importance for different media, not although, but precisely *because* it does not operate with precision, but rather with certain tolerances and in a 'soft' manner.

The focus of what follows will be schema formation. How this relates to the question of similarity will become clear step by step; as in other chapters to follow, I will go through various media complexes; and I would like to begin with certain theses on perception which have already played a role in some of my earlier publications[2] and which I now question again with regard to similarity, as they form the basis of what follows.

2. Perception

Human perception already proceeds according to criteria of similarity. Around 1900, the Gestalt theory but also perception psychologists like Stern or Ebbinghaus emphasized that we would have great difficulties to perceive things at all, to free them from their background, if we would not *recognize* them. Thus, Ebbinghaus describes the situation of an infant lying in its carriage:

> "A very young child looks from a certain place into a certain room. It receives from it a little-structured, diffuse general impression; as often as it repeats its look, this impression repeats itself. Now the child is pushed by the mother in its carriage into a neighboring room; in the main, another overall impression takes the place of the first. Yet the mother and the carriage have remained the same. The optical stimuli emanating from them thus find their possible material and mental effect already somewhat predetermined [...]; the remaining, modified partial stimuli lack this dual foundation. [...] On the one hand, the impression stemming from the sight of the mother thus comes about more and more easily; on the other hand, it tears itself more and more loose from the various diffuse backgrounds in which it was originally absorbed: the view of the mother becomes an ever more independent member of the respective overall impression."[3]

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[1] This fourth chapter is based on a lecture as well: I presented the central theses at the colloquium 'Similarity' at the University of Tübingen (Germany) in June 2019.

[2] First in: W., H.: Der filmische Raum und der Zuschauer. Apparatus – Semantik – Ideology. Heidelberg: Winter 1992, p. 131f.

[3] Ebbinghaus, Hermann: Grundzüge der Psychologie. Vol. 2, Leipzig: Veit 1913, p. 15 (transl. H. W.).

For the question of similarity, the following is important here: First, that objects of perception are not simply given, but are only slowly, step by step, exposed against their background and constituted as objects. And closely connected to this: That the impressions stabilize only in *repetition.*

Repetition, however, means similarity. Impressions that are similar to one another gain contour and – in tension with the changing contexts – pile up into fixed perceptual concepts. This subsequently allows for recognition; perception is no longer confronted exclusively with something new but can apply what it has already obtained from experience. This includes the fact that memory is always already involved in the process of perception; with the consequence that the respective present perception is by no means only a present perception.

"Does not this amount to saying", Bergson writes around the same time,

> "that distinct perception is brought about by *two opposite currents*, of which the one, centripetal, comes from the external object, and the other, centrifugal, has for its point of departure that which we term 'pure memory'? […] Together, these two currents make up, at their point of confluence, the perception that is distinct and recognized."[4]

What Bergson is explaining here is the fact that perception always has a projective component. The stream of perceptions coming from the outside is opposed by a second stream coming from within; the patterns that make it possible to identify what is perceived are fed by memory.

On the basis of these early psychologies of perception, extended *schema theories* have been developed. These were elaborated mainly by Cognitive Psychology, and they are not without problems.[5] The concept of schema itself, however, is a great gain; first, because, as I will show, starting from perception it can be used in other fields as well; and second, because – similar to similarity – it always admits a certain vagueness. Schemata, as the term itself already implies, do not simply coincide with the schematized. They are more abstract than the schematized; and one would expect them to be stable, but at the same time always dependent on development, always under reconstruction.

Perception, then, *seeks* similarity. It observes similarity and extracts it from the amorphous material that the senses offer. And this begins outside the human sphere already in nature, because many animals have not only innate but also acquired schemata. The process of schema formation itself is inherent and completely automated; and it goes far beyond object recognition, insofar as temporal processes are also stored in process schemata; and finally, there is a transition to nearly all other types of regularities. Schema formation, one might say, is the basic mechanism to which *abstraction* and *form* can ultimately be traced. Let us now pass from perception to media, and first of all to language.

3. Medium Language

In language, its inner structure and its functioning, similarity plays a prominent role, and this on the most different of levels; e.g., when one distinguishes between contiguity and similarity, or when de Saussure contrasts the syntagmatic axis with the 'associative' chains which follow a logic of similarity;[6] or in the different dimensions of linguistic mimesis, which always imply similarity.

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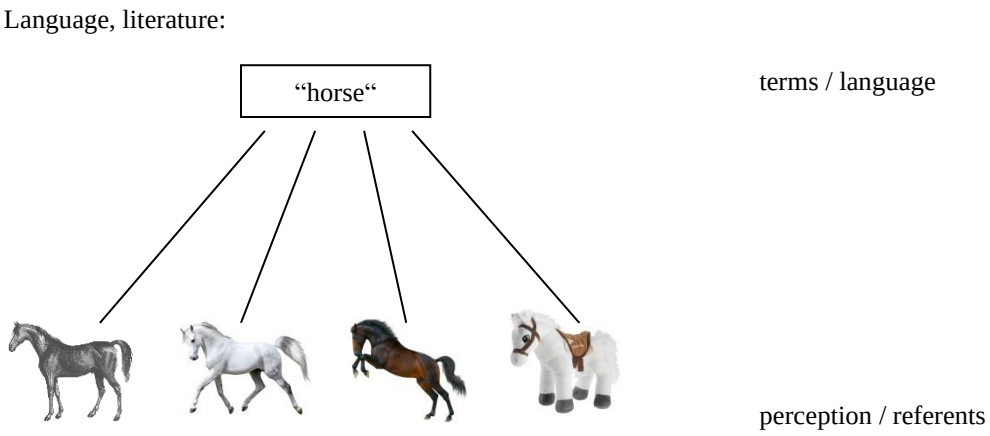
[4] Bergson, Henri: Matter and Memory. London: Allen & Unwin 1970, p. 163 [1896] (emph. H. W.).

[5] I will present some of these problems in my ninth chapter.

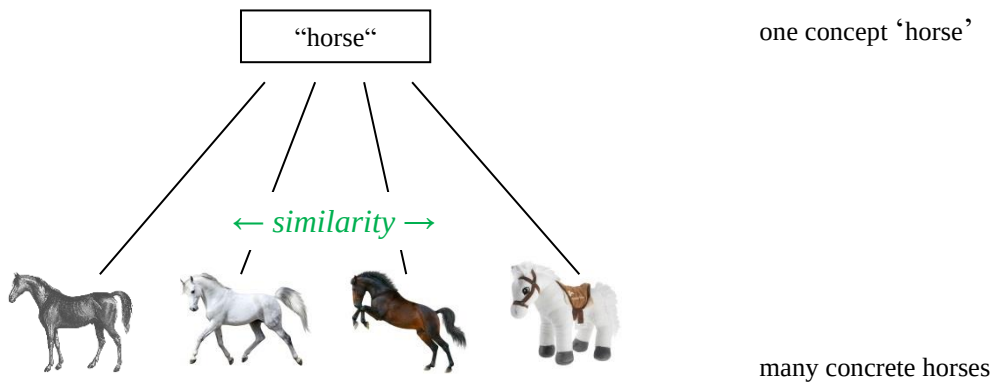
[6] De Saussure, Ferdinand: Course in General Linguistics. NY: The Philosophical Library 1959, pp. 128ff. [1916].

Out of all these possibilities, I would like to select just one and pursue it more closely, and this is the mechanism of subsumption, which is of absolutely fundamental importance for the functioning of language, semantics, and the formation of concepts. How concepts arise is a matter of some dispute. Linguistic theory would usually say that words/concepts come about through distinction and that vocabulary is organized according to the rules of contrast and difference.[7] I will show that similarity plays an equally important role; first, because distinction, difference, and contrast are not simply 'the other' of similarity, but remain related to similarity and even to 'identity.' And secondly, quite directly, insofar as concepts always and fundamentally subsume. The term 'horse,' to take an example, does not refer to a single specimen, but to a category or genus that includes the most diverse specimens; and this applies analogously, if we exclude names, to all terms and words.



Herein lies one of the crucial differences between language and the world, signs and the sphere of referents; both qualitatively as well as with regard to quantities: An infinitely large number of exemplars is confronted with a relatively limited set of terms; resulting in the fact that while the world might not fit into our small heads, language does so very well.

The crucial point now is that the specimens must *resemble* each other in order to fall under a common concept.



The formation of the concept 'horse' *owes itself to similarity*. A linguistic community observes that certain animals are particularly similar to each other; and it records this observation by grouping them together and then giving them a group label, the linguistic designation 'horse.'

[7] Lyons, John: Semantics. Vol. 1, NY: Cambridge University Press 1977, pp. 270-335.

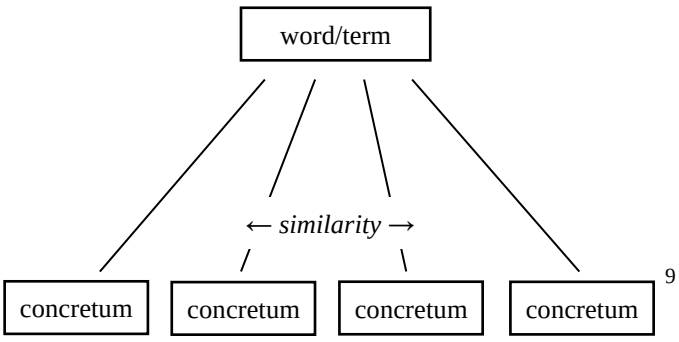
If one goes into detail, things become more complicated. In subsumption, only certain observations, certain similarities are taken into account; those characteristics which, according to the linguistic community, make a horse a horse. In other respects, the specimens can be markedly *dissimilar*, that is, they can differ greatly. In the case of 'horse,' for example, the color is irrelevant; the feature is suppressed for the conceptualization.

The observation of other similarities will accordingly lead to completely different groupings: Rabbits and stones, for example, are drastically different, i.e., quite predominantly *dissimilar*; and yet they may share the characteristic 'gray.' The designation 'gray' holds this one, very particular similarity.

A horse can be a horse and gray at the same time. This makes it clear that the categories overlap so that in semantics, one must assume a complex network of superjacent similarities and contrast axes. Further, one will have to note that similarities in semantics are not always those of perception; and finally, there are many abstract concepts whose world reference is indirect, complicated, or disputed. Not without reason did Walter Benjamin call language a system of *'nonsensuous similarities'*.[8]

Let us keep in mind, then, that that the individual terms subsume; and that this always implies similarity.

Language, literature:



[9]

the general

the particular

[8] Benjamin, Walter: Lehre vom Ähnlichen. In: Ges. Schriften. vol. II/1, Frankfurt am Main: Suhrkamp 1980, pp. 204-210, here: p. 207 [1933].

[9] When I speak of concreta here, then rather neglectfully; as a technical term 'concretum' already means a concept, a concept, however, which – in contrast to abstracts – denotes things which are sensually experienceable. (Cf: Wikipedia (Germ.): Konkretum; http://de.wikipedia.org/wiki/Konkretum).

4. Visual Media: Photography and Film

As a second media complex, I would like to address the technical images, photography and film, precisely because at first glance, they function completely differently from language and writing. The most obvious dimension of similarity is iconicity, the fact that images, unlike words, 'resemble' what is depicted; but this is not what I am concerned with; rather, I would like to discuss here as well – isolated by way of example – only the problem of subsumption.

The point of photography and film is that they manage without terms and avoid the mechanism of subsumption. Where language uses the word 'table,' i.e., a general concept that initially evokes only a relatively abstract idea and could still designate a multitude of different tables, photography and film present the image of a *single* table. The images of photography and film provide *concretes*.[10]

Language and literature must resort to the means of description in order to concretize concepts; and that means to place further concepts at their sides. Images, on the other hand, always provide the description; the color and texture of the photographed table is always already determined; it is completely impossible for even one of these determinations to remain vague.

At the same time, as I have discussed in the previous chapter, images *weaken* the contrasts and boundaries that seemed guaranteed in language. Photography and film undermine identificatory thinking; clouds can look like horses, a horse can look like a shadow, a shadow can resemble a speck more than any other shadow...

This is one side of technical images. But they have another, unsuspected side, and here it finally becomes interesting for the concept of similarity. For what has been stated above does not mean that every technical image is actually unique, or that every photographed object stands only for itself. For, of course, we can only understand photos or films if we identify or recognize the table – despite all its concreteness – as a table.

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[10] Fig.: Pixabay.

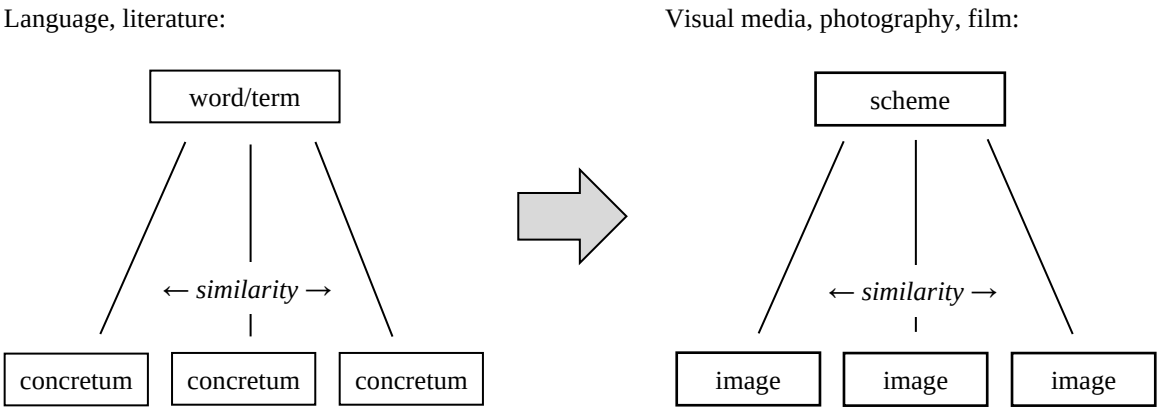
In consequence, this means that identificatory thinking plays a crucial role here as well; and accordingly, so does similarity. We can only identify the table as a table if we already have a concept, a schema, the stereotype of a table. Cognition theory tells us that we carry within us a whole set, a system of schemata and stereotypes that allows us to face the world and engage with the world in the first place. It is the treasure of a prior knowledge in which media competence and real experience are mixed.

Accepting the centrality of these schemata is not easy for film studies, for instance. Mostly, it is simply taken for granted that there are schemata, and often they are regarded pejoratively; and likewise, it is taken for granted that film images are ‘representational‘ images. In the visual arts, this is different. The advent of abstraction in art and, for that matter, also in experimental film has shown how great the confusion is when the images are no longer representational ones, when they purposefully subvert object recognition and our set of established schemata. To include the system of schemata in the analysis of visual media is of central importance, precisely because without it the medium does not function and it becomes impossible to explain how and why we understand images.

Behind the different surfaces of the images, therefore, the schemata and accordingly similarity prevail. The set of schemata and stereotypes forms a second level that lies – barely visible – behind the images. And these schemata, insofar as schemata are always abstract, stand in ~~a~~ systematic tension with the concreteness of the images.

5. Media Comparison

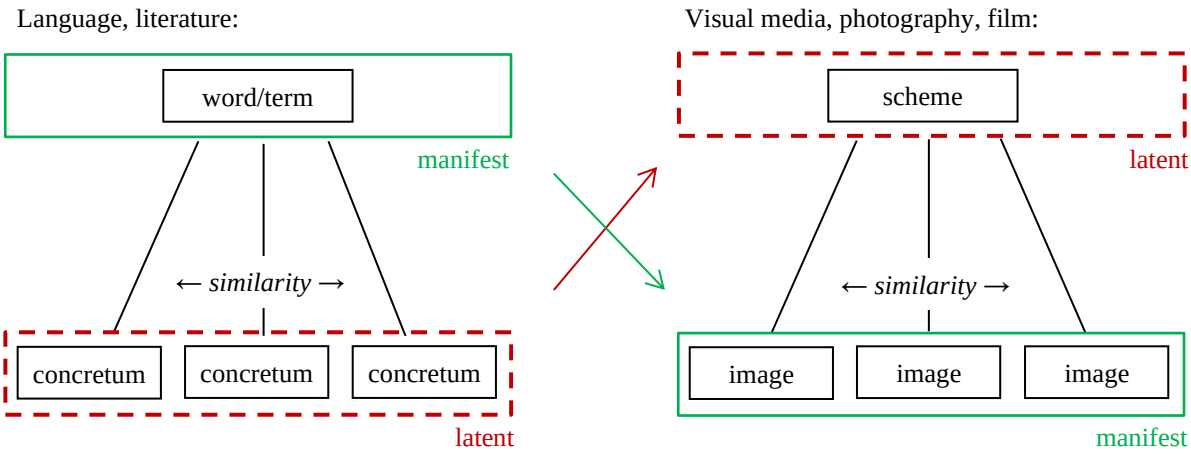
If we now go back to what I have said about language, a startling parallel emerges: namely, the schemata/stereotypes occupy a similar position as the concepts do in the case of language:



And as in the case of words/terms, it is again similarity that allows the leap from the respective individual to the schema. Immediately, however, decisive differences become apparent as well; especially with regard to the question of what separates the two levels and what significance they have in each case.

In the case of language and literature, it is texts that lie materially on the table and to which attention is directed. And since texts are made of words/concepts, it is the upper level of my sketch that is manifested and observable. Filling the concepts with concrete ideas, on the other hand, is left to the readers; here, their imagination is called upon; if a horse appears in the text, they must imagine what kind of horse it is and what color it is. This concretization remains in the mind and thus latent.

In the case of photography and film, it is exactly the other way around: since the materially manifested images provide the *concreta*, they are to be found on the lower level of the sketch. And accordingly, it is precisely the schemata that remain latent here, because the recipients have to provide them – as media competence or knowledge of the world.



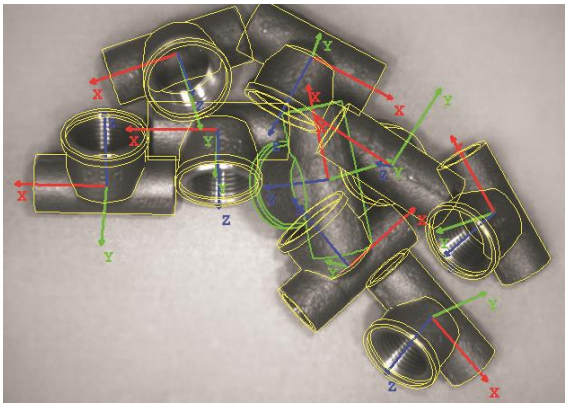
But how on earth can such a difference come about? Especially for similarity: Why can similarity once concern the level of the latent, that is, the imagined concreta, and once the material, manifest images?

My answer would be that exactly such differences are the reason why there are different media at all. Possibly more important than the usual way of distinguishing language from images, conceptual from visual, and iconic from arbitrary signs, would be how media deal with similarity, organize their schema formation, their type of similarity.

6. Computer, Machine Object Recognition

To ensure that my comparison of media does not appear too abstract, as a glass bead game that might just as well be left alone, I would like to address a third medium, because this one sums up nearly everything that has been said so far and shows that we are dealing with a very concrete and practically relevant question. And this medium is the computer, or – to stay in the field of images – one of its applications, machine object recognition.

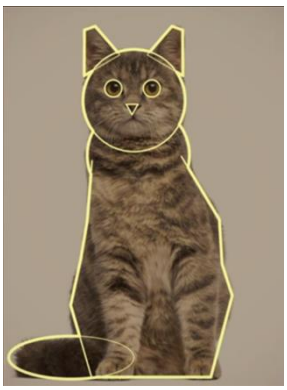
Object recognition is used in industrial production, for example, when a robot arm has to reach for a machine part. To control it, you use video cameras; and then you need a program that helps find the part, no matter where it is located in the pile.[11]



[11] Fig.: © MVTec Software; reprod. approved.

It becomes more difficult when *different* things are involved; for example, when you want to check whether a picture shows a dog or a cat. This task, playfully easy for a three-year-old child, is a serious problem for a computer. First of all, ‘objects’ have to be isolated in the continuous image, which in itself does not know any objects; and then it is a matter of identifying the objects. For this, the computer must be able to distinguish; it must have categories to which it can assign the objects in each case.

So how does one go about such a task? In a first step, an attempt was made to compile lists of typical features for all objects. If something has a round head and pointed ears, it might be a cat.[12]

This approach, however, quickly failed because the concrete illustrations differed greatly and hardly any image fulfilled all the characteristics that one would consider indispensable.[13]




For this reason, a different approach has been taken and today, so-called ‘deep learning‘ and ‘convolutional neural networks‘ are being used.[14] The special feature of these programs is that they completely dispense with the definition of explicit features; instead, the programs are ‘trained’ by being fed large quantities of preexisting images. This requires a great number of learning cycles and the process is roughly divided into three phases: To begin with, people have to tell the network what each object is, which is called ‘labeling‘; in a second phase, corrective action is only taken if the network delivers incorrect results; so that in the third phase, the program finally runs independently and – without further human intervention – recognizes objects in images; or only makes as many errors as the creators consider acceptable.

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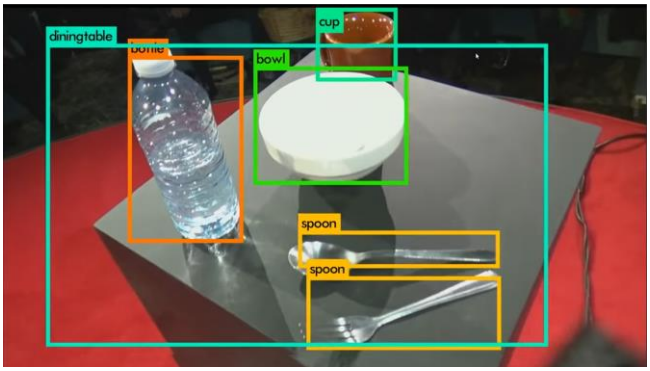
[12] Fig.: Video: Fei Fei Li: How we teach computers to understand pictures; https://www.youtube.com/watch?v=40riCqvRoMs, Min: 05:00ff.

[13] Ibid.

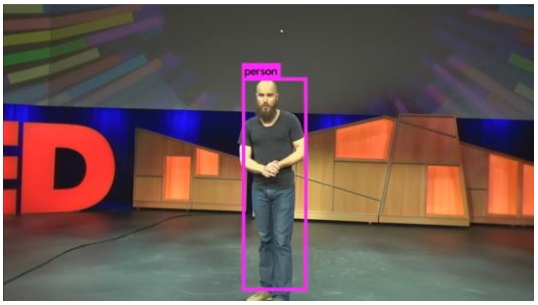
[14] Wikipedia (Germ.): Convolutional Neural Network; https://de.wikipedia.org/wiki/Convolutional_Neural_Network.

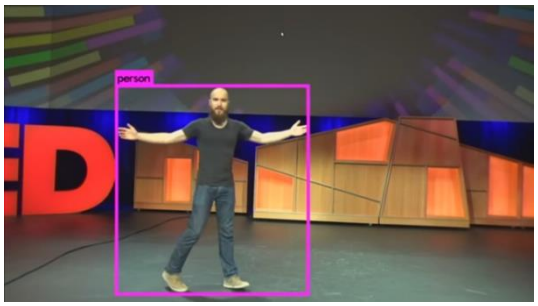
The programs rely on an extremely large database. Since 2009, the ambitious project ‘Imagenet’ has built up a database that contains millions of images and organizes them according to 22,000 categories. This database was created with the help of 50,000 crowd-sourced contributors – in other words, manually, by people. And because it is publicly available, many of the automatic image recognition projects draw on this data to train their programs.

Image databases and neural networks have advanced image recognition to a degree that hardly anyone would have thought possible just a few years ago. Thus, when presented with photos, the programs can identify different objects.[15]

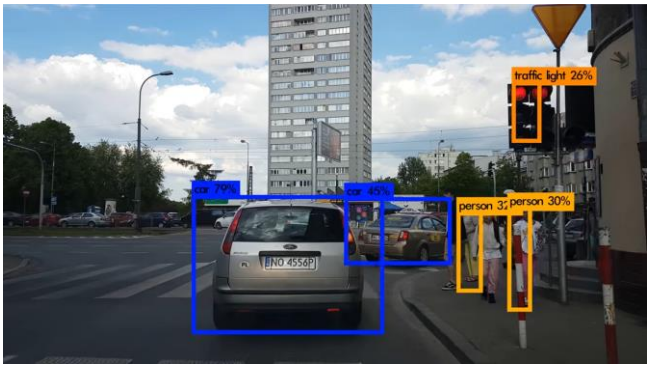


They also detect such objects that are in motion or change their size.[16]





And the third case is even more complicated: the control of autonomous vehicles through the complex traffic of a city. Here, the computer has to identify a large number of objects, even if they are in motion, distorted in perspective, or partially covered; and since driving is a time-critical affair and small children may run into the street rather suddenly, the whole thing has to happen in real time.[17]



[15] Fig.: Video: Joseph Redmon: How computers learn to recognize objects instantly; https://www.youtube.com/watch?v=Cgxsv1riJhI, Min: 03:10ff.

[16] Ibid.

[17] Fig.: Video: Yolo 9000 Object Detection #7; https://www.youtube.com/watch?v=_kxX09i4fds.

All of this is quite impressive, even if many problems remain unsolved and it will still be years before we see fully automated vehicles on the roads.[18] But how does machine object recognition relate to the issue I am pursuing here?

On the one hand, it is obvious that here, too, it is about similarity. Machines are to be enabled to recognize similarity, a skill that until now has been attributed exclusively to humans. And if it is possible to actually formulate this ability in algorithms, one must conclude that similarity is perhaps capable of theory after all.

Second, the programs imitate human perception, primarily insofar as they tie perception to recognition. Here, too, we can find the two levels I have shown above: There are the respective current perceptions and 'above' them, there are the schemata (even if these are called categories here). And as described above for the technical images, the aim is to leave the concretion of the images behind and find schemata in heterogeneous material.

An essential difference, however, is that the categories are fed to the artificial neural networks, whereas in the case of perception – that was Ebbinghaus' point – they emerge from the material in the process of repeated perception.[19] Perception forms its categories in the process of perception itself; this is something artificial neural networks are as yet not able to do.

7. Conclusions

This brings me to my final consideration. For how – we should now ask – do the various building blocks I have discussed fit together? Is there a transition between the mechanisms of perception and the functioning of media? Between the role of similarity in Gestalt-recognition and the conceptualization of language, or the schemata in image discourse? I think that such a transition can indeed be shown. And I think that my computer example has already illustrated this to some extent.

Let's start again with perception. Perception, as I have said, looks specifically for similarity. If all perception is recognition, bound to the ascertainment of similarity, to repetition and memory, and if our perceptual apparatus already possesses schema formation, then it suggests itself here to build a bridge to the schemata of image discourse.

Quite obviously, it is similar mechanisms that Mother Nature first inscribed into our perceptual apparatus and which human history then installs as 'media' in the space of culture. Or, more plausibly: media seem to *imitate* and prolong what is preformed in the mechanisms of our perception.

If this is the case, however, it is shifted in a significant way: Media operate in intersubjective space, in the space of the collective, and this means: *between* people, which is why they are often hastily reduced to 'communication.' And they operate in the external space, manifest/material, insofar as they always make use of technology. If one wants to avoid short-circuits, it will be necessary to spell out the connection a little.

If perception seeks similarity, it is because of economic reasons. It is a matter of reducing the complexity of the world to such an extent that it loses its overwhelming character and becomes at least somewhat manageable; and if the perceptual apparatus forms schemata which allow it

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[18] The problems can be clearly observed in the cited video itself: It is shocking how many objects the algorithm does *not* recognize.

[19] This difference is very far-reaching. In essence, the material organizes itself almost automatically in the process of repeated perception; the schemata and categories form themselves in repetition. In the world of computers, for example, clustering algorithms are used for this...

to recognize objects, it prevents itself from being swamped, as it would undoubtedly be swamped if it were confronted with material which is – always – new.

Exactly the same function – this is my assertion – *is performed by the media.* My consideration of subsumption has shown that here, too, reduction of complexity is the goal. It is possible to bring a very large number of individual items under a single term, a single scheme; with the consequence that subsequently, the term or the scheme takes their place, so that – incomparably more economically – only term or scheme has to be worked with. Here, too, it is a matter of building up prior knowledge that enables us to deal with what is new in each case.

Similarity is the condition and the rule that allows this reduction. Its ascertainment is always perspectival, reductionist, selective, and precarious, which is why concepts and schemata fundamentally 'lie'; but media that operate without this reduction do not exist. The functioning of media is bound to schema formation.

It seems remarkable to me that this, in my opinion, very central function does not play any role in common media definitions. One reason for this could be that it is taken for granted that media reduce complexity, and the *work* that the media do on this front is therefore overlooked. And perhaps the very fact that perception operates in a parallel manner makes it difficult to recognize the importance of the mechanism of schema formation. But much is lost from view in this way.

In any case, I think one should insist on inspecting the wheels of the machinery. The first consequence would be to shift the focus of what is considered to be the characteristics of media. Possibly, it is not – or not primarily – about 'communication,' not about technology or networks/ networking, not about environments, but about the function of processing the world with the help of technical-symbolic systems, of structuring it, of making it understandable and accessible. Once again, the *semiotic* aspect moves to the center of attention;[20] and the precarious and still unresolved question of what a semiotics should look like that actually makes this side of the media comprehensible.

This question, as I said, is open, and will certainly remain open for the time being. As a conclusion, however, it can be stated that the concept of the schema is an indispensable key when it comes to comparing and relating different media – despite their different characteristics and modes of operation. And it seems equally indisputable to me that similarity is at the center of schema formation.

Schema formation as well as similarity are bound to the criterion of 'fuzziness.' For both, it is true that haziness is not a defect, but the condition of their functioning; and even more: they make a very intelligent use of vagueness. To include different things under one concept *means* to overlook some of their particular differences; and the central point of a visual scheme is that no single perception fulfills the scheme completely.

All higher functions, the capacity of abstraction and generalization, of typification and form building, are based on this vagueness (as on similarity). To render this plausible, or more plausible, is the project that the following chapters pursue.

[20] Cf: Winkler, Hartmut: Zeichenmaschinen. Oder warum die semiotische Dimension für eine Definition der Medien unerlässlich ist. In: Münker, Stefan; Rösler, Alexander (eds.): Was ist ein Medium? Frankfurt am Main: Suhrkamp 2008. pp. 211-221.

[…]

9 Schema Formation

A Machine for Reworking Content into *Form* [1]

1. Intro

I would now like to take up the notion of *schema*, which has already appeared at various points in my text. This term has to bear a great burden within my overall argumentation, because it acts as a kind of pivot between similarity, perceptual theory, and semiotics. So far, however, I have not determined what a 'schema' actually is.

And finding a succinct definition is by no means easy, because the term shimmers in many directions. The term schema is used in so many contexts and in so many different ways that it is almost torn apart.[2] Terms that shimmer, however, do not lose their meaning; rather, their shimmer can indicate a special efficiency, a special vitality that allows them to migrate amphibiously from context to context. Exactly this – as I will try to show in the following – also holds true for the matter at hand. The concept of the schema abstracts many aspects and ideas and has its particular point in this synthetic achievement, for which a certain fuzziness is possibly a condition. In my opinion, the concept of schema is of great importance to media studies. If only relatively few theories make use of it, or better: only relatively few make theoretical use of it, this is not due to the term itself.

The schema concept seems to me as yet insufficiently scrutinized. I will show that a meaningful concept of the *sign* can only be grasped at all within the framework of a developed theory of schemata, insofar as the sign forms a special case in their realm. And further, that also the different media differ particularly with regard to the schema formation. In the schema concept, this is my thesis, lies the key as to why there are different media at all.

2. Conceptual Field

If one starts from everyday language usage, the schema term already splits. For example, Wikipedia – much maligned, but in many cases compact and useful – lists ten aspects:

> "The term schema [...] (from Greek σχήμα, [...]) denotes:
> - in general, a form specification or pattern limited to the essentials, see template
> - a simplifying drawing like a diagram

[1] Lecture at the Graduiertenkolleg Automatismen, University of Paderborn, November 2009; published in: Conradi, Tobias; Ecker, Gisela; Eke, Norbert; Muhle, Florian (eds.): Schemata und Praktiken. Munich: Fink 2012, pp. 15-35; the text has been revised for the reprint.

[2] "A unified theory of schema does not currently exist. Rather, it is a group of theories whose common feature is that they use the schema construct but may well differ depending on the concrete subject matter." (Mandl, Heinz; Friedrich, Felix; Hron, Aemilian: Theoretische Ansätze zum Wissenserwerb. In: Mandl, Heinz; Spada, Hans (eds.): Wissenspsychologie. Munich/Weinheim: Psychologische Verlagsunion 1988, pp. 123-160 (transl. H.W.)).

- in computer science, a formal model of the structure of data, see schema (computer science)
- in ethology, a group of characteristics that trigger an innate behavior, see innate triggering mechanism
- in psychology
  - a structure of memory contents characterized by simplification, see schema (psychology)
  - the action-related aspects of thinking and intelligence
- in mathematics, a central concept of algebraic geometry, see scheme (algebraic geometry)
- a Bible verse (from Hebrew Shma), see Shma Yisrael.
- an RI flow diagram in process engineering [??]
- a standardized procedure, cf. 'Schema F' [cookie-cutter]."[3]

'Form specification' and 'pattern' point forward: It is often implied that schemata have a certain imprinting power. Schemata seem to be preconceived and to work from there into the future. Second, schema sounds like planning, routine, and economy. It is always implied that it is a *simplification*, more concise and economical than what is to be described or designed.

The reference to 'Schema F,' however, shows a clearly pejorative connotation; the terms schema and schematism are often used critically, for instance in the sense that the schema goes too far in its simplification and reduces actual complexities too much. Likewise, the schema – 'Schema F' – appears as inflexible and rigid; thus standing in contrast with the dynamics and vicissitudes of the respective contexts. Often the schema is experienced as unrealistic, sometimes as repressive. This negative connotation is important precisely because when the term is used in science, attempts are made to gain a concept of schema that is as value-free and neutral as possible.

3. Bartlett

As far as science is concerned, the concept of schema is probably most commonly used in psychology. Psychological schema theory has its basis in the Gestalt theory of Wertheimer, Köhler, and Koffka and in developmental psychology, especially Piaget. The concept itself, however, goes back to F. C. Bartlett's social psychological theory of memory developed in the 1930s.[4] Bartlett, according to my encyclopedia 'Cultural Theory,'

> "criticizes the previous concept of schema as being too static and places his concept of schema under three premises: (a) schemata are conscious and active processes; they reduce complexity and constitute meaning. (b) Schemata do not consist of individual elements but form holistic structures that represent complex knowledge. (c) Schemata integrate not only cognitive knowledge components, but also social and affective ones."[5]

Bartlett opposes the mechanical 'storehouse' models of memory:

> "[In the processes of memory] the past operates as an organised mass rather than as a group of elements each of which retains its specific character. [...] For this combined

[3] Wikipedia (Germ.): Schema; http://de.wikipedia.org/wiki/Schema, 10/23/09 (transl. and add. H.W.).

[4] Bartlett, Frederic C.: Remembering. A Study in Experimental and Social Psychology. Cambridge/NY 1995 [1932].

[5] Nünning, Ansgar (ed.): Metzler Lexikon Literatur- und Kulturtheorie. Stuttgart/Weimar: Metzler 1998, p. 478 (transl. H. W.).

> standard, against which all subsequent changes of posture[6] are measured before they enter consciousness, we propose the word 'schema.'"[7]
>
> "Such schemata modify the impressions produced by incoming sensory impulses in such a way that the final sensations [...] rise into consciousness charged with a relation to something that has gone before. [...] It would probably be best to speak of 'active, developing patterns.'"[8]

And because Bartlett regards schemata as dynamic from the outset, he moves quickly to a developmental model:

> "[S]chemata are build up chronologically. Every incoming change contributes its part to the total schema of the moment in the order in which it occurs. [...] All of us, in reference to some of our schemata, have probably completed the model and now merely maintain it by repetition."[9]

And finally, to the problem of intersubjective validity, closely related to the role of the media:

> "With this, [...] as my experiments repeatedly show, goes a great growth of social life, and the development of means of communication. Then the schema determined reactions of one organism are repeatedly checked, as well as constantly facilitated, by those of others."[10]

Thus, already in the thirties, important determinations of the concept of schema are present in Bartlett. A second witness is Halbwachs,[11] who explicitly does not use the term schema, but argues very similarly with his theory of 'frames'; the term frame was used in AI, as an alternative to the term schema, to typify situations.[12]

Schema theory then receded for a few decades with the rise of behaviorism; however, it was widely revived in the 1970s.

> "Almost simultaneously, publications appeared in cognitive psychology (D. E. Rumelhart), AI research (M. Minsky), linguistics (Ch. Fillmore), [and the] theory of motor control (R. A. Schmidt), all of which are based on schema theory. It has been an integral part of these research areas ever since."[13]

4. Cognitivism, Matthes

Despite all their differences, the fields mentioned above were in close rapport in the 1970s; and the hub for this close interaction was above all the suggestion of the computer. It effortlessly provided the metaphors in which even delicate sciences such as linguistics and psychology reformulated their subject matter step by step; the developmental thrust of IT and the engineering rigor of the hardware seemed to provide the traditionally 'soft' subjects with the longed-for connection to the natural sciences.

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[6] ...Bartlett's example relates to positional changes of the body....

[7] Bartlett, Remembering, op. cit. p. 197, 199 (add. H. W.).

[8] Ibid, p. 200f., B. citing Henry Head.

[9] Ibid, p. 203.

[10] Ibid, p. 206; on intersubjective validity and the collective unconscious, see also pp. 281ff.

[11] Halbwachs, Maurice: On collective memory. Chicago/London: University of Chicago Press, 1992 [1925].

[12] Minsky, Marvin: The Society of Mind: Mentopolis. New York: Simon & Schuster 1988 [1985].

[13] Nünning, Lexikon Literatur- und Kulturtheorie, op. cit., p. 478 (transl. and add. H. W.).

Especially Cognitive Theory took up the schema concept; and almost all definitions of the present are determined by ideas and terminology of cognitive science. That these are anything but unproblematic remains to be shown; at the same time, however, cognitive theory has contributed essential determinations to the schema concept. Based on Matthes,[14] who tries to give a summary focused on media impact research, I would like to briefly discuss some of these determinations; the first one, however, is provided by Wikipedia:

> "Schemata are contents of implicit memory, i.e., are 'brought along' into the respective situation, and through *recognition* (top down) determine the selection/filtering of incoming information, its meaning, and further, the storage and classification of the new knowledge."[15]

Whenever the concepts of 'knowledge,' 'information' etc. are invoked in an undiscussed way, the footprint of Cognitivism is already clear. Nevertheless, the definition seems to me suitable, insofar as it grasps the schemata as the *counterpart* of the respective current perceptions; the current perception meets a structure already existing in the memory; established schemata decide how the current perceptions are classified and – again a technical metaphor – 'filtered' and 'processed.' Perceiving is, also in schema theory, recognizing. And the schemata have a certain *power* over the current perception.

The second determination I take from Matthes, who is citing the cognitive psychology handbook by Eysenck and Keane: "A schema," he quotes,

> "is a structured cluster of concepts; usually, it involves generic knowledge and may be used to represent events, sequences of events, percepts, situations, relations, and even objects."[16]

Schemata, then, are intrinsically plural and constellative. This determination is difficult enough; after all, even semantic theory is hardly able to actually conceive of plural, constellative representations. So Matthes quickly retreats to safe terrain:

> "In simplified terms, according to schema theory, human knowledge is organized similar to a drawer system [!]: In principle, there are an infinite number of drawers, since there is a schema for every situation, every object, etc."[17]

But what would this mean? If there were indeed an infinite number of schemata, the term would lose all sense. It is obvious – and already implied in the concept of recognition – that a schema includes a multitude of different situations, objects, or perceptions; provided that these are recognized as *similar* in some way. In this respect it is to be assumed that there are a great many, but by no means an 'infinite' number of schemata and 'drawers.' Rather, their number must be significantly smaller than that of the respective current perceptions/situations, and this specific scarcity/economy certainly is one of the striking effects of schema formation. Schemata, as I have written above, obey a logic of *subsumption*; as is known, for example, from linguistic terms.

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[14] Matthes, Jörg: Schema Theorie in der Medienwirkungsforschung: ein unscharfer Blick in die 'Black Box'? In: Medien und Kommunikationswissenschaft, vol. 52., no. 4/2004, pp. 545-568.

[15] Wikipedia (Germ.): Schema (Psychologie); http://de.wikipedia.org/wiki/Schema_(psychology), retrieved 10/24/09 (transl. and emph. H. W.).

[16] Ibid., p. 546 (transl. H.W.), Matthes cites Eysenck/Keane: Cognitive Psychology - a student's handbook (2002).

[17] Matthes, Die Schema-Theorie, op. cit., p. 546 (transl. and emph. H. W.).

5. Abstraction

The cognitivists are well aware that schemata are *more abstract* than the respective schematized: "Memory", write Rumelhart/Norman,

> "contains a record of our experiences. Some of the information is *particular* to the situation that it represents. Other information is more *general*, representing abstraction of the knowledge of particular situations to a class of situations. [...] A psychological theory of memory must be capable of representing both general and particular information. We believe that general information is best represented through organized information units that we call *schemata*."[18]

And the authors try to explain the abstraction or generalization inherent in schemata – unscrupulously using rather mechanical terms:

> "It is possible that our early experiences with some class of events give rise to a set of particular representations of those events. Then we generalize from these experiences by substituting variables for the aspects of the events that seem to vary with situations, leaving constants (particular concepts) in those parts of the representation that are constant across the different events in the class. The result is a general schema for a class of events."[19]

The sketched conception, as said, is itself rudely schematic, and in speaking of variables and constants it seeks the comforting proximity of mathematics. If one accepts this for the moment, however, the model is quite illuminating: Actually, only such factors are distinguished which are constant at each occurrence of the schema and those which, without damaging the schema, vary from situation to situation. The schema is *structure* insofar as it relies only on the former. And for the same reason it is 'abstract': By requiring of the particular situations only *certain* features while leaving others open, it distances itself from the concrete setting and can subsume many, varying situations.

On the basis of this idea, Rumelhart/Norman can plausibly describe cases of overgeneralization – "a young child learns that not all animals are 'doggies'"[20] – and more generally, that the comparison between schema and concrete situation always raises questions about 'adequacy' and 'applicability.'[21]

It is interesting to note that in most cases the 'variables' are not simply left open, but are provisionally filled in by pre-assumptions, which Rumelhart/Norman call 'default values':

> "The different variables in a schema are often constrained: We do not expect to find all possible plants or animals on a farm. Tigers, eels, and poison ivy are animals and plants but not within the normal range of possible crops or livestock. Many of the variables in schemata have default values associated with them. [...] Variables (and their constraints) serve two important functions: 1.) They specify what the range of objects is that can fill the positions of the various variables. 2.) When specific information about the variables is not available, it is possible to make good guesses about the possible values."[22]

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[18] Rumelhart, David E.; Norman, Donald A.: Accretion, Tuning, and Restructuring: Three Modes of Learning. In: Cotton, John W.; Klatzky, Roberta L. (eds.): Semantic Factors in Cognition. New Jersey 1978, pp. 37-53, pp. 40f. (emph. H. W.).

[19] Ibid, p. 41.

[20] Ibid, p. 39.

[21] Ibid, pp. 48, 43.

[22] Ibid., p. 43f.

The computer shines through everywhere, and one will have to note that it has by no means been possible to write plausible software on the basis of schema theory; the general idea that emerges, however, is not damaged by this.

6. Schemata and Current Perception

Let us now return to Matthes and to the situation of the respective current perception. Matthes describes the clash between current perception and the schemata existing in memory as follows:

> "When information reaches the information processing system [!], first the schema that best fits the incoming information is identified. This phase of schema identification can be called data-driven (bottom up). Which schema is identified determines whether and how that information is understood and classified."[23]

Of interest now is what happens when an incoming perception shows differences from the invoked schema. "When a stimulus configuration", Matthes writes, [My God, even behaviorism is still in charge here!]

> "is matched against a schema, elements in the configuration come to be ordered in a manner that reflects the structure of the schema." And he continues: "This structuring function is the basis for schema-induced memory performance, because schema-relevant information is remembered more easily and quickly than schema-irrelevant information."[24]

The core of the so-called 'structuring function' is that the comparison with the schemata does not leave the current perceptions untouched. Rather, these are reshaped and adapted; what does not fit the invoked schema is threatened to be filtered out. This becomes especially apparent when investigating how the perceptions are in turn remembered.

Equally, however, the opposite seems to be possible, with authors of the 1990s showing that in certain cases

> "contrary to the original assumption [...] schema-inconsistent information leads to *higher* recall performance than schema-consistent information."[25]

This is also plausible, insofar as one is certainly more likely to remember what contradicts expectations, what is extraordinary or perplexing. Leaving aside the special problem of memory, then, two ways seem possible: an alignment of perception with schemata as well as an irritation of the schemata themselves. This leads to the question of the ways in which schemata *change*.

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[23] Matthes, Die Schema-Theorie, op. cit., p. 547 (transl. and emph. H. W.); however, I would dispute that this is a 'data-driven (bottom up)' process, because it concerns an *alignment* between the current perception and the schemata. Much more plausible, therefore, seems to me Bergson's determination that in the process of perception 'two streams' (current perception and memory contents, the first 'bottom up' and the second 'top down') intersect (cf. ch. 4, fn. 4).

[24] Ibid, p. 547 (transl. H. W.), M. citing Taylor/Crocker 1981.

[25] Ibid, p. 551 (transl. and emph. H. W.).

7. Change of Schemata

If schemata are on the one hand "relatively stable" cognitive structures,[26] Matthes – citing Rumelhart – nevertheless finds three ways of their modification: accretion, tuning, and restructuring.

> "Accretion refers to the successive accumulation of factual knowledge, e.g., in learning telephone numbers or names. New information is added to an already existing schema without causing structural changes in the knowledge organization. However, if no schema can be used for the new information, then learning by accretion is no longer effective. In this case, either an existing schema must be modified (tuning) or a new schema is formed (restructuring)."[27]

Current perceptions modify schemata; so it is by no means the case that schemata simply dominate current perceptions; they are also subject to the perceptions' modifying power.

Two further determinations might be touched upon only briefly: Cognitive theory agrees that schemata have a function of *relieving strain.* Schemata are considered economical especially in view of the scarce mental resources. And further, Matthes mentions as consensus the structuring function. Schemata *structure* experiences and assign a meaning to 'incoming information.'[28]

8. In the Wrong Hands

All these determinations are, as I said, quite plausible to me. And at the same time, the rhetoric of cognitive theory – 'store,' 'human information processing,' 'drawer system,' 'stimuli,' or 'knowledge' – is simply atrocious. Somewhat wickedly, one can say that schema theory – for all its superficial success – has fallen into the wrong hands with cognitive science.

At the same time, it is apparent that ultimately, the protagonists despair of the concept of schema. In search of an exactness and operationalizability that the term neither gives nor perhaps wants to give, its adherents seem to diverge in almost every conceivable direction. Matthes' last chapter, which attempts a critique of the concept of schema and mixes plausible points with control fantasies, as well as his fast decision to rather rely on connectionism and/or attitudinal research,[29] maps this exactly. It is certainly to be taken seriously that it is difficult to make schema theories the basis of concrete material analyses. But if schemata are indeed part of *tacit knowledge*, it cannot be surprising that they can hardly be brought out of their hideouts by means of empirical social research. After all, it is only in recent years and under the pressure of neuroscience that cognitive theory has been forced to even consider something like an unconscious or preconscious.

Further, it seems disappointing that schema theories obviously do not allow concrete predictions. Supposedly, it is practically impossible to fix the level of abstraction at which schemata are to be assumed (which could be due to the fact that they operate on different levels of abstraction). Because it is thought to be something dynamic rather than something static, Iran-

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[26] Ibid. 545, 547 (transl. H.W.); "Subjects showed little inclination to restructure their schemata, even when the information conveyed in the [actual] texts was in clear contrast to their everyday theories about the items in question." (Mandl/Friedrich/Hron, Theoretische Ansätze zum Wissenserwerb, op. cit., p. 128 (add. H. W.)).

[27] Matthes, Die Schema-Theorie, op. cit., p. 548 (transl. H.W.).

[28] Ibid, p. 547.

[29] Ibid, pp. 552ff, 559, 560.

Nejad holds that the long-term 'memory' character has to be abandoned[30] and instead, a completely dynamized concept must be adopted:

> "[A]ll types of cognitive representations will be found to be flexibly reconstructed in a context-sensitive way rather than retrieved from memory as they were stored – like items buried in a time capsule."[31] "We have to leave behind the structural aspects of information processing."[32]

However, if context alone reigns, the terrain of any meaningful schema theory is abandoned. So Rumelhart asks the essential question:

> "How can a schema be an abstract structure or knowledge representation, and at the same time sufficiently malleable to apply to different situations?"[33]

And the problem may be solvable, at least on a theoretical level. Perhaps the concept of schema is by no means a "conceptual monster" that "leaves the reader alone with his knowledge of the unexplained concepts." And perhaps, as I surmised at the beginning, it is not a defect if the schema concept needs a certain fuzziness to do its work.[34]

In my eyes, the concept of schema is a *model* which, like all models, allows only a limited number of statements/assertions. My assertion, however, is that one can say more with and about this model than the referred framework suggests. Though in this case, we will have to leave the terrain of cognitive theory behind.

9. Essentials

As a first step, I would like to extend some of the lines drawn by the theorists I cited above. First of all, it seems important to me that the schema links past (experience), present (dealing with current perceptions, incoming 'information'), and future (expectation) in a regular way. So schemata necessarily have a temporal axis. This makes it crucial to develop a concept that plausibly grasps this specific time structure and to ask how schemata, which are the result of experiences, at the same time format new experiences.[35] Cycle and progression, change and relative stability, discourse and memory aspect are obviously linked with each other.

Second, a model of emergence is needed. Here, I think, the schema concept can learn from a close relative, the stereotype. While schemata easily appear as preconceived, antecedent, as always already present, it is clear that stereotypes first gain their form, identity, and boundaries in a chain of discursive events. For the schemata at issue here – it may differ for schemata established in instinct – the same is probably true: Stereotypes and schemata are a product of accumulation; they are hardenings in discourse that emerge in repetition and through repetition alone; and the concept becomes interesting only when completely dependent on experience and repetition. The internal time structure (experience/perception/expectation) and the question of the historicity of schemata are related.

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[30] Ibid, p. 559.

[31] Ibid, M. citing Smith 1996.

[32] Ibid. (transl. H. W.).

[33] Ibid, M. paraphrasing Rumelhart.

[34] Ibid, p. 552, M. citing Herrmann 1982.

[35] "In the context of knowledge acquisition, schemata can be viewed from two perspectives: as a result and as a prerequisite of knowledge acquisition. The first aspect – schemata as a result of knowledge acquisition – has rarely been taken up in schema-theoretical research." (Mandl/Friedrich/Hron, Theoretical Approaches to Knowledge Acquisition, op. cit., p. 124).

The third point I would like to emphasize is once again the role of abstraction. Schemata are always and necessarily more abstract than the perceptions, phenomena, or events they order and represent. A schema can only be a schema if it allows *recognition*, that is, if it subsumes a multiplicity of cases.

The repetition itself, this I have worked out elsewhere, is a machine of abstraction. For repetition breaks things away from their individual context and emancipates them as 'things.' Or more precisely: Repetition is a kind of mechanical filter; in each concrete event it separates what is repetition and what is not – and in the last instance, what is unique. Schemata fall entirely on the side of repetition. From the connection between repetition and abstraction, I will derive much of what constitutes my actual thesis.

10. Media

I would now like to turn to the media. The question of schemata is as conspicuous as it is relevant within media studies; thus, the mass media in particular have been accused of schematism, mostly pre-theoretically, or elaborated in Horkheimer/Adorno or in Prokop in the framework of a comprehensive critique.

The problem immediately arises that the concept of schema, as it is understood in psychology or social psychology, does not seem suitable for the media. After all, it is by no means only about those schemata that are at work on the subjects', the recipients' side. Schemata, schematization, and schematisms, on the contrary, also seem to characterize the media products; again closely related to the concept of stereotype, which in essence means that the products could also turn out differently, less schematized.

This leads to the question of the relationship between the schemata on the side of the recipients and those on the side of the media product. If one excludes a simple manipulation theory, the first answer would be that of Horkheimer/Adorno of a reciprocal-circular conditionality or correspondence.[36] Polemically, Horkheimer/Adorno hold that the culture industry absorbs the schematized needs of the masses, but in the schematism of its products it surpasses the synthesis that Kant had still assigned to the transcendental subject. As far-reaching and still topical as this polemic is, it seems worthwhile to free the concept of schema from its pejorative connotations, also within media studies, and I would like to attempt to do so in the following.[37]

In my eyes, and the subtitle of the chapter already announced it, media are in general – beyond all contents and beyond just a more or less 'schematized' representation – *machines that generate schemata.* Media have the task to extract from contents, i.e. from the respective particular, a general, spread out on different levels of generalization. *Media are machines for the transformation of content into form*.

However, I concede that this requires an explanation. First of all, it is obvious that the mechanism of subsumption, which has been exposed above as a core of the concept of schema, is characteristic of all symbolic-medial processes. Media are media only insofar as they subsume the shattered heterogeneity of the world under schemata. This is evident in the field of language; concepts are schemata that rasterize and abstract the material and relate it to a network of general determinations. No one would expect the term 'zebra' to measure up to an individual specimen; rather, the term addresses the genus and cuts off what definitely distinguishes the

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[36] Horkheimer, Max; Adorno, Theodor W.: Dialectic of Enlightenment. Philosophical Fragments. Stanford: UP 2002 [1947]; the central question of Horkheimer/Adorno is why the audience *agrees* to what is offered to it; thus, it is by no means a matter of 'manipulation,' as one can read again and again, but of a destructive circle between need structure and offer; (on the figure of the circle see ibid., pp. 95, 100, 106, 117).

[37] Ibid, p. 145.

individual from its conspecifics. That language subsumes and *does injustice* to the respective individual was shown by Nietzsche and Adorno in their brilliant critiques of language.[38]

But does this really apply to all media? Is it not precisely the visual media – photography and film – that have set out to correct this defect, this flaw of language? If one follows appearances, photography and film indeed manage without subsumption. Instead of a general, they showcase an individual that presents itself in all its concreteness and is moreover embedded in its respective concrete, non-interchangeable context. This is the special feature and the special point of this media constellation; a radical concreteness that binds itself to the individual non-exchangeable surfaces.

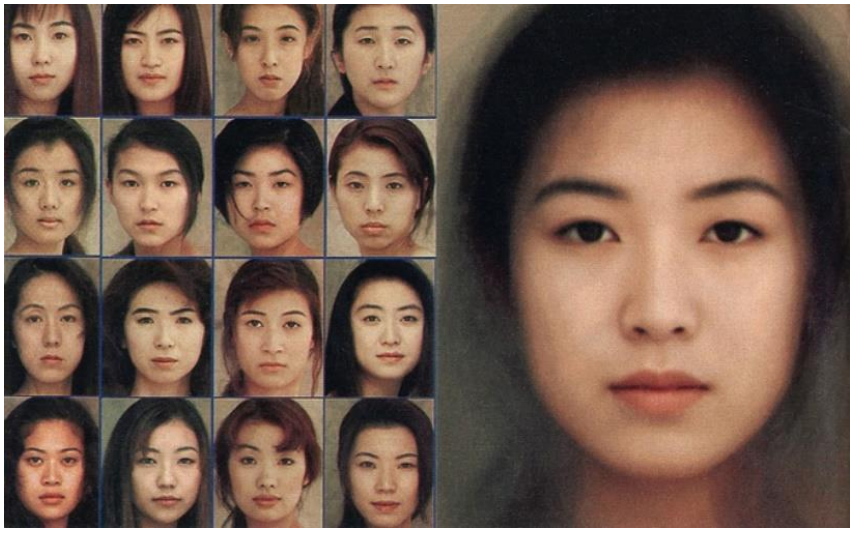
But is this really all there is to be said? First of all, it is striking that photography and film proceed quite predominantly *exemplarily*. The respective individual almost never stands for itself, or only for itself, but in the overwhelming number of cases the presented, in its respective concreteness, provokes generalization. The filmed pub is concrete, but on a second level it simply stands for a 'pub.' The filmed dog barks concretely *and* as an example. And if the viewer identifies with the actor or the fictional character, this is also a mechanism that turns a concrete individual into something obviously transferable.

Similarly frequent are cases of metonymy/synecdoche, which make a whole out of parts and a hidden general out of neighboring concretes. In addition, any conceivable level of allegory is possible; if a 'Justitia' is positioned – blindfolded – in front of a courthouse, and this stands for the abstract principle of justice in general, one can say that film and photography are teeming with Justitiae. The radical concretion of the surfaces is reality – and at the same time a sham.

And this becomes even clearer as soon as one switches to the side of the recipients. If the Gestalt theory already teaches that all perceiving is recognizing, this implies that behind, under, and beyond the concrete there is a schema (even if this is not the final thing to be said about the process of perceiving). But can this come as a surprise? Are we not thus back where we started, on the terrain of psychology?

11. Galton

That it is really about the material functioning of the media, and by no means just about the soft processes of the human soul, may be illustrated with an additional example. In the 1990s, the German newspaper 'Die Zeit' – completely untouched by any gender debate choosing the title 'Beauty, What is it?' – presented the following illustration:[39]



[38] Nietzsche, Friedrich: On Truth and Lies in a Nonmoral Sense. In: The Complete Works of Friedrich Nietzsche. Hastings (UK): Delphi Classics 2015, https://archive.org/details/nietzsche-delphi-complete-works_202109 [1873]; Adorno, Theodor W.: Negative Dialectics. New York: Continuum 1973 [1966].

[39] Zimmer, Dieter E.: Schönheit, was ist das? In: Die Zeit - Magazin, no. 2, 1/5/96, pp. 8-15, here: p. 10; fig.: © Karl Grammer, University of Vienna; thanks for permission to reproduce.

This is a so-called composite portrait, which creates the large image on the right from the 16 images on the left by simply superimposing them. The technique of composite photography can be traced back to the English 'gentleman scientist' Francis Galton (1822-1911), who tried to "discover and to define the types of features […] that are associated with different kinds of criminality" from thousands of photographs of convicted criminals.[40]

In their brilliant book 'Typecasting,' Ewen/Ewen examine the role of stereotypes and the alliance of the history of science and popular culture; they place Galton in the problematic history of anthropological-physiognomic research:

> "Galton's procedure owed a great deal to statistical innovations pioneered more than thirty years earlier by Adolphe Quetelet. […] In 1844, using an astronomical principle called the Law of Error, Quetelet had measured the chest sizes of five thousand Scottish soldiers. Each soldier had his own particular measurement, but together these data [...] permitted Quetelet to establish the physical dimensions of what he called the average, or normal, soldier. In short, while each member of a given group had his or her own peculiar individuality, the 'average' characteristics of that group could be determined by calculating those individuals into an 'ideal type.'"[41]

Galton only had to translate Quetelet's numerical method into the optical medium of photography in order to extract *the* type of criminal from concrete portraits of criminals. Ewen/Ewen quote Galton:

> "'[I]f we have the portraits of two or more different persons taken in the same aspect, and under the same conditions of light and shade, and ... if we put them into different optical lanterns converging on the same screen, and carefully adjust them – first, so as to bring them to the same scale, and, secondly, so as to superpose them as accurately as the conditions admit – then the different faces blend surprisingly well into a single countenance. If they are not very dissimilar, the blended result will always have a curious air of individuality, and will be unexpectedly well defined; it will exactly resemble none of its components; but it will have a sort of family likeness to all of them, and it will be an ideal and an averaged portrait.'"[42]

According to 'Die Zeit,' it is only a short way from criminology to beauty. And both seem to be solely a question of typification. It seems interesting to me that in the case of beauty it is not only about the ideal type, but – quite literally – about 'ideals'; the statistical superimposition proves to be a mechanism of *idealization*. And if one assumes that our perception of beauty is indeed schematizing/statistical, one would have to conclude that beauty is also a matter of economy, i.e., a laziness of thought.

Whatever one thinks of Galton and his research: What I am trying to show with his example is that there are regular transitions between media techniques and schema formation, technical and mental processes. (By this I do not imply that both are causally connected, merge into each other, or are even directly compatible).

The concept of schema falls by no means simply on the side of recipient psychology; rather, Galton shows that the relatively unsophisticated mechanism of repetition/accumulation produces something that we would intuitively recognize as a process of schema formation. But more precisely, the process does presuppose a certain degree of *similarity*; for example, it would

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[40] Ewen, Elizabeth; Ewen, Stuart: Typecasting: On the Arts and Sciences of Human Inequality. New York: Seven Stories Press, 2006, p. 212.

[41] Ibid.

[42] Ibid, p. 213.

certainly be impossible to extract a plausible composite photograph from a post office truck, a tree, and a guinea pig.

At the same time – and this is indeed more than important – *composite photography is a process which autonomously establishes the tertium comparationis.* This suggests that in *any material,* schema formation can begin solely according to the scale of empirically occurring similarity/ repetition.[43] The mechanism thus seems uniquely robust: It does not appear to be tied to any particular level of abstraction, since it produces that abstraction as an effect of similarity/repetition/cumulation itself. And it appears – this, too, had thrown cognitivism into some confusion – dynamic/open-ended as well as inert/stable to the same degree.

Schema formation creates a dynamic general out of an abundance of concretes. It is – why I choose the term form, I will show in a later chapter – a machine for reworking content into *form.* And schema formation seems not only to produce the general, but to be itself the most general of all abstraction mechanisms imaginable.

12. Media Differences

Now, at the end, I will take up the question of how all this can contribute to the clarification of media differences or media specifics. The field of media studies is rich in unanswered questions; next to the most obscene one – what is a medium in the first place – there is certainly the issue of why there are different media at all, media in the plural, and thus media differences.

To this, the concept of schema can provide a perplexing and, I believe, far-reaching answer. First, it is striking that different *levels* of schemata and schematization are found in the media. The 'hard' schematized media and symbolic systems – writing, numbers, data, formal languages, or mathematics – are contrasted with others that know only 'soft' mechanisms of schematization; in photography and film, stereotypes or genre rules are operative, in real perception it is gestalt recognition; constituted 'signs,' however, do not exist. In a first sum, the following picture emerges:[44]

hard schemata ↑		numbers, data, formal languages, mathematics
	signs, characters ↑	writing
		oral language, music
↑	stereotypes, rules, genres ↑	photography, film
soft schematization	schemata	(real-world perception)

As rough (schematic?) as the assignment is at first, it seems evident that we are dealing with a continuum, with *stages* of hardening. The degree of schematization increases in stages. The crucial point seems to be the notion of the sign (which separates the upper, 'hard' stages from

[43] "In many cases, the process of schema induction is triggered by the perception of regularity and order in the environment." (Mandl/Friedrich/Hron, Theoretische Ansätze zum Wissenserwerb, op. cit., p. 128 (transl. H.W.).

[44] I have taken the figure from my book: W., H.: Basiswissen Medien. Frankfurt am Main: Fischer 2008, p. 258.

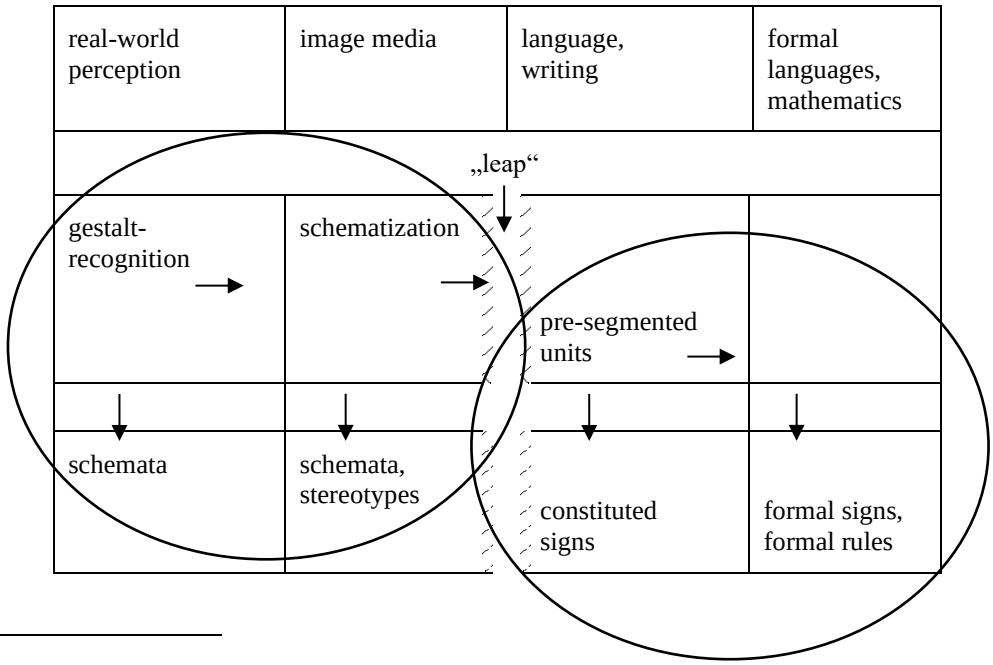
the lower, ‘soft’ ones). The fact that writing has constituted signs, but photography and film operate without them, would have to be described anew in the light of schema theories.

Perhaps we have to understand the concept of the sign in a new way. As a stage of hardening, where the schemata reach the level that they – as in a chemical reaction – are virtually *precipitated* as constituted signs. Only at a certain level of hardening one can speak of ‘signs’ at all.

A second graphic attempts to take seriously the metaphor of precipitation (the solidification of something originally liquid, processual):[45]

	real-world perception	image media	language, writing	formal languages, mathematics
(continuum of the perceived)	gestalt recognition →	schematization →	pre-segmented units →	→
	↓			
	schemata	↓		
		schemata, stereotypes	↓	
			constituted signs, characters	↓
				formal signs, formal rules

Finally, a third one makes the crux of the matter clear:[46]

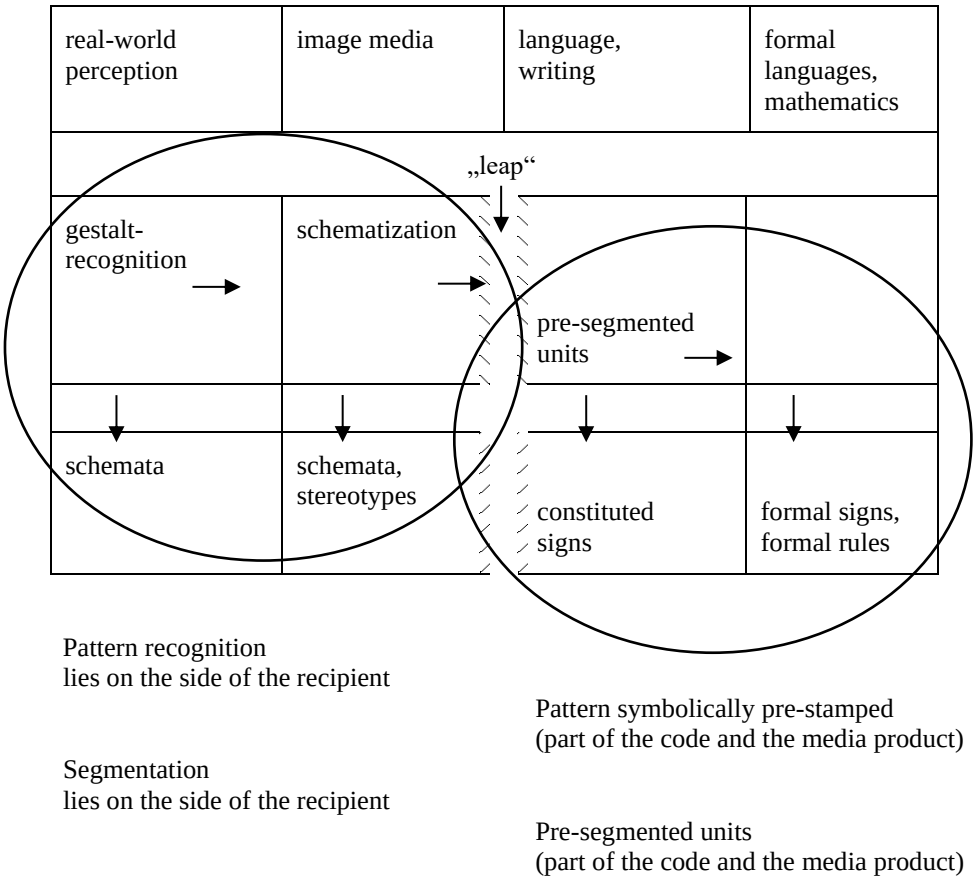


[45] Ibid, p. 271.

[46] Ibid, p. 272.

But what is it that happens concretely at the point of the leap? What – ultimately – separates the left 'soft' from the right 'hard' side?

My answer would be, strictly in the corridor of schema theory, that on the left the pattern recognition falls within the purview of the recipients; only they are able to identify schemata and stereotypes in what is perceived. What is contained in the perceived is 'similarity' and repetition itself, but since the concrete acts of repetition are *scattered* and, moreover, similarity is a matter of negotiation, it remains in their hands – depending on the set of mental schemata – whether the repetition is recognized and reaches consciousness, whether the event enters subliminally into the schema formation, or whether it remains without any effect on the structure – Rumelhart had spoken of 'accretion' –, persists as a single event and probably burns up. Only in the act of recognition is the schema released, 'segmented,' from the continuum of the perceived.[47]



On the right side, things are different. Here, the patterns are symbolically pre-stamped, part of the code, and are supplied ready-made with the product. Also the 'segmentation,' the separation from the context, is already carried out by the code; as can be easily seen from the empty spaces that separate the letters and words.

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l e t t e r s
^ ^ ^ ^ ^ ^ ^
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The point is not the sign itself, but the mechanism by which it acquires its identity and its boundaries. Both, identity and boundaries, are the result of schema formation and repetition; a schema formation, however, that is far advanced and has been hardened, conventionalized, and

[47] Ibid.

institutionalized into a code. The difficulty here is that once the code is constituted, its 'soft' schema past cannot be seen. Only theory can make it probable, with the plausibility of the model, and assert it on more or less valid grounds. Empiricists like Matthes, however, will be hardly convinced by this.

13. Conclusion

If it is plausible to trace the sign back to schema theory, this means in essence a de-hierarchization of the media. 'Harder' schemata are in no way better or worse than avoiding them. Rather, one has to assume a strict complementarity, and that one medium does what the other media cannot do.

It is striking that photography and film, which rely on radical concretion and operate without constituted signs, are historically a *reaction* to 5,000 years of writing and 350 years of printing. Photography and film as media emerge complementary to language, exactly at the point where Nietzsche, Hofmannsthal, and Adorno apply the leverage of their radical language critique, where they see the systematic defect of constituted signs. As a stably conventionalized system, language is bound to society. To speak (and to be truthful in language), says Nietzsche, "means to employ the usual metaphors;"[48]

> "[o]nly by forgetting this primitive world of metaphor can one live with any repose, security, and consistency: only by means of the petrification and coagulation of a mass of images which originally streamed from the primal faculty of human imagination like a fiery liquid, […] only by forgetting that he himself is an artistically creative subject, does man live with any repose, security, and consistency."[49]

If signs are indeed created by 'petrification and coagulation' of something originally fluid, schema theory accomplishes exactly what our everyday consciousness finds so difficult: going back behind the forms once constituted and showing how this 'coagulation' comes about.

[48] Nietzsche, On Truth and Lies, op. cit. (the online edition does not provide pagination).

[49] Ibid.

10 Similarity, Identity, and Difference

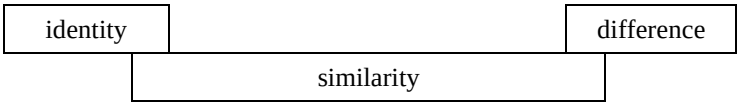
What Does it Mean to Identify Oneself or Something?

1. Intro

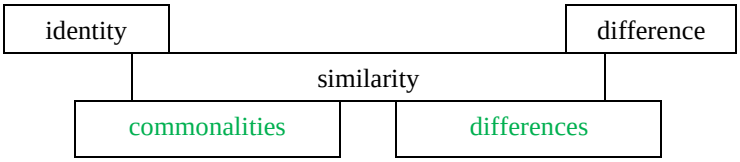
As announced in the introduction, I now come to the core of my argument: The present tenth chapter provides what I consider the real innovation of my book; I will examine what it means that similarity has its place between identity and difference; and I will show that here – in the interplay between identity and difference, similarity and schema formation – is hidden one of the basal mechanisms that determine media.

This, I admit, is a far-reaching thesis. All the more reason, I would argue, to give the unfolding of the individual steps some time. While the present chapter seeks to clarify identity and identification, the following one, the eleventh, will focus on difference. In my concluding chapter, I will sum up the yield specifically for the field of semiotics.

Let us start again with the basic scheme I have outlined above. If two things or events are similar to each other, they are neither identical nor completely different; between the poles of identity and difference spans the wide area of similarity.



Things that are similar may differ in many respects, but some peculiarities they must have in common, they must be comparable.[1]



The same is true for repetition. It, too, connects identity and difference.

[1] I have discussed this aspect in Chapter 7: Similarity - in what way.

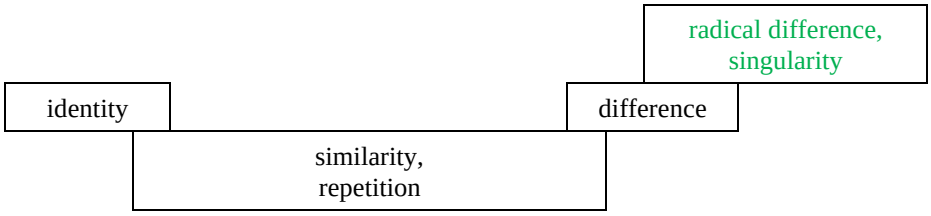
2. Identity?

The concepts of identity and difference are initially used here colloquially; but if one looks more closely, the pole of identity in particular proves to be treacherous; and it turns out that there are completely different types of identity, which in turn has some consequences for the question of similarity.

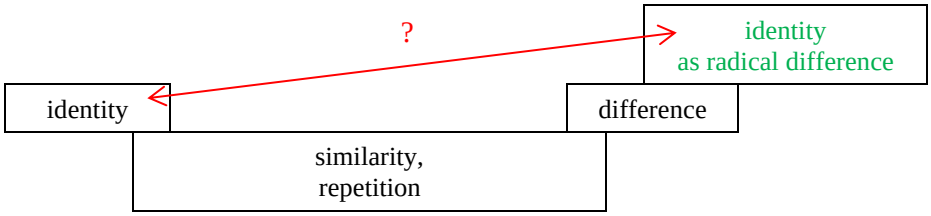
Our idea of similarity is tied to the practice of comparison. Two things are confronted with each other and turn out to be more or less similar.[2] So if it is always about at least two things: Can they ever be 'identical'? In the strict sense, certainly not.

One could almost say that exactly the opposite is the case; because a first type of 'identity' would bring it close to individuality. Persons/individuals in particular are identical with themselves and identifiable as individuals insofar as and to the extent that they are radically different from each other. And the same is true of other things; if a thing or event is unique – one might think of a work of art or a great catastrophe – it would be called incommensurable. In this case, neither something 'similar' nor a repetition are conceivable.[3]

In this way, identity would be radical difference or singularity. Both, however, would precisely not fall on the left side of my sketch, but – somewhat astonishingly – on the right.



Or rather:



So how can this be possible? Obviously, there must exist another type besides identity as radical difference, and 'identity' on the left must mean something else. All considerations that are to follow serve to come closer to this question.

3. Intermediate Consideration

If one compares two things with each other and finds commonalities/similarities, these things will never coincide completely, never be completely 'identical.' Accordingly, 'identity' can only be the most extreme point of the spectrum in which similarity varies. So one would first of all have to assume the existence of a pragmatically reduced identity.

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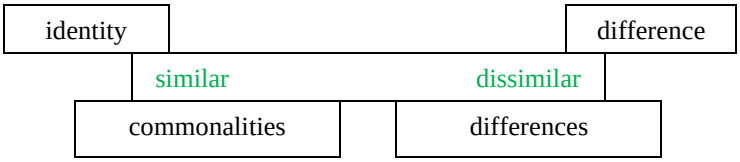
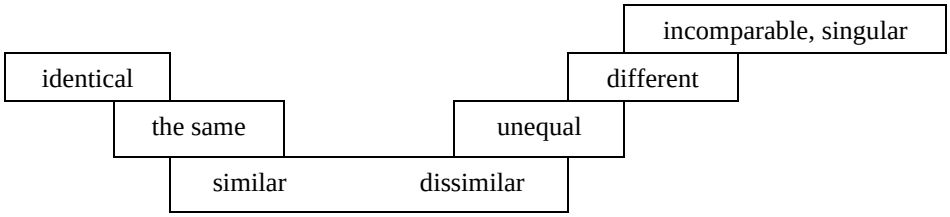
[2] ...or it is the other way around: In a mass of heterogeneous material, two things stand out as similar.

[3] Whether or not there are actually completely incommensurable things is another matter.

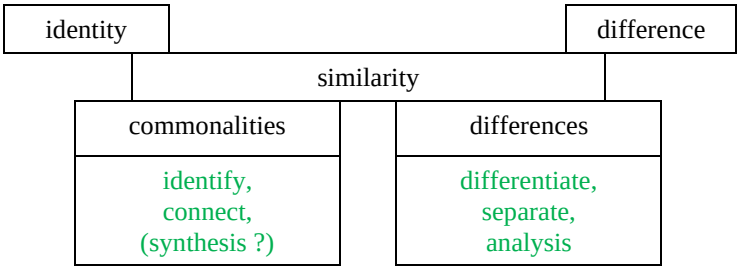
Second, one will have to realize that similarity itself is by no means a neutral concept that would be positioned midway between identity and difference; rather, the term similarity has a clear bias insofar as it increases on the left while it recedes on the right:



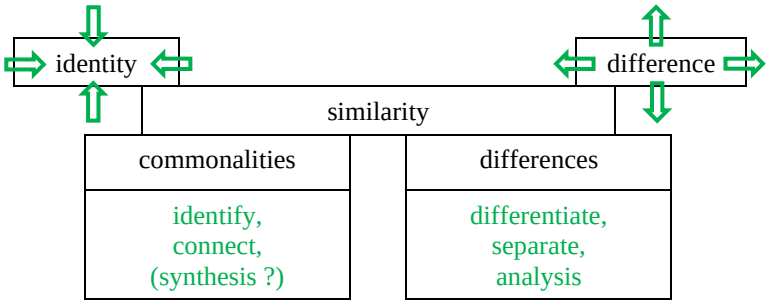
In addition, and this would be a third point, one should realize that everyday language has a much finer gradation:



Finally, it may be worthwhile to take a look at the concrete activity of comparison and to use the corresponding verbs instead of nouns:



Now it becomes clear that at the pole of difference, centrifugal forces, forces of repulsion, are at work, at the pole of identity, however, centripetal forces:



And this actually changes the picture. For possibly more important than identity is the action of *identifying*. One can identify oneself by showing an identity card, one can identify oneself with a group or with an actor, one can identify one thing with another, and finally one can identify a thing *as something*, and this means recognizing it.[4]

[4] Cf. Ritter, Joachim (ed.): Historisches Wörterbuch der Philosophie. Vol. 4, entry: Identifikation [Identification]. Basel: WBG 1976, p. 140.

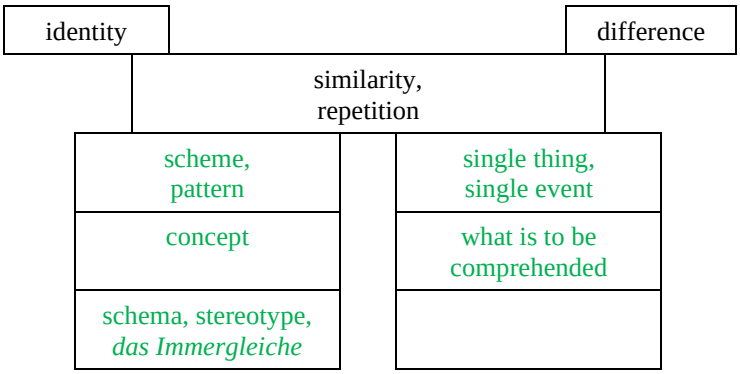
All of this suggests that the discussion on similarity is possibly about much more than the comparison of two things, that the question pursued here takes on a completely new significance. For what does it mean when – mediated by similarity – two of the most basic and possibly most far-reaching cultural techniques, separation and connection, analysis and synthesis, confront each other? At this point, my reflection relates to a whole field of traditional questions of cultural studies.

4. Identifying Something, Identifying Oneself

Thus, to choose a particularly prominent witness, Adorno discusses the problem of identification by using the example of conceptual thinking.[5] He wants to distinguish – quite basally – the concepts from the things that are to be comprehended. While things are always concrete in a radical way, it is also for Adorno the main characteristic of concepts that they subsume, that is, that they always encompass a number of intrinsically heterogeneous things. Concepts therefore have a necessarily abstract character. This abstractness has two faces: On the one hand, it is inevitable because without it there would be no conceptual thinking; on the other hand, the abstractness distances the concepts from the concrete individual things. The abstraction of concepts thus *wrongs* that what is to be comprehended – this is the really unusual thought in Adorno's 'Negative Dialectics.'

In my sketch, the concrete things would fall on the side of difference,[6] the concepts on the side of identity. And at the same time, the concept of identity has also changed: If one follows Adorno, the hallmark of identificatory thinking would be that one identifies a thing or an event *with something else* or *as something.* Comparing two things would be a special case. The more general case would be that on the side of identity there is an already established *concept* or *pattern* against which the respective individual concrete is measured.

And the same would apply to all types of patterns and schemata; for example, to those that govern the *image media,* as Horkheimer/Adorno make clear in the Dialectic of Enlightenment[7] when they criticize the strict schematism of the culture industry and accuse it of ultimately producing *das Immergleiche* – unending sameness – in repetition.

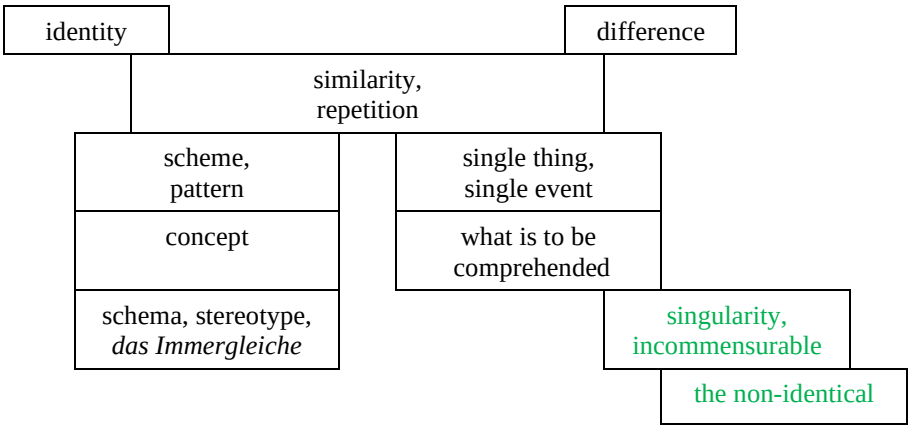


[5] Adorno, Theodor W.: Negative Dialectics. New York: Continuum 1973, pp. 11, 135ff. [1966].

[6] ...at least in case one considers the single things as single in a radical way, as (initially) singular...

[7] Horkheimer, Max; Adorno, Theodor W.: Dialectic of Enlightenment. Philosophical Fragments. Stanford: UP 2002 [1947].

And finally, Adorno coins – as a counter concept to identifying thinking – the concept of the 'non-identical,' which is supposed to capture that which eludes schematization.[8] For Adorno, the exponent of the non-identical is art,[9] and above all twelve-tone music, which taboos repetition and seeks to push back schema formation in a systematic way.

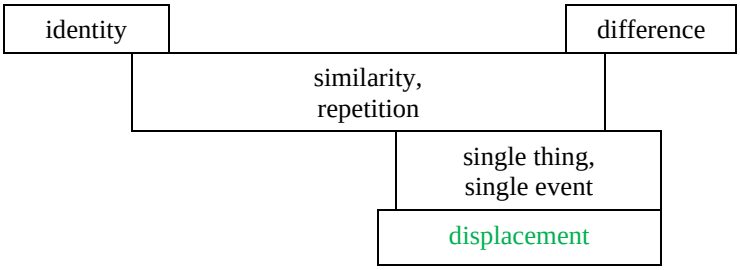


The singular/incommensurable and the non-identical resemble what above has been called radical difference.

5. Derrida, Butler

Twenty years later, Derrida argued in a similar vein.[10] Derrida focuses not on similarity but entirely on repetition, and he emphasizes more strongly than Adorno that it is *heterogeneous* individual events that repetition chains together. In Derrida, repetition results in *differance* (and precisely not in unending sameness). Derrida is critical in the extreme of any notion of identity. (He largely excludes the obvious objection that repetition necessarily contains a moment of similarity and thus of identity).

And another twenty years later, Butler takes up Derrida's argument.[11] She makes the political point that repetition, by causing *displacement*, performatively produces the new. And this argument, too, would fall entirely on the side of difference.



What is new about Derrida's and Butler's concepts is that time now plays a greater role; on the one hand, insofar as repetition, unlike similarity, is always processual, always bound to time; and on the other hand, insofar as both Derrida and Butler focus on displacement and change.

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[8] Adorno, Negative Dialectics, op. cit.

[9] Cf. Adorno, Theodor W.: Aesthetic Theory. London: Routledge 1984 [1970].

[10] Derrida, Jacques: Of Grammatology. Baltimore: Johns Hopkins Univ. Press 1995 [1967].

[11] Butler, Judith: Gender Trouble: Feminism and the Subversion of Identity. New York: Routledge 1990; pp. 16-34, 121ff., 140ff.

And equally new is that it is now definitively no longer a matter of comparing only two things or events. Repetition, rather, can effortlessly chain together a very large number of individual occurences.

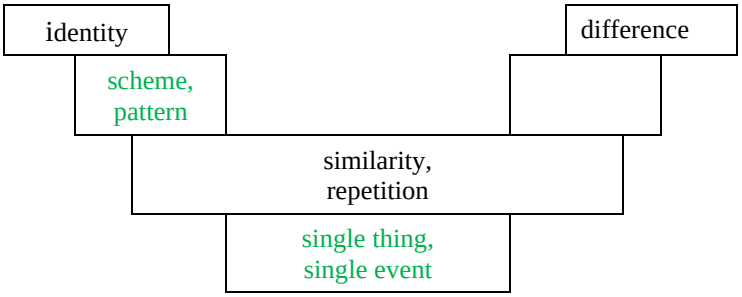
In Derrida as in Butler, however, this would be my objection, the concept of pattern is missing. Patterns, schemata, and stereotypes have a fundamentally different status from single events. If it was said that it is patterns that individual events confront and by which similarity (identity and/or difference) is measured, then it follows that these patterns have a disproportionately greater weight of their own, a greater stability and persistence.

So how can all this be thought together? Are identity and difference, similarity, comparison, single event, and pattern connected in a regular mechanism? I think that – again drawing on schema theory – one can indeed show such a mechanism, and that it offers a key to an extended understanding of similarity.

6. Intermediate Consideration: Is the Single Thing or Single Event Only Different?

Before this is possible, however, I think it makes sense to modify the idea I have just developed in one point: In my sketch, schema and single event opposed each other, the schema on the side of 'identity,' the single event on the side of difference. The single event, then, seemed to fall entirely on the side of difference. Derrida and Butler would indeed see it this way, because in the end, they consider the single event singular and incommensurable;[12] and differently/similarly Adorno, because he sees in the respective individual the counterpart of schematization.

This choice, however, seems to me by no means obligatory. Therefore, I propose to detach the single thing or single event from difference and to position it – even if provisionally – in the neutral middle between identity and difference:



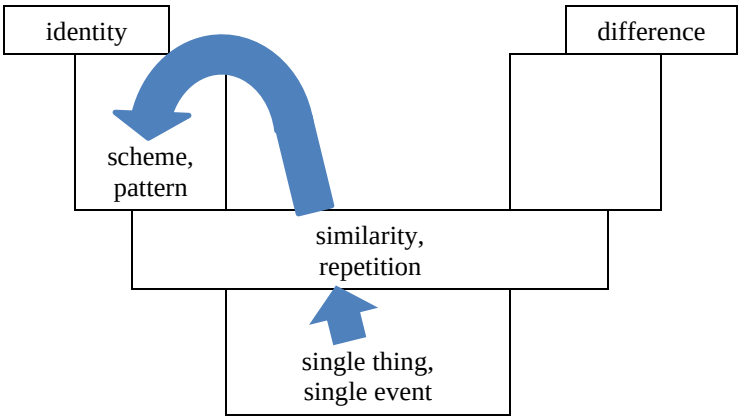
This has the advantage that it initially remains open in which way single event and schema interact and which role 'identity' and difference play in this interaction.[13]

[12] This view was also held by other poststructuralist authors; an example is Deleuze, for whom the concept of 'singularity' is of great importance and who – similar to Derrida – wants to exclude any moment of identity even from the concept of repetition (cf. Deleuze, Gilles: Difference and Repetition. London/New York: Continuum 2001 [1968]).

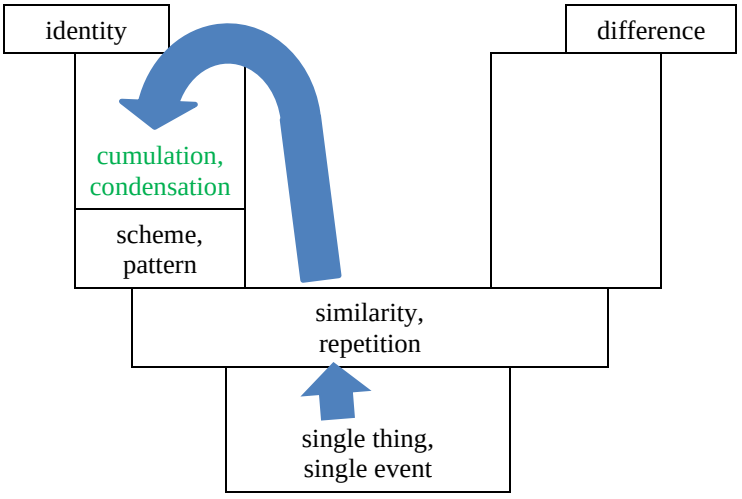
[13] And there is a second argument in favor of this: One of the results above has been that the single thing or event is also not simply given, but that it detaches itself from the context as a single one only in the play between identity and difference (cf. chap. 5). So, if there is indeed a 'mechanism' that relates single event and schema to each other, then one will have to take this into account as well.

7. Schema Formation

Now, I think, all that is needed is ready. As far as the mechanism is concerned, I would like to start again with the question of how the formation of patterns or schemata comes about in the first place. I have described it in my consideration of schema formation: All theories dealing with pattern emergence would here refer to repetition.[14] Accordingly, the answer can only be that it is nothing else than the (repeated) detection of similarity which – cumulatively – leads to the formation of patterns.



Elsewhere I have made the suggestion to bring into play the concept of condensation in correspondence to the concept of displacement.[15] If it is repetition that produces schemata and patterns, then it has a quantitative aspect; for surely a great many individual events are necessary for this to happen. The concept of condensation retains this quantitative relationship; patterns and schemata are the product of condensation. Each case of similarity strengthens the schema and writes back into the schema.



Finally, this provides the opportunity to remodel the whole context as a temporal process. And since it is about repetition, the idea that it is a *cycle* imposes itself – again:

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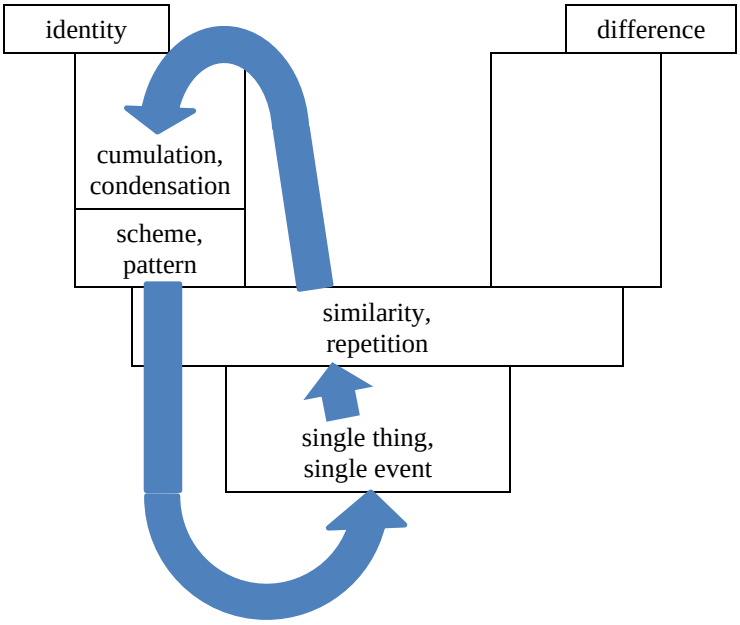
[14] This applies to schema theory as well as to cognition theory, theories of habitus, social memory, theories of perception such as Gestalt theory, and, finally, theories of individual socialization.

[15] Winkler, Hartmut: Docuverse. Zur Medientheorie der Computer. Munich: Boer 1997, pp. 13-184 (https://homepages.uni-paderborn.de/winkler/Winkler--Docuverse.pdf); W., H.: Diskursökonomie. Versuch über die innere Ökonomie der Medien. Frankfurt am Main: Suhrkamp 2004, pp. 110-130 (https://homepages.uni-paderborn.de/winkler/Winkler--Diskurs%C3%B6konomie.pdf).



Thus, not only is the schema dependent on repetition (dependent on what resembles each other and repeats itself in the individual things and events), but the schema also exposes itself to the shift that the individual event, insofar as it is always also different, causes. Schemata are stable *and* changeable, and themselves subject to shifts. (In schema theory, as I have mentioned in a previous chapter, this adaptation is called 'tuning').

What my sketch captures only in the concept of condensation but what it cannot really show is the difference in weight: the fact that something like inertia (and thus resistance to adaptation) develops on the scheme side.

8. Intermediate Consideration: Aren't the Schemes Always Already There?

And yet another objection suggests itself at this point: For what does it mean to ask how it comes to the formation of patterns in the first place? Is it not part of the concept of schema that it is prior? *Aren't schemata always already established?* When we learn to speak, do we not adopt the vocabulary and rules of the language we inherit? And is this not ultimately true of all schemata, patterns, and rules? Aren't we socialized into stably established codes of behavior that existed long before us and that will effortlessly outlast our lifetimes?

All this is true. And yet we must insist that patterns and schemata do not fall from the sky. As fixed and predefined as they appear, it is also clear that they have developed in the course of the historical process. And within the historical process – through repetition.

If the schemata and patterns appear 'fixed,' it is because they have become *solidified* in numerous cycles of repetition. This is especially clear in the case of stereotypes; no one wants stereotypes to emerge, no one invented them, planned them, or consciously brought them into the world; only in a long chain of 'Westerns' does the fact emerge that it is a genre at all, i.e., an organized set of stereotypes.

First of all, therefore, repetition affects products; that is, what can be observed in texts, images, or films. Exactly the same, however, applies to the recipients: They go through an individual media socialization, and it takes a whole chain of individual media experiences for them to identify genres or stereotypes as such. On both levels – discourse and media socialization –

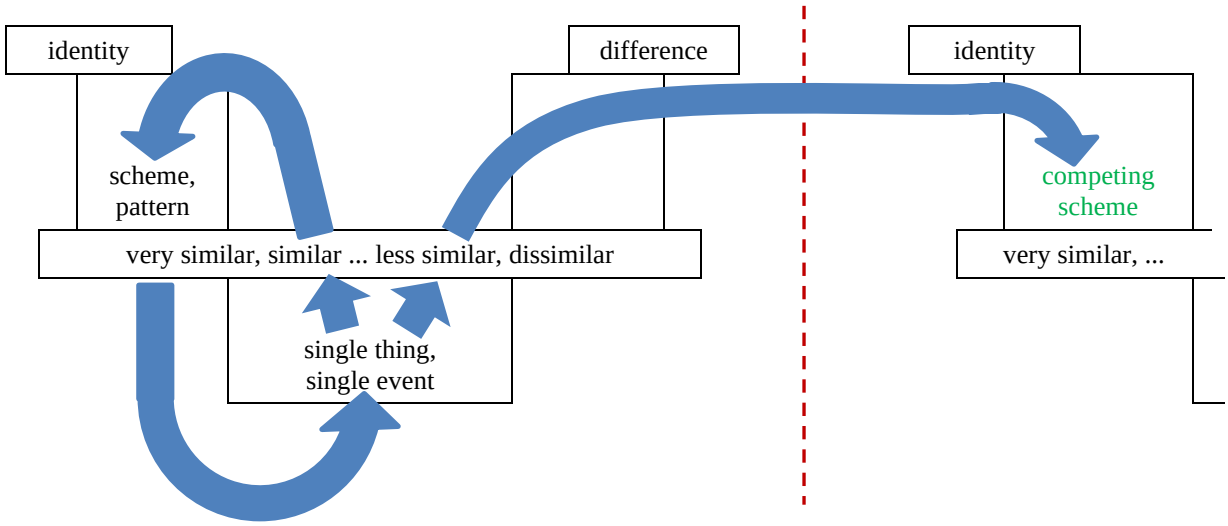
individual events turn into repetition, and repetition turns into structure formation. This is exactly what metaphors like ‘solidification,’ ‘condensation,’ or ‘hardening’ want to show.[16]

So both are true: The schemata are antecedent *and* the result of repetition. They appear as antecedent if one considers only a single event, a single repetition cycle. If, on the other hand, we look at the chain of repetitions taken as a whole, it becomes clear that the repetition itself produces the schema.[17]

9. Competing Patterns, Formation of New Patterns, and Schemata

So let us return to the outlined path and again take up the problem of similarity, identity, and difference; for one thought is still missing which can complement and round off what has been said – in my eyes somewhat perplexingly. Namely, what happens, one will have to ask, if difference prevails instead of similarity (or within similarity not the moment of identity, but that of difference)? When the single thing or event is similar but not sufficiently similar to fit the schema in question?

In this case, I think the fact comes into play that there is not just one pattern, but that each pattern competes with a large number of other patterns.



In this respect, similarity is a sorting machine that makes decisions according to the measure of similarity: If the similarity is sufficient, the single event enters the schema in question via condensation; if there is a competing schema to which the single event is more similar, the single event enters the cycle of the competing schema.[18]

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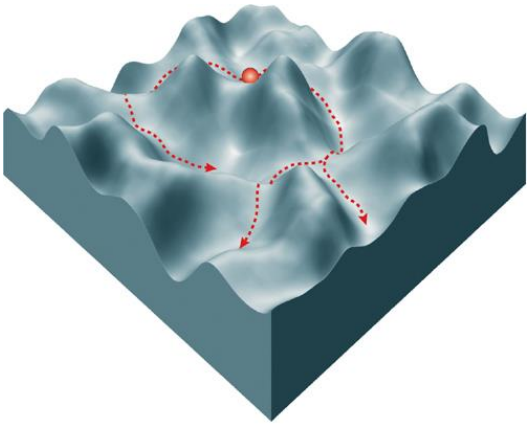
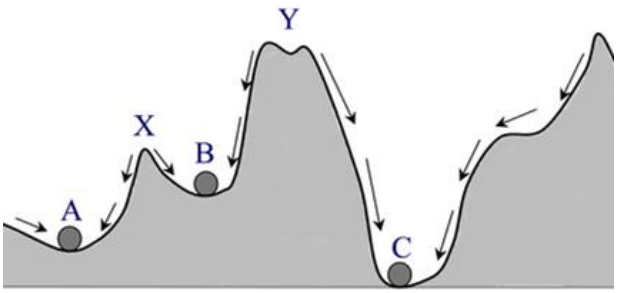
[16] The notion that fluid practices turn into structures has a somewhat difficult time gaining traction in German media theory; one reason for this might be that one cannot assess the incalculably large area of practices, and cannot observe the transformation, the emergence of the patterns and schemata themselves.

[17] Goldstone, who examines the connection between similarity and categorization in 1994, passes the core of the matter with his head held high because he obviously cannot imagine a circular connection in any way. When he says: “Similarity cannot explain categorization if it is dependent on categorization for definition”, one can only reply: Sorry, exactly that is the case, exactly this circularity has to be comprehended. (Goldstone, Robert L.: The role of similarity in categorization: Providing a groundwork. In: Cognition, 52 (1994), pp. 125-157, here p. 132).

[18] Ramscar/Port refer to a text of Anderson’s that argues in a completely parallel way: “[T]he RATIONAL model of categorization (Anderson 1991) [...] creates hybrid representations in which a new item may either be used to update an existing cluster of similar examples [...] or, if unique enough, it may initiate a new cluster. Which choice is made is a function of the probability that the new item belongs to an existing cluster. When this probability is

This can be visualized via the image of a hilly landscape through which balls are rolling:[19]





Here, gravity ensures that the balls gather almost automatically in the valleys (where the balls stand for the individual cases and the valleys for the schemata, patterns, or categories). The peaks operate as points of 'repulsion' (centrifugal forces act here), the valleys as attractors (they act centripetally).

The treacherous peculiarity in the case of the schemata would be that the mountains and valleys are not predetermined but that they also change; although very slowly, depending on the course of the rolling balls.

10. Conclusions

All these are no more than ideas or models, and they are – I readily admit – themselves somewhat model-like/schematic/abstract. So what, one will have to ask, is the yield?

I argue that the outlined 'machine' – let me get away with the metaphor – is of absolutely fundamental importance for understanding cultural and semiotic processes. One of the crucial puzzles seems to me to be in what way schemata, patterns, concepts, or categories emerge, in interrelation with the concrete discourses – textual universes, visual worlds… – that are the main object of cultural studies. The discourses themselves are material; they may be complex and ramified, making observation notoriously difficult, but at least in principle they are – de Saussure says: in praesentia – exposed. Exactly this is not true for schemata, patterns, concepts, and categories.

A part of them, the concepts, are visible as words on the surface of the discourses. But already those who ask for their 'meaning' find themselves referred to such obscure things as the competence and the memory capacity of the language users. The situation is even more precarious in the case of image schemata or stereotypes, which have no undoubted material counterpart in the manifest images. In this respect, whether an image fulfills or even materially contains a certain stereotype must always remain debatable.

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below a given threshold, a new cluster is created. If above the threshold, the existing cluster that it is most similar is updated to reflect the new exemplar." (Ramscar, Michael; Port, Robert: Categorization (without categories). In: Dabrowska, E.; Divjak, D. (ed.): Handbook of Cognitive Linguistics. Berlin/Boston: De Gruyter Mouton 2015, p. 85 (emph. H. W.)). However, the aspect of condensation is also missing here.

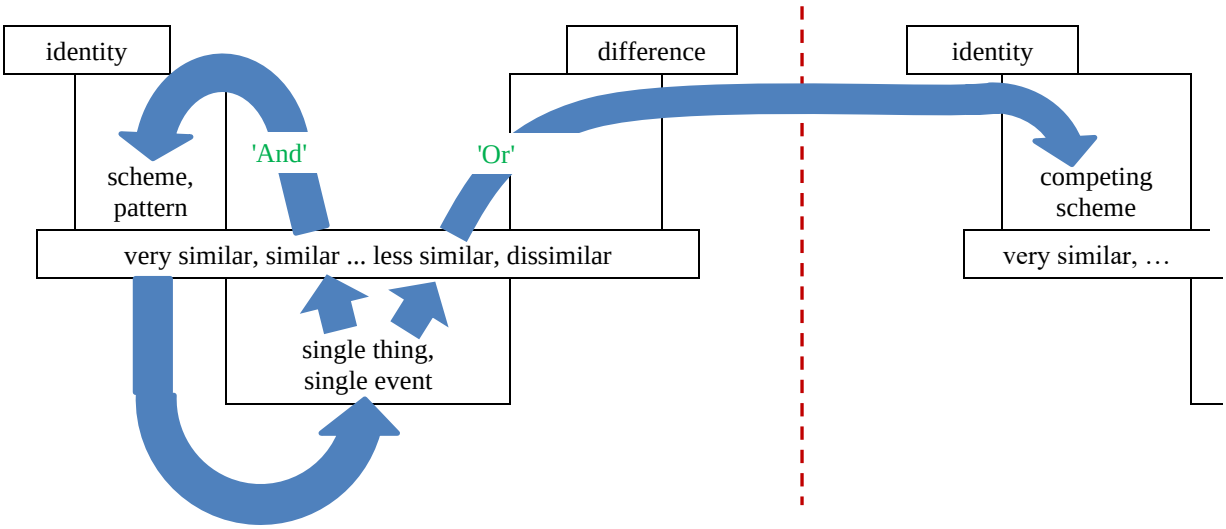
[19] Fig. 3d: © Nature Reviews Molecular Cell Biology, reprod. authorized; https://www.researchgate.net/figure/Cellular-reprogramming-as-navigation-through-a-complex-attractor-landscapeIn-a-complex_fig1_26797458, 12. 2. 19; Fig. 2d: © Ghaderi, Ali: A mathematical theory for mixing of particulate materials, PhD thesis, University of Surrey, 2006. https://www.researchgate.net/figure/5-A-Heterogeneity-landscape-the-arrows-denote-the-directions-in-which-the-mixture_fig9_262876747, 12. 2. 19; reprod. authorized.

How does one deal with such a situation? No one would deny that there are schemata and patterns. And likewise that patterns (schemata and stereotypes, regularities, genre laws...) have great power insofar as they structure the discourses beneath their surfaces. But how – to ask the question again – do schemata and regularities emerge?

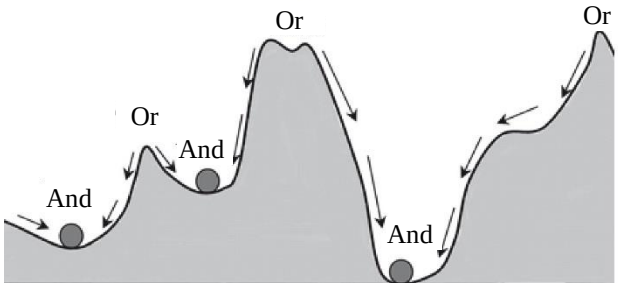
The answer lies in similarity and in the machine outlined above. At the pole of 'identity,' there is accumulation; the centripetal force of similarity ensures that individual things and individual events are layered and condensed. The price, that was Adorno's point, is generalization. With each run, with each new individual event, each new case of similarity, each individual repetition, the schema moves further away from the individual events; it becomes more abstract. And at the same time, it gains independence and stability.

And conversely, each individual case, insofar as it is also different, questions the schema and – as a tendency – wears it away. That stabilized schemata exist at all, that they can hold their own against the gnawing entropy of difference, shows that both sides do not simply balance each other out. This, I think, is because as similarity diminishes, there is always another schema available that is more 'similar.' The leap to this alternative relieves the original schema and diminishes the force of the difference it would erode.

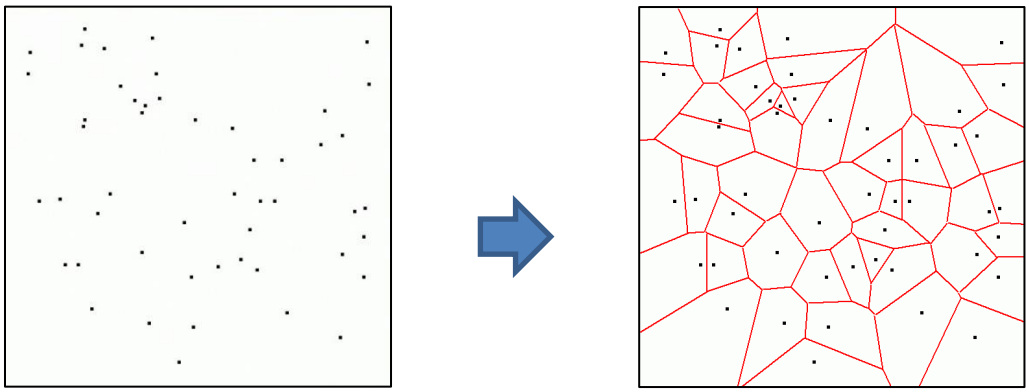
That is why I called the whole thing a sorting machine. In a last, somewhat bold step, I would therefore like to assign the 'And' and the 'Or' to the two possibilities. The 'And' on the side of the accumulation, the 'Or' on the side of the jump to the alternative.



I am referring here to the colloquial, not the logical And and Or. The 'Or' provides the distinction, boundary, or repulsion, which, as has been said above, acts as a second force in the field.



Bhatti/Kimmich follow a similar idea when they refer to prototype theory[20] and to the so-called Voronoi diagrams, a type of algorithm used for pattern recognition:[21]



Voronoi algorithms start from a given set of points and calculate what the boundaries of the surfaces surrounding them look like.[22]

All this suggests that distinction, delineation, and repulsion are as important for the constitution of the schemata as the centripetal forces of the 'And' that provide accumulation and condensation. Apparently, the schemata must *move apart*, must differ, so that condensation can take place within them. Apparently, then, *condensation and distinction condition each other*; they are to be thought of as equally strong and as symmetrical, systematically intertwined in a common mechanism.[23]

And now, at the very end, it becomes possible to refer also back to the first type of identity mentioned above, identity as radical difference. Identity as radical difference singles out the moment of repulsion from the described interaction in order to favor it in a unilateral way. This is possible (and plausible), as already stated, in the case of the identity of individuals. Unlike in the case of collective products (patterns, schemata, concepts, or group identities), difference and distinction are conspicuously dominant here; and what delimits an individual does not seem to emerge in the process of identity formation, but – in the case of human individuals – is always already given in the closedness of the skin bag. (To what extent the 'And' of condensation also plays a role in the case of individual identity formation would have to be proven by recourse to, e.g., socialization theories).

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[20] Bhatti, Anil; Kimmich, Dorothee: Einleitung. In: Bh./K. (Eds.): Ähnlichkeit. Ein kulturtheoretisches Paradigma. Konstanz: UP 2015, pp. 11ff.

[21] Ibid, p. 12; Fig.: Illustration of Voronoi algorithms; I have taken the right part of the figure from: http://www.algorithmic-solutions.info/leda_guide/images/voronoi_diagram.gif, © Algorithmic Solutions; reprod. authorized.

[22] The boundary is chosen so that each point within a surface is closer to its 'center' than to any other center. The result is a kind of tile pattern called Voronoi tessellation. (Cf.: https://de.wikipedia.org/wiki/Voronoi-Diagramm); moreover, it is important to know that the graphical representation is only an illustration; the algorithm itself is not bound to the two dimensions of a sheet of paper.
My objection would be that in the case of identity and schema formation, which I am concerned with, the points/centers are not predetermined at all. The task would rather be to describe the process in such a way that centers ('and') and boundaries ('or') take shape simultaneously and in interaction. Particularly interesting in this context are algorithms which allow a so-called 'mean shift clustering';
(see, for example: https://www.youtube.com/watch?v=Evc53OaDTFc).

[23] Within the framework of other basic ideas and concepts, other authors have also recognized this connection: "Rosch et al. (1976) argue that *the distribution of features among concepts results in natural clusters that maximize within-category similarity and minimize between-category similarity*." (Ramscar/Port: Categorization, a. a. O., p. 81 (emph. H. W.)).

What emerges from all of this, then, is the sketch of a general theory which, starting from schema formation, will – I am convinced – shed a genuinely new light on the established questions of semiotics. *The main result of my consideration is that behind or below semiotic processes, a dialectic of separating and connecting is in progress.* And it seems to be this dialectic that sustains and gives rise to schemata and signs. My concluding chapter, as I have said, will sum up the results specifically in terms of semiotics.

I think it is somewhat astonishing that between identity and difference, separating and connecting, And and Or, single thing and repetition, something like a dynamic connection can effectively be shown. And I think it is even more astonishing that *similarity* is at the center of all this. Of all things, this ‘soft’ category that philosophers consider unfit for theory.

11 Separating, Differentiating, Analyzing

The Second Pole in the Field of Similarity is Difference

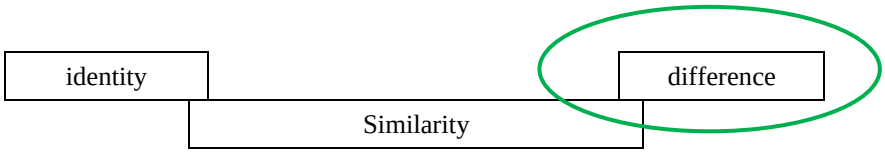
Somewhat ironically one would like to cite Heidegger:
"The close relation of identity and difference will be shown in this publication to be that which gives us thought."[1]

1. Intro

Let's set out once more to explore the territory of similarity from a different angle. The previous chapter focused on *identity*. And specifically a pragmatically reduced concept of identity: My question was how we identify things, e.g., how we recognize a donkey as a donkey.

The result was that patterns or schemata are needed for this; asked where these come from, the answer was that schemata emerge in a kind of condensation: multiple repeated events pile up; schema formation extracts what is common (similar, 'identical') about them and establishes it as a schema or pattern.

And towards the end of my reflection, the question of *difference* arose, which is the counterpart of identity in the field of similarity.



In certain cases, I wrote, the pattern recognition runs into problems because the similarity becomes doubtful and more and more differences become apparent. This led to the hypothesis that perception[2] – if I choose this example once more – in these cases deflects to other, competing patterns: The perceived is identified with an alternative pattern which seems to fit better, which is thus *more similar* to the current perception. I now want to take up this question of difference and examine it in a slightly more systematic way.

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[1] Heidegger, Martin: Identity and Difference. New York/Evanston/London: Harper & Row 1969, p. 21 [1957].

[2] Perception is the most vivid example of schema formation because it is here that one can most readily imagine the mechanisms. However, as the previous chapters have certainly made clear, schema formation is by no means a matter of perception alone.

2. If the Difference Prevails

My first suggestion was to distinguish between ‘And’ and ‘Or’: The cumulative formation of schemata follows a logic of ‘And’; the jump to a competing schema follows a logic of ‘Or.’

This, however, presupposes that the competing patterns to which the perception jumps already exist. And here now the question arises, no longer how patterns in general, but how *competing* patterns come about. Stratification and accumulation, the repeated finding of similarity, I think, can only make plausible the emergence of individual patterns. Is there a mechanism that, on a par with the cumulative ‘And,’ also explains the ‘Or’?

The first step is certainly the ‘No,’ the decision that similarity is not sufficient to identify the current perception with a certain pattern. With this ‘No’ the original pattern is put at a distance. For alternative patterns to come into play, however, it takes more. What is needed is the power of a *distinction* that has this ‘No’ as a condition, but which then certainly follows its own rules. So let us first summarize a few points about the problem of differentiation.

3. Differentiating

“Differentiation (distinctio, διάκρισις, διορισμός)”, says German Wikipedia, referring back to Eisler’s Dictionary of Philosophical Terms,

> “is a basic activity of thinking. It exists in the ‘[...] active determination or clarification of differences, dissimilarities, othernesses.’ It is a prerequisite of classification and understanding. *The practice for differentiation is comparison.*”[3]

And Ritter adds:

> “Differentiating [...] occurs both at the level of perception on observable objects and at the level of thinking on intentional objects. [...] The Latin term ‘distinctio’ gains terminological significance, serving as a counter term to both ‘identitas’ [!] and ‘confusio.’”[4]

Differentiation is therefore bound to comparison; and in order to be able to differentiate at all, *differences* must catch the eye:

> “Difference does not indicate the dissimilarity [...] of a and b, but the viewpoint from which in another respect identical things are different from each other.”[5]

This leads back to the question of *features,* which I discussed in the seventh chapter; for as soon as perception compares, it cannot stay with the objects as a whole but must break them down into aspects or features. Some of these features will be similar, the same, or ‘identical,’ others will vary and thus be responsible for the difference.

And more than that, one can push the difference to the point where the features that create the difference function disjunctively:

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[3] Wikipedia (Germ.): Unterscheidung. https://de.wikipedia.org/wiki/Unterscheidung, 13. 3. 20 (transl. and emphas. H. W.).

[4] Ritter, Joachim (ed.): Historisches Wörterbuch der Philosophie: Unterscheiden. Vol. 11, Darmstadt: WBG 2001, p. 308 (transl. and emphas. H. W.).

[5] Ritter: Unterschied, op. cit., p. 310 (transl. H. W.).

> "The difference is the quality which divides two subclasses of objects by being attached to everything that falls under 'a' and denied to everything that falls under 'b.'"[6]

Here, the distinguishing feature acts binary, like a toggle switch. In any case, however, it is a matter of *contrast*. Differences make it possible to *take things apart.*

But at this point, have we not moved too far away from the question of similarity? Is not similarity, as Kimmich says, the realm of the 'vague,'[7] of the precisely not reliably distinguishable, not distinguished? Closer to the aforementioned 'confusio' than to neat distinctions? We shall see. And my suggestion is to stay a little longer with the problem of distinction for the time being.

4. Language as a Machine of Distinction

One medium that organizes itself – first and foremost – by way of contrasts is language. "It is [...] a fact", Lyons writes in his Semantics,

> "that binary opposition is one of the most important principles governing the structure of languages."[8] "[D]ictionaries will classify as antonyms pairs of lexemes [words] which […] are related in a variety of ways ('high'/'low', 'buy'/'sell', 'male'/'female', 'arrive'/'depart', 'left'/'right', 'front'/'back', etc.). What all these examples have in common […] is their dependence upon dichotomization."[9]

Structural semantics, in particular, has placed this aspect at the center of its conception of language. And Lyons adds:

> "We can leave to others to enquire whether the tendency to think in opposites, to categorize experience in terms of binary contrasts, is a universal human tendency which is but secondarily reflected in language or whether it is the pre-existence of a large number of opposed pairs of lexemes in our native language which causes us to dichotomize, or polarize, our judgements and experiences."[10]

Language, in this view, is an *analytical medium*; a medium that allows or suggests making distinctions. The structure of vocabulary retains a whole system of pre-articulated distinctions and, stably conventionalized, makes them available for further use.

5. Luhmann

Niklas Luhmann has also dealt with the problem of differentiation. And he insists that differentiating always means *drawing boundaries.* "In all of his more recent publications," Reese-Schäfer reports,

> "Luhmann starts from George Spencer Brown's operational logic, which begins with the instruction: 'Draw a distinction!' We cannot make a designation without making a

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[6] Ibd., p. 311 (transl. H. W.); Ritter refers to a historical definition from the Scholastic period.

[7] I have already cited this book several times: Kimmich, Dorothee: Ins Ungefähre. Ähnlichkeit und Moderne. Paderborn: Konstanz UP 2017.

[8] Lyons, John: Semantics. Vol. 1, Cambridge: UP 1977, p. 271.

[9] Ibid. (add. H. W.).

[10] Ibid.

> distinction. In order to observe anything at all, the system needs a boundary across which it can observe. One must therefore draw a boundary line."[11]

The point is that Luhmann includes the position of the observer. Whereas one would commonly assume that the person making the distinction stands outside (or above?) that decision, Luhmann separates inside and outside, locating the observer on this side of the drawn boundary. "It is a defining point of distinction that one cannot be on both sides at once."[12] "One can clarify this," Luhmann writes,

> "with the help of the concept of form on which George Spencer Brown bases his 'Laws of Form.' According to this, forms are no longer to be seen as (more or less beautiful) shapes, but as boundary lines, as markers of a difference, which forces one to clarify which side one designates, that is: on which side of the form one is located and where one has to start accordingly for further operations. The other side of the borderline (of the 'form') is given at the same time. Each side of the form is the other side of the other side. No side is something by itself."[13] "Observation can observe other things, but not its own distinction. This is its blind spot."[14]

This is, even if I will not really use it hereafter, an important consideration. And secondly, it is important that Luhmann emphasizes that distinctions always have an operative character, are always bound to time, are always practice.[15]

6. Analysis

Distinctions have – the keyword has already been mentioned in connection with language – to do with the different cultural techniques of *analysis.*

> "An analysis (from Greek ἀνάλυσις [...] 'dissolution') is a systematic investigation in which the object of study is broken down into its constituents (elements)."[16]

This definition assumes that it is always already certain what these constituents or elements actually are. Therefore, the verb is more interesting at first: To analyze things means to determine such constituents and elements in the first place and then to clarify how they relate to each other and to the original 'whole.' Seen in this way, analysis means to *take things apart*. This applies to the activity of the mind, insofar as one would first think of mental operations when thinking of 'analysis;' at the same time, however, it seems important to me that analysis also has a media-practical side.[17]

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[11] Reese-Schäfer, Walter: Luhmann zur Einführung. Hamburg: Junius 1992, p. 71 (transl. H. W.). In my consideration of the context, the drawing of boundaries has already appeared once. There, it was about the border that encloses the object and separates it from its surrounding space, as well as about the technique of drawing that particularly emphasizes this border as an 'outline' (cf. chap. 5, section 6).

[12] Reese-Schäfer, op. cit. (transl. H. W.).

[13] Luhmann, Niklas: Die Gesellschaft der Gesellschaft. Vol. 1. Frankfurt am Main: Suhrkamp 1997, p. 60 (transl. H. W.).

[14] Reese-Schäfer, op. cit. p. 71 (transl. H. W.).

[15] Ibid, pp. 71-75.

[16] Wikipedia (Germ.): Analyse, https://de.wikipedia.org/wiki/Analyse, 1. 3. 20 (transl. H. W.).

[17] ...and that is the main reason why I called it a cultural technique.

7. Diagrammatics

Thus, to choose one example, recent research on *diagrammatics* has shown that in many cases, one needs a *flat surface* to be able to take things apart.[18] In the case of diagrams, this is particularly pronounced; "diagrams are visual representations that show relations or ratios."[19]

Diagrams are a peculiar hybrid of image and writing;[20] they operate, say Bauer/Ernst, "at the interface of perception and imagination, of sensuality and reason."[21] But in order for diagrams to reveal relationships, they must first break down their object into its individual aspects:

> "This assumption may be based on the meaning of the Greek syllable 'dia.' It can be translated as 'apart,' 'through,' and 'between'; sometimes its meaning corresponds to the prefix 'zer-,' as in the German verb 'zerlegen.' Diagrams break down a context into its parts, thereby exposing the structure of that context to the observer."[22]

And this directs the attention to the media-technological means by which this breaking apart takes place. Diagrams make use of two-dimensional surfaces;[23] and even more clearly than writing, which lines up its characters in rows and – at least in principle strictly linear – uses only one spatial axis.

In diagrams, more often than in pictures, for example, individual elements or objects are juxtaposed on the white of the background; an aspect that Krämer, Mersch, or Dirmoser understand as 'interspatiality':[24]

> "Diagrammatic structures make use of 'interspatialities,' as spatiality in general denotes their basic principle."[25]

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[18] Krämer, Sybille: Die Schrift als Hybrid aus Sprache und Bild. Thesen über die Schriftbildlichkeit unter Berücksichtigung von Diagrammatik und Kartographie. In: Hoffmann, Thorsten; Rippl, Gabriele (eds.): Bilder. Ein (neues) Leitmedium? Göttingen: Wallstein 2006, pp. 79-92.
- Krämer, Sybille: Operative Bildlichkeit. Von der 'Grammatologie' zu einer 'Diagrammatologie'? Reflexionen über erkennendes ‚Sehen.' In: Hessler, Martina; Mersch, Dieter (eds.): Logik des Bildlichen. Zur Kritik der ikonischen Vernunft. Bielefeld: Transcript 2009, pp. 94-121.
- Krämer, Sybille: Notationen, Schemata und Diagramme. Über ‚Räumlichkeit' als Darstellungsprinzip. Sechs kommentierte Thesen. In: Brandstetter, Gabriele; Hoffmann, Frank; Maar, Kristen (eds.): Notationen und choreographisches Denken. Freiburg/Berlin/Vienna: Rombach 2010, pp. 29-45.
- Krämer, Sybille; Cancik-Kirschbaum, Eva; Totzke, Rainer (eds.): Schriftbildlichkeit: Wahrnehmbarkeit, Materialität und Operativität von Notationen. Berlin: Akademie 2012.

[19] Bauer, Matthias; Ernst, Christoph: Diagrammatik. Einführung in ein kultur- und medienwissenschaftliches Forschungsfeld. Bielefeld: Transcript 2010, p. 9 (transl. H. W.).

[20] Ibid, p. 28.

[21] Ibid, p. 10.

[22] Ibid. (transl. H. W., emphasis in the original).

[23] Krämer highlights this aspect in particular in the concept of 'Schriftbildlichkeit.'

[24] Krämer's texts were cited in FN 18.
- "Furthermore, the structure of pictorial knowledge is characterized by a logic of contrasts, which is due to the 'spatiality,' the 'interspatial' constitution of visual media, as well as by a 'topological differentiality' which, as it were, provides the formatting of pictorial space." (Heßler, Martina; Mersch, Dieter (eds.): Logik des Bildlichen. Zur Kritik der ikonischen Vernunft. Bielefeld: Transcript 2009, p. 12 (transl. H. W.).
- Dirmoser, Gerhard: Denkfiguren. Denkfiguren. Verwendung von Diagrammen in Wissenschaft und Kunst. http://gerhard_dirmoser.public1.linz.at/FU/Denkfiguren_Diagrammatik.pdf.

[25] Mersch, Dieter: Wissen in Bildern. Zur visuellen Epistemik in Naturwissenschaft und Mathematik. In: Hüppauf, Bernd; Weingart, Peter (eds.): Frosch und Frankenstein. Bilder als Medium der Popularisierung von Wissenschaft. Bielefeld: Transcript 2009, pp. 107-134, p. 121.

The white of the background is therefore already suitable for isolating and separating objects from each other.[26] In other cases, similar to tables, lines are drawn, thus marking explicit boundaries. In diagrams, one can observe how things are physically taken apart.

A second important aspect is that diagrams are *operative* writings.[27] With the isolation and the "visualization of elements and relations, certain possibilities of the reconfiguration of the object, circumstance, or event context are also suggested."[28] Once they have been released, then, the objects can be brought into new relations – even on a trial basis; this ties in with theories that determine the media as a whole as a sphere of trial action.[29]

And finally, this is the third aspect, Bauer/Ernst make clear that one can easily return from the materiality of diagrams to mental operations, insofar as "thinking – especially descriptive thinking, which takes place before the inner, mental eye – also proceeds diagrammatically."[30]

> "What is emphasized above all is the possibility of using diagrammatic structures to make invisible relations 'visible.'"[31]

The whole approach is designed to treat both sides – the mental and the media-material aspect – with equal attention. And the question of the relationship between the two is decided very plausibly in terms of an interaction:

> "It should be borne in mind that within diagrammatics, the semiotic translation process between internal-mental operations and external-material structures (and vice versa), consequently between consciousness as well as cultural performances, constitutes one

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[26] To a certain extent, this also applies to writing itself: "Does not writing, with its two-dimensionality and logic of gaps, already have an inherent diagrammatic trait?" (Schneider, Birgit; Ernst, Christoph; Wöpking, Jan (eds.): Diagrammatik-Reader. Grundlegende Texte aus Theorie und Geschichte; Berlin/Boston: De Gruyter 2016, p. 10).

[27] Krämer also coined the term operational writing;
- Krämer, Sybille: Operative Schriften als Geistestechnik. Zur Vorgeschichte der Informatik. In: Schefe, Peter; Hastedt, Heiner; Dittrich, Yvonne (eds.): lnformatik und Philosophie. Mannheim: BI-Wissenschaftsverlag 1993, pp. 69-84;
- Krämer, Sybille: Kalküle als Repräsentationen. Zur Genese des operativen Symbolgebrauches in der Neuzeit. In: Rhein berger, Hans-Jörg; Hagner, Michael; Wahring-Schmidt, Bettina (eds.): Räume des Wissens: Repräsentation, Codierung, Spur. Berlin: Akademie 1997, pp. 112-122;
- Krämer, Sybille: Operationsraum Schrift. Ein Perspektivwechsel im Schriftverständnis. In: Grube, Gernot; Kogge, Werner; Krämer, Sybille (eds.): Schrift. Kulturtechnik zwischen Auge, Hand und Maschine. Munich: Fink 2005, pp. 13-32;
- Krämer, Sybille: Zur Sichtbarkeit der Schrift oder: Die Visualisierung des Unsichtbaren in der operativen Schrift. Zehn Thesen. In: Strätling, Susanne; Witte, Georg (eds.): Die Sichtbarkeit der Schrift. Munich: Fink 2005, pp. 75-84;
- Krämer, Sybille: Operative Bildlichkeit. Von der 'Grammatologie' zu einer 'Diagrammatologie'? Reflexionen über erkennendes Sehen. In: Heßler, Martina; Mersch, Dieter (eds.): Logik des Bildlichen. Zur Kritik der ikonischen Vernunft. Bielefeld: Transcript 2009, pp. 94-123.

[28] Bauer/Ernst, Diagrammatik, op. cit., p. 24 (transl. H. W.).

[29] This is a thesis I have also repeatedly advocated (W., H.: Diskursökonomie. Zur inneren Ökonomie der Medien. Frankfurt am Main: Suhrkamp 2004, pp. 200, 220ff.; W., H.: Prozessieren. Die dritte, vernachlässigte Medienfunktion. Paderborn: Fink 2015, pp. 59, 129, 227, 246ff.);
Bauer/Ernst state: "Diagrammatics links the interplay of con- and reconfiguration with the concept of the thought experiment, the concept of heuristic fiction, the concept of modeling and simulation of facts or sequences of events, and with other procedures that mediate between theory and practice and establish a control loop of descriptive thinking and trial action, of design actions and cognitive processes, of acts of investigation and mediation." (Bauer/Ernst, Diagrammatik, op. cit., p. 15 (transl. H. W.)).

[30] Ibid, p. 20 (transl. H. W.).

[31] Ibid, p. 29 (transl. H. W.); the thesis that media have the property of translating abstract topologies into concrete ones goes back to Yuri M. Lotman.

> of the central problems and explanatory goals."[32] "Diagrammatics, then, is a theory which helps to describe the exchange process between mental cognitive processes and external media, which include complex semiotic representational systems such as writing."[33]

For my question about the techniques of distinction, all of this is more than helpful.

8. Tokens

A second example of a cultural technique of analysis that uses material, media-technical means is provided by the prehistory of writing. The archaeologist Schmandt-Basserat has described that thousands of small clay objects, so-called 'tokens,' have been found in Mesopotamia, whose function has been a mystery for a long time; and she has been able to prevail with the thesis that they were 'counting stones' which represented certain goods, livestock, merchandise, or levies.[34]

The point of these tokens was that one could calculate with them; one could form quantities, add, subtract, or divide – and all of this actually with the hands (operatively); so even if one had no mathematical skills. To calculate with tokens means – even more clearly than in the case of diagrammatics – to put together or to take apart tangible signifiers on a table.[35]

9. Articulation

I would like to add another media consideration to the sections on diagrammatics and tokens. In media theory, the term *'articulation'* is discussed in various contexts, which – at least regarding one of its facets – also denotes a media technique of distinction, of separating, or taking apart. First, the concept of 'articulation' is associated with oral language:

> "In the linguistic or phonetic sense, articulation (Latin articulare 'to pronounce clearly') refers to the realization of phonemes and words of human languages by the organs of articulation, i.e., the neuro-muscular process of speaking (in the case of spoken languages) or signing (with hands, in the case of sign languages). In the context of speech production in spoken languages, articulation is defined in a narrower sense as the speech

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[32] Bauer/Ernst, Diagrammatik, op. cit., p. 22 (transl. H. W.).

[33] Ibid, p. 36 (transl. H. W.).

[34] Schmandt-Besserat, Denise: Before Writing. Vol. 1: From Counting to Cuneiform. Austin: Univ. of Texas UP 1992; Fig.: © Staatliche Museen zu Berlin - Vorderasiatisches Museum, Foto: Olaf M. Teßmer; reprod. authorized.

[35] With the restriction, however, that when dealing with the counting stones, it is only about their number. In this respect, one can at best speak of an 'analysis' of mathematical relations or of quantity relations…

> movements of the organs of articulation, as distinguished from respiration and phonation (vocalization)."[36]

When we speak, we produce sounds with our vocal cords which we simultaneously structure. With the help of our organs of articulation (pharynx, oral cavity, tongue, teeth, lips), we give the continuous flow of air that we exhale a tonal *form*.

And for this, the consonants are especially important. While the vowels provide the necessary volume and ensure that the voice reaches the ear of the receiver, it is the consonants which structure the sound stream by inserting unvoiced sound events into it.[37] In the suddenness of the occlusives[38], this structuring power becomes particularly clear. Somewhat figuratively speaking, we 'chew' the sound stream of the voice when speaking.[39]

Over time, the concept of articulation has been generalized; and Schwemmer, for example, extends it, starting from oral language, to the whole sphere of culture:

> "We call the structuring of an utterance its articulation. Even if this term is usually reserved for and exemplified by linguistic utterances, I would also like to use it generally for other forms of utterance, such as pictorial or gestural utterance, and moreover for our actions in general."[40]

Other authors agree with him:

> "It is not only speaking that makes people articulate beings. Articulation begins where people point at something and leads through the various expressions of feeling and thinking to the most complex cultural forms."[41]

"The central aspect of articulation," Jörissen writes,

> "lies [...] in the symbolic conciseness that is achieved through articulation. The basic idea of Ernst Cassirer, to which Schwemmer refers, is that only in the articulated form of cultural expression one can speak of culture at all."[42]

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[36] Wikipedia (German): Artikulation (Linguistik), https://de.wikipedia.org/wiki/Artikulation_(Linguistik) (transl. H. W.); Wikipedia cites: Pompino-Marschall, Bernd: Einführung in die Phonetik. Most introductions to phonetics curiously consider it superfluous to define the concept of articulation at all. They proceed straight to the rules and mechanisms of articulation.

[37] Voiced consonants like the 'M' represent, roughly speaking, a hybrid form....

[38] "Plosives […] are the consonants in whose articulation the respiratory airflow is blocked. The instantaneous release of the blocked airflow creates a small 'explosion' that produces the sound. Thus, the naming is based on the mode of articulation. For example, closure occurs through contact of the lips (example: [p], [b]) or tongue with the place of articulation in the vocal tract (examples: [t], [d], [k], [g])." (Wikipedia (German): Plosiv; https://de.wikipedia.org/wiki/Plosiv, transl. H. W.).

[39] At the same time, the theory emphasizes that the sound stream, physically speaking, remains continuous and that – again a case of pattern recognition – it is ultimately the listeners who break down the sound stream into words and sentences. Both assumptions do not contradict each other because the sound stream is certainly both: physically continuous and yet 'articulated.'

[40] Schwemmer, Oswald: Kulturphilosophie. Eine medientheoretische Grundlegung. Munich: Fink 2005, p. 49 (transl. H. W.).

[41] Publisher's announcement for the volume: Roussel, Martin; Niklas, Stefan (eds.): Formen der Artikulation. Philosophische Beiträge zu einem kulturwissenschaftlichen Grundbegriff. Munich: Fink 2013, https://brill.com/view/title/51438, 30. 3. 20 (transl. H. W.).

[42] Jörissen, Benjamin: Anthropologien der Medialität. In: Kulturelle Bildung online, 2013, https://www.kubi-online.de/artikel/anthropologien-medialitaet, 30. 3. 20 (transl. H. W.).

On the one hand, the concept of 'articulation' is now related to phenomena of culture in general, but on the other hand, one falls back on concepts such as 'expression,' 'feeling,' or 'thinking,'[43] whereby articulation appears to be centered – possibly hastily – on the individual subject. It is all the more important that Schwemmer also provides more materialistic definitions of articulation; for example, when he establishes articulation above all as the *generation of form:*

> "In order [...] to make further progress, we have to look at the side of structuring, which is inherent to the cultural phenomena themselves. Or, to put it differently: We have to see the cultural phenomena as structuring, as form-generating achievements. This is the decisive change of view that enables us to develop a cultural-theoretical perspective. It is a shift of focus from the 'outside' or the 'surface' of cultural phenomena *to their immanent structuring, to their self-structuring.* [...] The structuring of an utterance we call its articulation."[44]

And more clearly, insofar as Schlemmer, which is by no means common in philosophy, also wants to include considerations of *media. "*New and decisive in Schwemmer's argumentation," writes Jörissen,

> "is the media-theoretical aspect: for cultural forms are medially situated. The 'patterns of conciseness' themselves [...] are subject to [...] medial structures as 'forms of shaping': there is no articulation outside of medial structural conditions. Every articulation, therefore, requires a medium, and medial form-generating possibilities are 'constitutive for the inner structuring of articulation'; their analysis is therefore one of the 'main tasks of any reflection on cultural theory.' Media are thus *structural conditions of the possibility of articulation*."[45]

"Any articulation," says Schwemmer himself,

> "requires a medium. With this formula it is first indicated that every inner structure of an utterance can only be realized in a substance, in a material."[46]

Articulation, too, then – the keyword of structuring makes this clear – is a media technique of separating and differentiating. Articulation, too, divides things by taking them apart. And if we return to oral language, which has been mentioned at the beginning of the section, the spectacular thing is that this 'taking apart' is apparently also possible in the medium of the acoustic. The concept of articulation seems suitable to generalize and expand our notion of the analytical power of media.

10. Back to Schema Theory

My brief passage through diagrammatics, tokens, and articulation has made it clear that differentiation has a practical-operational, a media-technical side. This is certainly true more generally, insofar as the head is always interrelated with the eyes and hands; and moreover, practical operations have the advantage that they can be better observed as mental processes. With the aforementioned techniques in mind, it becomes clearer what differentiating is all about.

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[43] "Expressive acts are about the articulation of something, be it a conviction, a mood, a desire, a representation, or any other kind of communication." (Schwemmer, Kulturphilosophie, op. cit., p. 37 (transl. H. W.)).

[44] Ibid., p. 49 (transl. and emph. H. W.).

[45] Jörissen, Anthropologien der Medialität, op. cit.; J. citing Schwemmer, op. cit. pp. 53, 55 (transl. and emph. H. W.).

[46] Schwemmer, op. cit. p. 53 (transl. H. W.).

But now I would like to return to my actual topic, schema theory. In the chapter on identity and identification, I have tried to show, with the help of relatively abstract models, how schemata and patterns emerge in cycles of condensation/stratification. So how does my consideration of separating and differentiating fit into this context?

My thesis is that there is a *systematic interaction* between identifying and differentiating. In the mechanism of schema formation/recognition, the two are intertwined. Perception – to use the example once more – constantly matches individual perceptions with patterns (experiences and expectations) that are the product of past perceptions; and it simultaneously produces these patterns by typifying and schematizing individual perceptions in a long chain of iterations.

Identity and difference (identifying and differentiating) are equally involved in this mechanism. Both take place at the same moment: *Only the interplay of identification and differentiation, attraction and repulsion, layering/cumulation and moving apart makes up the overall process.*

My idea is that of a double movement: Step by step, with each repetition, the schemata acquire 'identity' and stability; and at the same time, the differences that separate the schemata from each other are stylized and accentuated; *with each iteration, then, the schemata move apart.* In this way, in this double movement, the schemata gain form and contour.

However – this is my second point – identifying and separating/differentiating obviously have different roles in this process: Identity and identifying concern the individual schema (which acquires stability and 'identity' through stratification/cumulation), whereas difference, separating, and differentiating concern the relation of schemata to each other.

This would mean that both occupy a different space and have a different range: Identity/identification/stratification/cumulation act 'locally,' just at the location[47] of the pattern in question. Difference/differentiation/separation, on the other hand, organize the space that spans *between* schemata and patterns. The suggestion of the last chapter to distinguish between centripetal and centrifugal went in a similar direction;[48] and so did the idea that the mountains of the 'Or' divide things, while the valleys of the 'And' gather them.[49]

But is this really the case? Are the different schemata really only separated from each other by differences (by repulsion)? Or are they not always also connected – however subliminally – by relations of similarity? And if this is so: Does this similarity not necessarily introduce a moment of identity into the relations as well?

My consideration of the 'features' of similarity[50] produced exactly this result: that the features provide a manifold overlapping and, in spite of all differences, entangle the schemata and patterns in an immensely manifold net of similarities. This net, like that of the differences, has its place in the space *between* the schemata.

For the time being, the fact remains that separating and differentiating are the other side (the complementary mechanism) of identifying. The fact that schema formation unfolds an *analytical power* and is able to separate things from each other constitutes – more conspicuously than its other, identificatory side – its cultural achievement. Analysis, ratio, and reason are closely connected; and all three depend on the techniques of dissecting the world.

The idea that difference and identity/identification form a common mechanism, however, means that both – necessarily – remain dependent on each other. And if this is so, then all the

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[47] Elsewhere I warned against using topological metaphors to designate relations, which are ultimately *semantic*…

[48] Ch. 10, section 3.

[49] Ibid., section 8.

[50] Ch. 7: Similar – in what way.

doubts formulated about ‘identity’ must ultimately also affect difference. A ‘pure’ difference, untouched by the problems of identity, does not exist; it is a purifying fantasy that has dominated theory formation for a while.

In any case, the leap from the individual schema to the relations which connect the schemata with each other is important. This point in particular will be the subject of my concluding chapter.

[…]

14 Media, Form, and Formalization

1. Intro

I would now like to turn to the concept of *form*, which has already been mentioned several times during my argument and which, to put it bluntly, I consider to be constitutive for the understanding of media.[1] The term itself can be found in the most diverse areas of media: One speaks of aesthetic form and of in-formation, of formats and of formalism; and when I have written about *schema formation*, this term obviously also uses the idea of 'form.'

Above all, however, 'form' is important in the field of information technology, i.e. computers. Formal languages, such as mathematics or the artificial languages of computers, are usually defined as being independent of the world and experience, as a construct or as a 'construction.' It is assumed that they – based on freely defined axioms – only follow their own rules. And this has a direct effect on the concept of form: because formal languages are, by definition, 'formal' precisely to the extent that they are distanced from the world.

'Form' thus takes on a special meaning in the sphere of computers, and while similarity has played a major role in the above chapters, we now seem as far removed from it as possible. Similarity appears to be bound to the senses and experience, worldly, 'dirty' and 'soft,' formalization appears as 'pure' and as 'hard.' But what if this is not right? An ideological idea that formal languages use to deceive their audience? What if the 'dirty' similarity extends into the 'pure' formal sphere? How would the concept of 'form' change? And how (in reverse) the concept of similarity?

I would like to hypothesize that everything we call 'form' is a certain kind of similarity. Of course, this cannot be an immediate sensory similarity (if there is such a thing), but perhaps a 'non-sensory' similarity is an option. There may be a way to understand what a non-sensory similarity could be. And also, once again, there may be another approach to mimesis, which I largely exclude from my considerations, but which a book that bears similarity on its cover cannot completely ignore.

And I have a second hypothesis. I am of the opinion that it is possible *to define form as a similarity extracted from things*. What is meant by this is to be shown; but first I would like to demonstrate how 'form' and formalization in the discourse on computers and media are usually understood.

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[1] I presented parts of this chapter at the conference 'The shape that matters – Form als medientheoretischer Grundbegriff' [Form/shape as a media-theoretical concept] (Univ. of Siegen 2008); the introduction has been changed for the translation.

2. Purity of Form

Formalization is usually described as being directed against any notion of representation, as a free logical-combinatorial game that – independent of the concrete contexts of the world – follows only its own rules. I have described this in more detail in my book 'Diskursökonomie' [Economy of Discourse];[2] and there I mainly referred to Bettina Heintz's account of the history of science.

> "The formalist view of mathematics," writes Heintz, "stands for mathematical modernity. [...] In formalism, the signs have become 'self-sufficient,' they no longer have a reference function, no meaning, and the mathematician who operates with them is in principle free in their setting. In formalist mathematics, there is no longer any reference to anything outside the mathematical system, be it perception, evidence, sensory experience, or intuition. Mathematics itself generates the objects with which it operates and the rules according to which it proceeds."[3]

Heintz outlines a development: While traditional sign systems are bound to representation, reference, and mimesis, formal languages have left this terrain. In formal languages, the signs have become 'self-sufficient.' And the abandonment of representation, reference, and mimesis leads directly to the confidence that it is now mathematics itself that "generates" the objects with which it operates. 'Form' here is *design*, construction, or 'Vor-ahmung,' as Flusser puts it in order to make clear the break with any mimetic tradition.[4] The reservation against mimesis and the notion of generation/construction are closely related.

The second property that characterizes formal languages is the freedom from internal contradictions. Formal languages are built in such a way that they exclude contradictions by definition, and they ensure this at the level of individual programs, for example, by means of test algorithms. This is fundamentally different in the case of 'natural' language: It certainly allows for internal contradictions and makes them thinkable and manageable with the means of language itself. The admission of contradictions means that natural language opens itself up; it always acknowledges that it is in a certain sense unfinished, that it will never fully grasp its object(s), that the concept and the phenomenon which is to be grasped do not coincide; and it is only this difference that makes a reference to the world possible at all.

Formal languages can only guarantee freedom from contradiction if they form a universe that tends to be closed;[5] and this universe can only be closed if it isolates itself from the context. This sense of closure thus also supports the idea that formal languages are reference-less, 'self-sufficient,' or freely 'constructed' systems. And even though Heintz wrote her text thirty years ago and she herself is ultimately critical of the image of formal languages outlined in this way, it can be said that the overall picture is still mainstream today.

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[2] W., H.: Diskursökonomie. Versuch über die innere Ökonomie der Medien. Frankfurt am Main: Suhrkamp 2004, pp. 147-169; the German text is available online:
https://homepages.uni-paderborn.de/winkler/Winkler--Diskursökonomie.pdf.

[3] Heintz, Bettina: Die Herrschaft der Regel. Zur Grundlagengeschichte des Computers. Frankfurt am Main/NY: Campus 1993, p. 16 (transl. H. W.).

[4] Flusser plays with words here: The German term 'Nachahmung' means imitation, mimesis, or *re*-production; Flusser's neologism 'Vorahmung' accordingly connotes an anticipation, a production directed towards the future. "[The digital] images will detach themselves from their imitative, mimetic function and become inventive and poetic." (Flusser, Vilém: Does Writing Have a Future? Minneapolis/London: Univ. of Minnesota Press 2011, p. 71 (add. H. W.), see also: p. 150).

[5] The rapid historical development of mathematics shows that its universe is by no means simply 'closed'; however, the criterion of freedom from internal contradictions also applies here...

To understand the constellation in its entirety, however, something else is important. One has to realize that – in parallel to the development of formal languages – the established ideas of representation, reference, and mimesis have been harshly criticized in philosophy, in the humanities, and in cultural studies. I have briefly outlined this above: The post-structuralists, following Nietzsche's critique of language and with good theoretical reasons, have fundamentally questioned the ability of symbolic systems to understand the world. The 'linguistic turn' (the thesis that our access to the world is mediated by symbolic systems) and the insight that symbols first relate to other symbols and only then relate to the world, the insight that languages are dependent on social processes, that they are by no means 'transparent' and are therefore very unreliable mediators – all of this had to feed the doubts of a philosophy that, above all, understood itself as *critical of signs*.

This seemed to fit in well with the emergence of computers and with the idea that formal languages refrain from claiming a reference to the world from the outset; and also with the phantasy of a 'construction.' It is striking that the critique of signs has largely omitted formal languages – until Latour, for example, made the proceedings of the natural sciences the subject of a similarly radical questioning.

3. Relation to Other Media

Roughly speaking, this is the concept of form as it determines the discourse on formal languages and, in one way or another, their everyday understanding. If we want to counter this with an alternative, it seems to me that this is possible from a *media-comparative* perspective. Because 'form' is not a privilege of formal languages alone. Rather, the term is used in relation to almost all individual media; as a basic category of aesthetics, it operates across media, in the space that separates media and connects them.

What is irritating, however, is that the concept of form takes on different colorations depending on the medium in question. The problem of form in art is different from that in the case of computers; the notion of form in formalist film theory is by no means limited to its tension with 'content;' and Heider/Luhmann have set us further tasks, not to say puzzles, with their medium/form thesis. I will skip these problems by first picking out just one single aspect from all these issues, namely the element of abstraction. If this can be justified, then it is because abstraction is central to the understanding of formal languages but is also effective in all other media. The question of form cannot be separated from the question of abstraction.

As a kind of preliminary contribution to the overall problem, I therefore propose to ask about the specific types of abstraction and formalization in different media, because media differ drastically also in their modes of abstraction.

4. For Example: The Office

The fact that there is a connection between these at all, that a concept of formalization can be conceived across media, has been shown particularly vividly by Hartmut Böhme, albeit initially only using a single example and in a rather marginal consideration that has the office, abstraction, and bureaucratization as its subject.[6] So we must first take a leap into the concrete.

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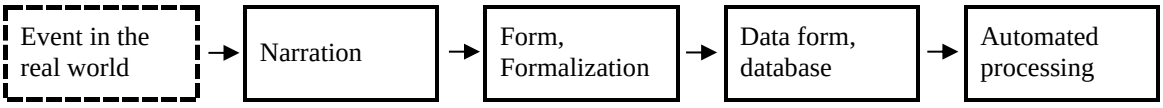
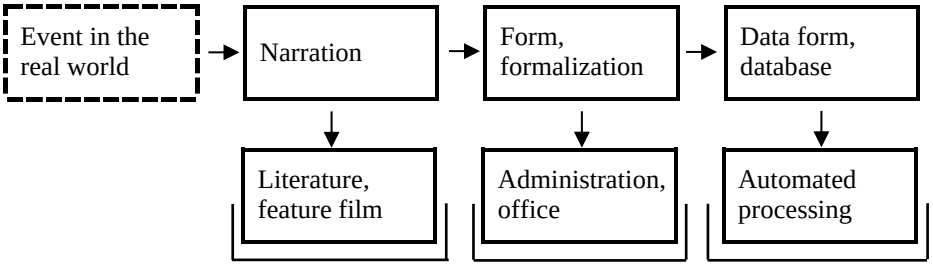
[6] Böhme, Hartmut: Das Büro als Welt ‑ Die Welt im Büro. In: Lachmayer, Herbert; Louis, Eleonora (eds.): Work & Culture. Büro. Inszenierung von Arbeit. Klagenfurt 1998, pp. 95-103.

Böhme notes that an incident, in order to become an administrative process, must go through certain stages of formalization. Take, for example, the processing of an insurance claim: an event occurs in the real world; this is – secondly – converted into a linguistic/symbolic representation, through the narrative of the customer; the task of the staff – thirdly – is to record this narrative on a paper form or a screen mask; a translation that enables the bureaucracy to process the case in the first place, and that finally – fourthly – paves the way for automated processing of the data. Böhme's thesis can be summarized as follows:



This consideration is so interesting because one can conclude that 'narrative media' such as literature or the feature film simply settle for a lower level of formalization:



It can also be concluded that formalization obviously has its own rules, gradation, and limits. Not everything that the insurance customer says about the event will be included in the form or interest the insurance company in the first place. And not everything that can be written on a form can be processed automatically. *So at every stage there will be a gain in form and a loss in 'content.'* And finally, there will be problems that completely resist formalization.

5. Stages and Types of Abstraction

If we accept this for the moment, it becomes possible to categorize media more generally according to the type of abstraction to which they subject their material. To this end, I would like to propose a sequence of stages that begins with the concrete individual case (bottom left) and then, via example and allegory (which are already types of generalization in that they focus on a single case but at the same time demand that the recipients transfer it to other similar cases), progresses to the *concept* by moving further and further away from the concrete and through increasing abstraction.

Level of abstraction	Type of abstraction					
high ↑	structural abstraction ↑		Abacus	Numbers, mathematics	Laws of nature	Formal languages
		Calendar-bones	Tokens (Meso-potamian counting device)			
	conceptual ↑	Language			Humanities	
	allegorical ↑	Myths, religious systems	allegoric sculpture (‘Justitia’)		hidden allegoric strategies in the mass media	
	exemplary			Literature	Magazine, star system	Television
↓	↑				Photography, feature film	
low	individual case, concretion					
		Media history →				

Formal languages surpass the conceptual abstraction of natural language. They are more abstract – not to say more formal – than the concepts, further removed from any ‘content’ that natural language still implies as ‘semantics.’ It is this abstraction that leads to the specific impression – the specific illusion? – of their ‘purity.’

At the same time, however, the perspective has changed fundamentally. As soon as the concepts of language are also regarded as a type of abstraction and formalization, formal languages are released from their isolation; it makes little sense to continue to regard them as a pure ‘construction,’ a creatio ex nihilo, and the question arises what it is that is being abstracted from, what the abstraction at the respective level is distancing itself from and to what extent.

6. The Schema Concept

The abstraction levels presented here are by no means used solely for categorizing. For it will now have to be shown that a uniform mechanism is at work at all the levels of abstraction outlined.

And here I would like to return to the concept of *schema*. Schemata, as I have shown in the previous chapters, exist in all media; and especially in visual media, the concept of schema is less controversial and less counter-intuitive than, for example, that of the sign; accordingly, only the concept of schema seems to me to be general and powerful enough to moderate the breaks between the various individual media. Schemata, that is the core of my argument, are stabilized form; and, as I have shown in the chapter ‘Schema Formation,’ one can order the media according to a hierarchy that leads from the ‘soft schemata’ of real perception to the ‘hard’ ones of formal languages:

hard schemata ↑		Numbers, data, formal languages, mathematics
	Signs	Writing
	↑	Oral language, music
	Stereotypes, rules, genres	Photography, film
↓ soft schematization	↑ Schemata[7]	(Perception)

What all levels have in common is that they are *all types of schematization*. The different media stand for different levels, different degrees of hardening within schematization.

If we turn the matter around and look at it from a processual perspective, the schemata appear as *precipitation*, as a product; only at a certain stage of hardening, which was also the subject of the above-mentioned chapter, does the phenomenon of constituted *signs* appear; signs, in turn, can be integrated into systems of rules varying in their strictness; and again, formal languages seem to surpass 'natural' language, at least in terms of strictness.

7. The Loop Through Experience

As soon as abstraction and formalization are understood as a gradual withdrawal from the concrete, the impression is dispelled that reference to the world no longer plays a role in the field of formal languages. However, the question of how formal languages and formal models organize their reference to the world remains open.

First of all, it is striking that although formal languages assert their complete independence from world realities, at the same time they have diverse, very fruitful, and far-reaching *applications* in this real world. The sphere of technology is inconceivable without the models of mathematics; economic and organizational problems are formulated in formal languages and written back into the world from there. This application dimension of formal languages would probably not be disputed by anyone.[8]

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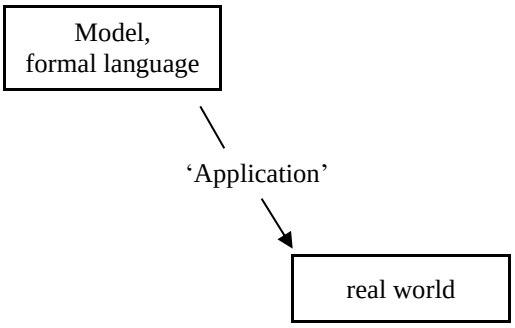
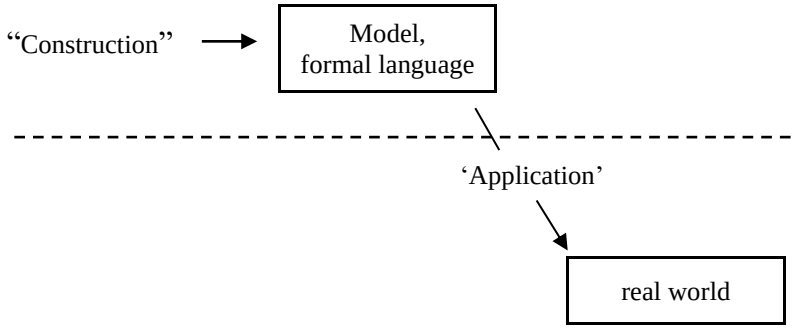
[7] From the fact that real perception is already schema recognition, Susan K. Langer builds a bridge to the concept of *form*: "the world of pure sensation is so complex, so fluid and full, that sheer sensitivity to stimuli would only encounter what William James has called (in characteristic phrase) 'a blooming, buzzing confusion.' Out of this bedlam our sense-organs must select certain predominant forms [!], if they are to make report of *things* and not of mere dissolving sensa. The eye and ear must have their logic—their 'categories of understanding,' if you like the Kantian idiom […]. An object is not a datum, but a form construed by the sensitive and intelligent organ, a form which is at once an experienced individual thing and a symbol for the concept of it, for *this sort of thing*." "The abstractions made by the ear and the eye – the forms of direct perception – are our most primitive instruments of intelligence. They are genuine symbolic materials." (Langer, Susan K.: Philosophy in a New Key. A Study in Reason, Rite, and Art [1942]. Dublin: Mentor 1954, pp. 72, 75 (emph. H. W.)).

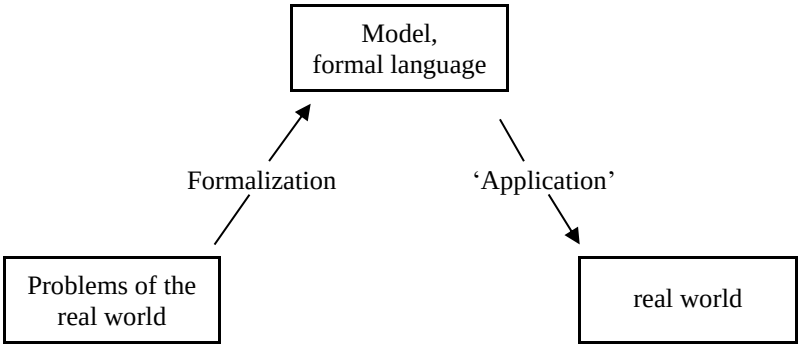
[8] However, it must be said that there is a certain aristocratic disdain for 'applications' in the specialist cultures of both mathematics and computer science. This seems to me to be part of the problem and part of the self-image that ~~the~~ these disciplines are dealing with pure constructions.



At the same time, the performativity debate has also drawn attention to the effect that signs have in the non-symbolic world. Much more critical, however, is the question of what brings formal languages themselves into the world. As described, Heintz emphasizes their character as a ‘construction,’ their fundamental independence from the problems and structures of the real world.

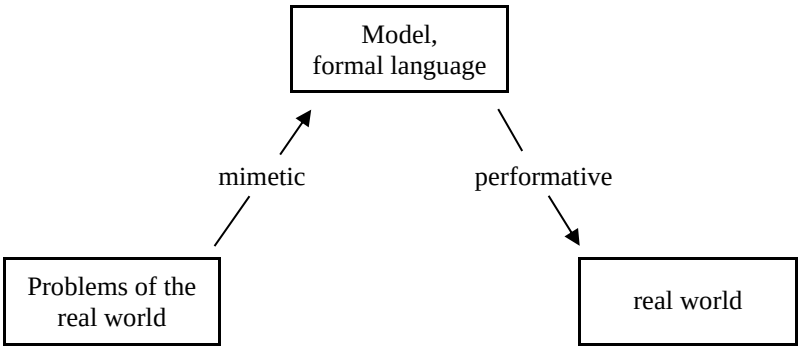


This view does not seem very plausible to me. If one looks at the actual history of mathematics and formal languages, one can see that they develop and evolve – at least to the same extent as according to the rules of their own logic – in a close interrelationship with real-world problems. The abacus emerged in the context of administrative and economic ‘applications’; the Hollerith machine was intended to solve organizational tasks, and the computer to solve deciphering problems. This also ties the formal languages back to the real world and its problems, namely in terms of model creation:

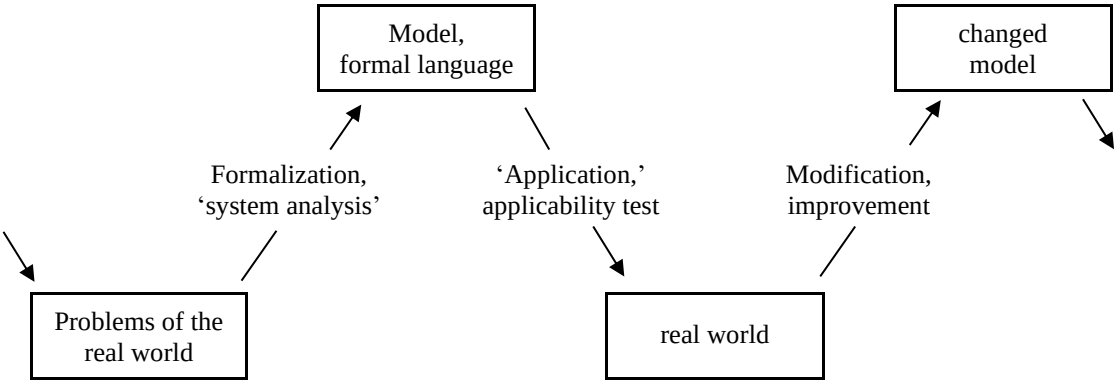


The left-hand side is that of ‘system analysis’ or model building; a problem arises in reality, and the system analyst has the task of penetrating this problem to such an extent that it can be formulated in the rules of a formal language.

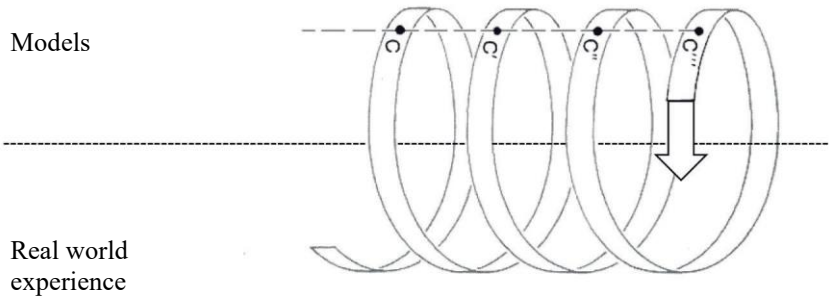
I would like to call this – precisely because the term is initially counterintuitive – the *mimetic dimension* of formal languages. Models formulated in formal languages and formal languages as a whole prove to be not only applicable, but they are constantly measured against application contexts and are gradually developed further in confrontation with these contexts.



Extending the time axis results in – how could it be otherwise – the model of a cycle:



At the same time, this means that model building remains systematically related to the sphere of *experience*. The development goes cyclically through experience again and again; models prove to be suitable or unsuitable, fruitful or unfruitful, are verified or falsified.[9]



[9] The need to view the relationship between science and technology as a cycle, as a reciprocal interdependence, was emphatically advocated by Latour in particular. In doing so, he opposes the traditional idea that attempts to understand technology – one-sidedly – only as an 'application of science.' Latour's main point also lies on the left side of the cycle: in demonstrating how much 'pure science' also owes to technical practices. At the cost of the models of science no longer being 'pure.'

The models, as I said, can be suitable or unsuitable, and appropriate or inappropriate to what is to be modeled. Especially if one argues with 'experience,' it will have to be made clear that the passage through experience by no means guarantees that the models are 'realistic,' 'true,' or even useful. Exactly as in the case of all other signs and sign systems, formal models can be distorted, or they can go completely astray. My claim is only that they remain in relation with what is to be modeled. A calculated weather forecast is measured by the weather that actually occurs; a structural engineer's algorithm is measured by whether the building remains standing.

And the same applies – at least in principle – at the level of the formal languages themselves that are used for modeling, even if the adaptation process is less direct and the cycles are longer.

8. Counterargument: Internal Coherence

The idea sketched out in this way does not seem very risky, to the point of being self-evident. Nevertheless, there is a weighty argument against it. For wasn't the thesis above that formal languages, primarily, follow an inner, intrinsic logic? And wasn't the decisive criterion that distinguishes formal languages from 'natural' ones that only formal languages fulfill the criterion of internal coherence and consistency? Is this not plausible? And an almost irrefutable argument for 'construction' after all?

The point becomes even stronger when Krämer makes *correctness* the decisive criterion for formal language formulations and argues that with formal languages the traditional question of truth is replaced and rendered superfluous by the question of correctness.[10]

Correctness means inner coherence; however, in the transition to correctness, the reference that was still indispensable for the concept of truth is cut off. In the case of formal systems, correctness can be checked and established beyond doubt in every case; if the formal system is implemented on a computer, the machine takes over the logical-mechanical consistency check. So how does this fit in with the assumption that formal languages also remain dependent on mimesis and experience?

It must be said here that models formulated in formal languages – as self-sufficient as they seem – are always and necessarily *incomplete*. In concrete terms, this means that doubt now attacks the system from the outside – from the context – although or precisely because it so carefully arms itself internally against doubt by adhering to freedom from contradiction. The problem shifts, I think, to the relationship between the model and its context.

It is obvious that formal languages are dependent on contextual additions; this begins with the clay tablets of Sumer, whose lists contain not only numbers but also words that provide contextual information. And it has remained that way throughout the history of media; anyone who buys a software package today will always receive a helpfile with it. The helpfile is by no means external to the software. Rather, it stands for the interface between modeling and the modeled problem; and it moderates between the possibilities offered by the formal language system and the various frictions that arise when it encounters the problems of the real world. *This moderation* – and this is important – *cannot be achieved by formal language with its own means*. Natural language comes to its aid and helps it out of a jam. The schema above would have to be modified accordingly, because system analysis and 'application' as a matter of course also make use of the mediating power of language.

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[10] "The formal handling of symbols according to rules that make no reference to the meaning of the symbols [...] also becomes the guiding principle of the epistemological ideal of rationalist philosophy, which consists in tracing truth back to correctness." (Krämer, Sybille: Sprachphilosophische Grundlagen des Begriffes 'Performanz.' Performativität als Medialität. Unpublished manuscript 1998, p. 5 (transl. H. W.)).

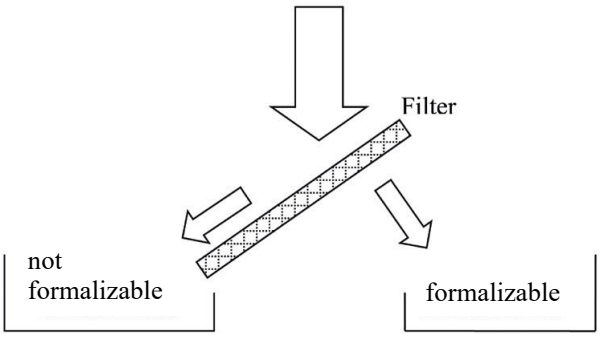
When mathematicians talk to mathematicians in formulas, and computer science and mathematics develop their formal systems in relative isolation from the world, this is a special case in terms of what has been said. An effect, one could say, of the social division of labor that isolates the members of these disciplines and interrupts interaction with the fields of application for a certain phase of production. In this respect, it is a kind of optical illusion that conceals the fact that formal systems are in rapport with the real world via mimesis and 'application.' Only in this way can the appearance arise that formal languages develop 'autonomously.' In fact, formal languages are dependent on the existence of other media.

10. Filter

This entails simply excluding those problems that resist formalization (i.e. the articulation in a formal language) from the field of interest and, as an inevitable consequence, leaving them to the 'softer' symbolic systems – the softer forms of form. This is also a variant of division of labor. Seen as a whole, a kind of filtering process takes place, an ongoing examination of what can be formalized and by what means, and what must be eliminated because it cannot be formalized. This filtering process is the main large-scale social experiment that takes place in the sphere of formal languages.

Every insurance company tests its probability algorithm against the perils of the dirty, pluralistic real world; every engineer who builds a bridge tests not so much the bridge as – with the help of the bridge – the calculated model on which its steel construction is based. Only under this condition, only because their terrain is limited, can formal languages be both: inherently free of contradictions and fruitfully applicable to practical purposes. And this dual position constitutes their special role in the concert of media and symbolic systems.

All problems that cannot or cannot yet be formalized fall back all the more decisively on the traditional media. The filtering process must therefore be viewed from a dual perspective: On the one hand, it delivers the formalizable; on the other, that which cannot be formalized.

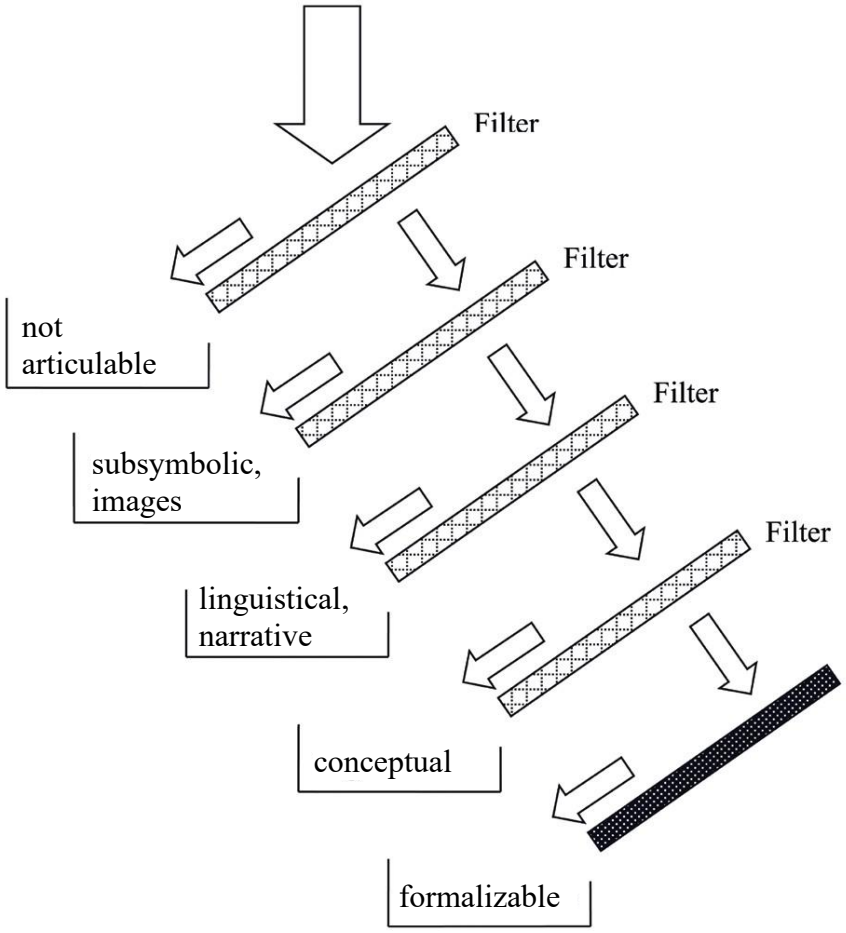


The boundary between the two spheres, as historically changeable as it is, organizes, among other things, such dramatic things as the relationship between the 'two cultures.' And it divides the computer itself; only on one of its sides is it the paradigmatic medium of formalization; but many, perhaps most, of the processes that run on computers also have another, rather conventional side: Computers can transfer, store, and permute images, but computers cannot process images according to content criteria (or understand images); digital images therefore only exist because the users are part of the arrangement; and contribute skills that cannot be formalized.

11. Machines for Extracting Form

So what is the result of the consideration outlined here? My proposal is to think of media overall according to the model of formalization; as a social machine that constantly and continuously tests the formalizability of the world.

And as described at the beginning, it is about formalizability on different semiotic levels: Images are less formalized than the concepts of natural language; these in turn appear informal or 'soft' compared to formal languages.



If we consider once again that the starting point is not semiotic but real-world problems, and that the decision as to whether these problems can be symbolized or not is only made in the filtering process itself,[11] we can say that media progressively extract from the world whatever form is contained in it. *Media, then*, as I return to my formulation from the schema chapter, *are a social machine for extracting and inscribing form.*

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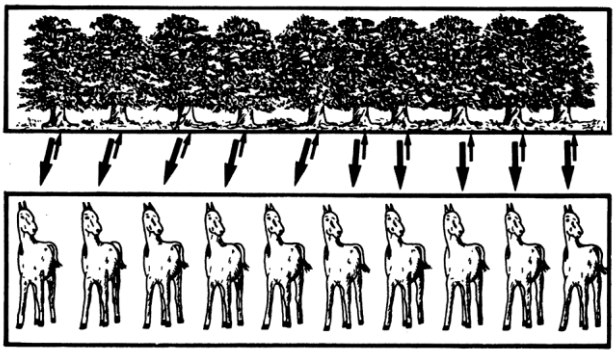
[11] The boundary between the symbolizable and the non-symbolizable is the central theme of Langer (op. cit., pp. 63ff.). What is called 'subsymbolic' in the illustration, Langer would call 'presentational symbolism' (ibid., p. 78f.). "[T]he symbolism furnished by our purely sensory appreciation of forms is a *non-discursive symbolism,* peculiarly well suited to the expression of ideas that defy linguistic 'projection.'" (Ibid., p. 75.) "Everybody knows that language is a very poor medium for expressing our emotional nature. It merely names certain vaguely and crudely conceived states but fails miserably in any attempt to convey the evermoving patterns, the ambivalences and intricacies of inner experience, the interplay of feelings with thoughts and impressions, memories and echoes of memories, transient fantasy, or its mere runic traces, all turned into nameless, emotional stuff. […] There is, however, a kind of symbolism peculiarly adapted to the explication of 'unspeakable' things, though it lacks the cardinal virtue of language, which is denotation. The most highly developed type of such purely connotational semantic is music." (Ibid., pp. 81f).

12. Similarity

And as if all this were not disputable enough, we now have to go a decisive step further, because my hypothesis was that everything we call form is a certain type of similarity. So why and to what extent similarity?

In my chapter on context, I defined similarity as something that connects things behind their backs.[12] And my consideration of 'characteristics'[13] provided some additional aspects: Comparison and similarity divide things into those aspects that are 'similar' and those that are 'dissimilar.'

Similarity thus extracts something from things; with the point that this 'something' (the aspect, the respect) only takes shape in the process of comparison and the detection of similarity. Precisely these new 'shapes' are the point. As soon as they are created, they are reified and stabilized, they take on form [!]; or – better – very different forms: What things have in common, what makes them similar to one another, can be a *characteristic*, such as the characteristic 'red,' for which language finds the label, the adjective 'red;' the common/similar element can result in a *schema* that makes it possible for us to recognize an elephant as an elephant, or in a *term*, such as the collective term 'animal,' which encompasses creatures as diverse as cockroaches, crows, and crocodiles. Or in *abstractions* such as a number, which sets aside all qualitative determinations in order to make only quantity the defining characteristic (which Ifrah illustrates by relating a quantity of trees – regardless of all their qualities – to an equally large quantity of horses):[14]



Generalized: The commonality/similarity leads to a *form*. Form, that is my assertion, is something that is extracted from things. Form is the most abstract type of similarity, which corresponds completely to the other types I have mentioned – as different as they undoubtedly are – in terms of function. And of course there are also very different concepts of form; the concept of form in aesthetics, as I said, differs from that of formal languages; what they all have in common, however, is that they are all abstractions.[15]

Abstraction is the defining characteristic of form; and similarity – albeit a possibly abstract one – underlies the mechanisms of abstraction; for this reason alone, it was problematic when Cassirer referred to 'similarity' solely in terms of the sensorially concrete.[16]

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[12] See W., Ähnlichkeit, op. cit. (FN 1), pp. 66-72.

[13] Ibid., pp. 93-116.

[14] Fig.: Ifrah, Georges: The Universal History of Numbers [1981]. NY: John Wiley & Sons 2000, p. 10.

[15] An interesting and important exception becomes clear when one refers to the 'form' of an individual work of art; here the form stands for the radically singular.

[16] The 13th chapter of my book is about Cassirer's concept of 'form' (see W., Ähnlichkeit, op. cit. (FN 1), pp. 217-238).

And one can easily extend the range of types yet again: Even if one asks what a *rule* is, one will come across abstraction and similarity, insofar as a rule always subsumes many cases, or conversely extracts what is rule-like from a multitude of cases. What is special here is that we are dealing with processes, with regular sequences along the axis of time. And if we go a little further, we arrive at causality and law...[17] And finally, even the laws of nature represent a type of 'similarity,' regardless of whether one counts them on the side of observation or on the side of the observed.

Once again: I am of the opinion that it is possible *to define form as a similarity extracted from things*. This similarity extracted from things becomes independent and takes on different forms at different levels of 'hardening': At the level of the schema, it already appears stabilized, at the level of the sign it is actually reified (insofar as signifiers have a material character). At the same time, the similarity fans out into different types of form.

From level to level there is a gain in form; the abstraction, the 'formal' character increases; the individual, the concrete, that which is abstracted from via similarity, remains behind – until finally the impression arises that the connection to 'content' has been broken and that form can be regarded as 'pure' (as independent of experience) at the level of formal languages.

My thesis is that the connection never breaks. That the concrete and the abstract, content and form, the object to be understood and the concept – however precarious – remain related to each other; connected by the mechanism that turns the concrete into forms via similarity. (That the connection *does* remain precarious, that signs 'lie' and cannot guarantee reference to the world, abstractions cannot guarantee reference to the concrete, and forms cannot guarantee content, has been shown irrefutably by the philosophical critique of signs).

Cassirer is therefore certainly right when he develops a comprehensive concept of 'form' that encompasses all forms of forms, from perception to the laws of nature. And he is also right insofar as he refers to these forms as 'symbolic forms,' thus assuming a close connection between the formation of forms and that of symbols.

What remains underexposed in Cassirer's work, in my opinion, are the mechanisms of abstraction itself, the path that leads from the concrete to the forms, and precisely the constitutive role that similarity assumes here. Because he also polemicizes against mimesis, the connection back to the concrete also threatens to break off in his work.

If one is looking for approaches that systematically think mimesis and form together, one could mention Adorno, for example, who in his aesthetics develops the thesis that *art* has its place between expression and form;[18] whereby – strongly simplified – the pole of expression stands for subjective experience, emotion, mimesis, and essentially suffering, and the pole of form for objectification and reference to the universe of other forms (think of styles, for example). Working out this reference would be a challenging project in its own right.

I would just like to adopt the basic idea here: That form is possibly the antipole of mimesis, but as such remains related to mimesis. That form distances itself from experience but does not eliminate it; and that – even in the field of formal languages – experience and mimesis must always be considered.

For any theory of perception, of schemata, of signs, and of media, such a concept of 'form' is of central importance. And my thesis is precisely that – as little as the individual cases and the forms resemble each other – form is nothing other than similarity extracted from things.

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[17] Cassirer names causality among the 'symbolic forms' that are, for example, of central importance for the natural sciences...

[18] Adorno, Theodor W.: Aesthetic Theory [1970]. London/Boston: Routledge and Kegan Paul, 1984.

[…]

16 Conclusion

Hardened Similarity

1. Intro

So what is the yield of my passage through the field of similarity? First of all, it is clear that only certain aspects came into view at all, because the perspective I chose is a very specific one.

The starting point of my project was the fact that similarity plays a prominent role within media, culture, and cultural techniques. Whoever engages theoretically or analytically with media is confronted with such an overwhelming amount and with so many different kinds of similarity that it seems inevitable to explore similarity as a category of media theory.

Surprisingly, however, this hardly happens. Looking for the reason, we learn that renowned authors of philosophy and cultural theory reject similarity as a theoretical category with a kind of horror. Similarity – as I have discussed – appears as too 'soft,' as unfathomable, as too widely distributed, as excess: Everything can resemble everything, everything seems to depend on the context or the perspective, whereby contexts and perspectives again appear to be incalculably manifold and unfathomable. On such terrain, theory has nothing to gain. But what if it does not have a choice, because similarity cannot be ignored? This contradiction was the starting point of my project.

The second point was the fact that horror goes hand in hand with a *fascination with similarity.* Researching similarity, one will come across an exuberantly diverse, yet tremendously interesting field of materials, examples, and aspects. The visual material that I have included in my book may give an impression of this; similarity, in any case, is not something that media exclusively 'suffer' from.

And finally, as a third point, there was the difficulty with semiotics. I also briefly outlined this at the beginning: As obviously as the media are closely related to the sphere of the symbolic, the concepts that classical semiotics provides as instruments appear just as obviously inadequate. If the concept of the 'sign' simply fails on the terrain of photography and film, or if formal languages, form, and formalization cannot be plausibly grasped in semiotic terms, media studies must look for alternatives. What presents itself is schema theory.

And it is precisely here that similarity turns from a difficulty into a hope: If schema formation relies on similarity as its basis, then similarity seems to take on a describable *function.* And it does so with all its peculiarities, which only a moment ago appeared to be a defect: For the 'fuzziness' is potentially not a weakness but a certain form of *organization;* and the question arises by what kind of rule similarity and schema formation are connected.

In schema theory, semiotics could find a new basis. A basis that is much more robust than any concept of signs; and this particularly because the schema concept effortlessly encompasses all media. *In the interplay of similarity and schema formation* – that would be my thesis – *the outlines of a recast semiotics are on the horizon.* So let us see what tesserae my reflection can contribute to this project.

2. Schema, Perception, Media

The first result, and an immediate output of schema theory, is the bridging between perception and media. Within schema theory, it is commonly accepted to apply the concept of schema to both sides: (1) to perceptual schemata and 'mental representations'[1] (phenomena that one would attribute to the interior of the subjects, to psychology), and likewise (2) to image stereotypes, the words of language or problems of 'form,' i.e. media phenomena in the external space.

In media studies, this bridging is by no means a given. The justified interest in understanding the media primarily from their material side[2] and in avoiding a rash 'psychologization'[3] has led to the consensus of a somewhat superficial materialism. One favors cultural techniques, 'actors,' practices, technology, and signifiers – everything that is considered materially observable – and sneers at 'soft' things like people,[4] 'meaning,' or the signified. With the rediscovered media anthropology and affect research, however, there have always been alternative approaches as well.

The concept of schema poses the question anew. In my eyes, media studies must have an interest in grasping both spaces – the material outside space and the inner space in the minds and bodies of people – in compatible terms. There are no media that are independent of people, and the concept of schema seems to me to make the interrelation between the two more transparent.

The second interesting aspect of the concept of schema is that, following the path of perception, we have to problematize the role of media in understanding the world and in knowledge acquisition. This, as I said, is opposed to the self-evident orientation towards 'communication,' which still (explicitly or implicitly) determines many media theories;[5] and the fact that media – similar to perception, integrated into perception and in interrelation with it – open up the world and essentially co-determine our access to reality, also means a reorientation for the field of media studies. The fervor for ANT and the increasing interest in philosophy of science and epistemology heralds this reorientation; but perhaps the question is a more general one; and perhaps media studies needs its own set of terms to model the medial access to the world. The notion of schema, I think, could be one of them.

And thirdly, there is (of course) similarity. In the concept of schema – unlike in that of the sign, for example – similarity is always already taken into account, and with it the question of what productive-functional role it may assume. The fact that schema formation reduces complexity and wrests structure from the overwhelmingly complex world that needs to be comprehended is suitable for shifting the focus of our understanding of media. No one would probably deny complexity reduction and the building of structure; but up to now they have not been the focus of a more general understanding of media.

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[1] Schlicht, Tobias; Smortchkova, Joulia (eds.): Mentale Repräsentationen. Grundlagentexte. Berlin: Suhrkamp 2018.

[2] Cf.: Gumbrecht, Hans Ulrich; Pfeiffer, K. Ludwig (eds.): Materialität der Kommunikation. Frankfurt am Main: Suhrkamp 1988.

[3] ...the accusation of psychologization has already been made against de Saussure's concept of 'associative axes.'

[4] ...which, for example, Kittler, in the gesture of the anti-humanist, liked to call 'so-called'...

[5] Explicitly, for example, in the communication sciences, which carry the reference in their name; the many forms of implicit reference are shown, for example, in: - Peters, John Durham: Speaking into the Air. A History of the Idea of Communication. Chicago/London: University of Chicago Press 2000 [1999]; - Czitrom, Daniel J.: Media and the American Mind. From Morse to McLuhan. Chapel Hill: University of North Carolina Press 1984, p. 91ff. [1982]; - Mattelart, Armand: The Invention of Communication. Minneapolis/London 1996 [1994].

If one argues with patterns and schemata, it becomes clear that perception is not a process only of the present, but always already includes memory and past experience. This, too, can modify our media concept. As soon as one understands media as a *biotope for schema formation*, one is forced to include the time axis and to consider the process in which the schemata gain their boundaries, their 'identity,' their contour, and their relations. This means that we are dealing with longer running media *processes*.

And perhaps the connection between perception and material media techniques is even more direct: Quite obviously, as I have written in the fourth chapter, the mechanisms that Mother Nature first inscribed in our perceptual apparatus are similar to those that human history then installed as 'media' in the realm of culture. Or possibly media *imitate* and prolong what is preformed in the mechanisms of our perception.

Schema formation and similarity seem to be dominant forces in both spheres. They establish a cycle that involves subjects and material media at the same time. Our perception, our access to the world is – at least in one of its dimensions – media-based; perception and media operate in parallel and intertwined, and gain access to the world via schema formation (the establishment and fixation of similarity).

3. Identity and Difference

The realm of the similar, as I said, is located between identity and difference; only that which is neither completely identical nor completely different can be similar. So let me turn to these two categories once again.

The issue was how schemata and patterns can emerge at all. If similarity is 'soft' and 'fuzzy' and if schema formation has its basis in similarity, one will have to explain how schemata nevertheless gain boundaries, 'identity,' and contour.

The 'identity' of schemata, as has certainly become clear in my reflection, can only be a pragmatically reduced one, which must be imagined – also procedurally – as dependent on the play of similarity, identity, and difference. When Deleuze implies that the tradition of philosophical ontology has always given priority to identity, in order to then push it off the throne with a heroic gesture,[6] then this is – quite obviously – not the identity that is of interest here.[7]

And the same, I think, is true of difference. When Deleuze writes about the program of his book, "difference and repetition have taken the place of the identical and the negative, of

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[6] Deleuze, Gilles: Difference and Repetition. NY: Columbia UP 1993, pp. 15f., 33ff., 51f.… [1968].

[7] As I said, I am far more concerned with 'recognition,' which Deleuze also clearly rejects: "The form of recognition has never sanctioned anything but the recognisable and the recognised, form will never inspire anything but conformities. Moreover, while philosophy refers to a common sense as its implicit presupposition, what need has common sense of philosophy? Common sense shows every day – unfortunately – that it is capable of producing philosophy in its own way. Therein lies a costly double danger for philosophy. On the one hand, it is apparent that acts of recognition exist and occupy a large part of our daily life: this is a table, this is an apple, this the piece of wax […]. But who can believe that the destiny of thought is at stake in these acts, and that when we recognise, we are thinking? […] We said above that the image of thought must be judged on the basis of what it claims in principle, not on the basis of empirical objections. However, the criticism that must be addressed to this image of thought is precisely that it has based its supposed principle upon extrapolation from certain facts, particularly insignificant facts such as recognition, everyday banality in person; as though thought should not seek its models among stranger and more compromising adventures." (Deleuze, Difference and Repetition, op. cit., p. 135). But if acts of recognition "exist and occupy a large part of our daily life," would this not be reason enough to be interested in recognition, and in its role in cognition? Recognition may be part of our everyday experience. But as far as the theory of media is concerned, its role is unclear. As is, therefore, 'identity.'

identity and contradiction,"[8] then I would say – admittedly from the vantage point of a non-philosopher – why should that be? Why should difference take precedence in this way? Are not all five – difference, repetition, identity, negativity, and contradiction – in equal need of explanation? And in need of explanation not on the heights of philosophy, but first functionally, in the attempt to describe their interplay by observing media processes? This was the reason for focusing my considerations precisely on the recognition that Deleuze calls an "extrapolation from certain […] particularly insignificant facts […], everyday banality in person."[9]

The result of my consideration was that in the process of schema formation, similarity does not remain what it is. I described schema formation as dependent on repetition, as a *cycle* that decides in each run anew about similarity and dissimilarity, 'identity' and difference. With the outcome that at the pole of 'identity' the most similar cases accumulate (or those that are considered as similar as possible), so that from the aggregation of these similar cases a schema is formed.

What is less similar or dissimilar – that was the second crucial point – is sorted out and sent off to another schema. Less similar or dissimilar means *different*; what is less similar or dissimilar is *distinguished*. And difference, too, will have to be conceptualized – apart from a philosophical consideration – as being a pragmatically reduced one.

'Identity' and difference, attraction and repulsion interact; their interplay allows the schemata to gain stability, to strengthen their boundaries and identity with each new case, each run through the cycle. The schemata emerge in a process of *hardening*. And along with the schemata, the semantic space emerges in which these schemata – positioned relationally – have their respective 'places.'[10]

Somewhat riskily, one might call this a *second-order articulation*; second-order because one would speak of 'articulation' first at the level of individual material utterances, and risky insofar as it is certainly sensible to limit the term to that level...

The schemata harden, but they resemble similarity in that they also remain – at least relatively – 'soft.' None of the individual cases falling under a schema completely fulfill it. Thus, for the concept of schema – just as for that of similarity – a certain 'vagueness' remains constitutive.

4. Signs

At this point the *signs* finally come into play. If my consideration is a semiotic one, or at least claims to contribute tesserae to a reconditioned semiotics, then it will have to make a proposal also to the central concept of the sign.

And the key points have already been mentioned. Schema formation is a process of typification and hardening. The assessment of similarity not only accentuates certain aspects and excludes the dissimilar, but also creates a new entity – namely the schema itself – that enters the world and begins a life of its own.

And when typification and hardening are well advanced, one would speak of a 'sign.' Signs retain and immobilize – now in actual tangible form – what were once judgments and hypotheses about similarities.

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[8] Deleuze, ibid, p. XIX.

[9] I quoted the passage in footnote 7...

[10] ...in my eleventh chapter, I warned against conceiving semantic relations straightforwardly (or metaphorically) in topological terms...

This makes it possible to play these special things – the signs – back into the discourse and to operate with them in the discourse. As placeholders, as conventionalized-hardened-preconceived judgments about similarity, they function like a ready-made part: all judgments about similarity which are incorporated in the sign no longer have to be made live in the discourse. And at the same time, this is the dialectic, the hypotheses about similarity that the sign contains are retested with each new usage.

My proposal, then, is to take the notion of schema more seriously than the concept of sign, and to view signs as a form of schema that is particularly hardened.

Such a determination not only builds bridges between perception, technical images (photography and film), and explicit sign systems, such as writing and language, but it also allows us to grasp the difference between these media: because the technical images, photography and film, possibly exist only because they are precisely less hardened than linguistic signs. By presenting – that was the point in my fourth chapter – concreta, they show schema formation in actu; and they make visible the process which is petrified and hidden in concepts and signs.

5. Once Again, More Precisely...

Possibly, however, it may be good to look at the thesis again in a little more detail. Signs, like schemata, emerge in the process of hardening. Only when schemata reach a certain degree of stability, when their identity is firmly consolidated and they are sufficiently differentiated and set apart from each other, schemata can become signs. Signs, then, are schemata that are highly typified and stably conventionalized. And signs are characterized by the fact that the schema carries a label. One has chosen a material signifier that now stands for the schema.

While the schema had its precarious place in the minds of many, the sign appears as an independent thing. As a material signifier, it enters – thing among things – into social circulation; and once reified, the schema, which is now a sign, can claim all the properties of things: a material existence in external space, operability/manipulability, material persistence (duration), intersubjective accessibility, and several other qualities.

In the sphere of signs (and that means the media), what has been said for schemata continues: The same dialectic between identifying and differentiating reigns; now it is the singular sign on which the meanings accumulate and which distances itself from the other signs via differentiation.

The same rules apply: Signs are also dependent on repetition, integrated in cycles that connect single event (actualization/utterance) and schema/sign; here, too, we find accumulation and ‘condensation.’ Now, however, the play of identifying and differentiating unfolds in the discourse; and it is the discourses that feed the sign as a product of accumulation (in the case of the schema, these were perception, event, or ‘experience’). The material that enters into the accumulation of signs is already symbolically pre-structured.

And at the same time, the decisive feature that separates the signs from the schemata becomes clear here: I described it in my ninth chapter: In the case of the sign, the separation from the other signs always already seems to be guaranteed. The spatial distance, the white space, which, for example, separates letters and words from each other, seems – together with the high degree of typification – to secure the ‘identity’ of the signs; the basis for how we take for granted that writing consists of ‘signs.’

In photography and film such white empty spaces do not exist; the image cannot be dismantled into material ‘elements,’ and it remains up to the recipient to isolate ‘objects,’ for example. Accordingly, the intuition resists speaking of ‘signs’ here; and accordingly, the semiotics of the

1960s shipwrecked in the project of nevertheless asserting such signs. Hence my proposal to use the more general concept of the schema instead of that of the sign. And, starting from there, to describe what the systematic preconditions are for recipients to nonetheless dissect images in the process of understanding.

At the same time, one will have to realize that also in the case of writing, the seemingly clear organization is less evident than one should think. For *although* it is true that in the structure of the signifying material (in the empty spaces between the individual signs) an organization is always already guaranteed, and *although* it is true that the signs are highly typified and seem to be able to assert 'identity' unproblematically – all this, however, obscures the fact that ultimately the signs also remain dependent on the time axis, are a product of history and hardening.

And this in several respects. Media-historically, insofar as schema formation reaches much further back – ultimately into natural history – and historically forms the basis of the formation of signs; by definition, insofar as – if one follows my thesis – schemata 'harden' into signs. And principally, insofar as signs preserve all the peculiarities of schema formation: For signs, too, despite the appearance of material stability, can claim only a very relative firmness or identity for themselves; since they remain dependent on discourse, and discourse writes back into the sign with each actualization (with each run of the cycle), they can counter the threat of displacement only with the weight they have gained in past cycles, in accumulation and condensation.

It is, I think, a decisive gain of the outlined schema concept that it also ties the concept of the sign back to the time axis, dynamizing and liquifying it. Here, above all, it becomes clear that the alleged 'identity' is by no means an eternal one.

6. Mimesis

Considerations about mimesis have only played a marginal role in my text, although they suggest themselves in the context of similarity. Now, however, I shall venture at least a single thesis on this almost intimidatingly difficult question.

Mimesis was already a classical category of ancient Greek aesthetics and is often understood – abbreviated – as 'imitation.' Derived from the μῖμος, the performer in the theater, art as a whole was regarded as mimetic, although the term has many facets of meaning and in antiquity also included representations without an antetype, i.e. without 'imitation.'

Whenever it really is a matter of imitation, similarity – needless to say – comes into play. The portrait is measured by whether it 'resembles' the person portrayed, and a TV thriller is demanded to be 'realistic,' i.e. to take up certain aspects of everyday experience and to incorporate them into the space of fiction. Mimesis is always linked to the question of how art and the media relate to the world.

Thus mimesis stands for a very precarious type of resemblance, because imitation crosses the boundary between the non-symbolic and the symbolic. And in modernity, almost all elements that play a role here have been discarded: With abstraction, art seemed to leave the terrain of 'imitation;' art theory turned away from notions such as 'mirroring;'[11] in semiotics, signified and reference were dismantled, and the question of how signs relate to the world was first declared naive and finally taboo. Media studies adopted the cliché that signs only refer to other signs and no longer to things of the world, or, supported by a (misunderstood?) discourse

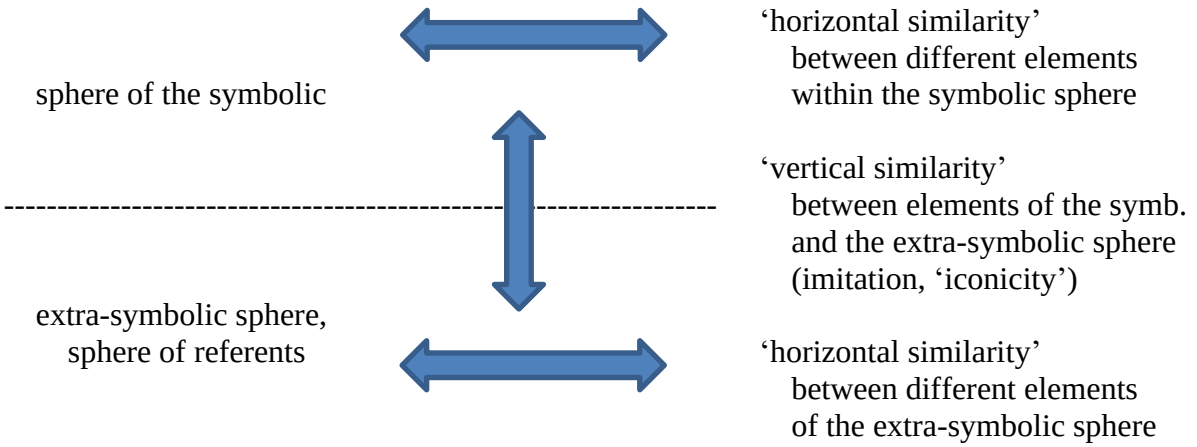
[11] The thesis of 'reflection'/'mirroring' (Widerspiegelung) was advocated by Lukacs, for example (L., Georg: Ästhetik. In: Werke Bd. 11 und 12, Neuwied/Berlin: Luchterhand 1963), and incurred the wrath of literally hundreds of authors (only some of whom had even read the book).

analysis and theories of performativity, denied that one should distinguish between the symbolic and the extra-symbolic at all.

As valuable the arguments are as *critical ones,* I do not think that the *problem* of reference is settled by them. The difficult question of what kind of relation the signs maintain to the world proves to be stubbornly vital and does not care whether the theory has valid answers.

Simplified answers, however, are indeed unacceptable. While it seemed plausible for a long time, for instance, to distinguish arbitrary from iconic signs, and to define the former as 'social agreement' and the latter by the fact that – for instance in photography – the image *resembles* the depicted, this certainly cannot be maintained.[12] If it is a matter of resemblance, and if I have insisted on a 'mimetic' dimension in my text, then certainly not in this sense. It must be about a less direct resemblance. So what can be said about it?

When I have spoken of 'similarity,' I have done so initially in avoidance of the boundary in question, i.e., with regard to elements that are either *all* symbolic or all extra-symbolic. I would like to call this similarity 'horizontal,' as opposed to a 'vertical' similarity that crosses the boundary. (To maintain the boundary itself in a definitional sense, however, I consider inevitable).

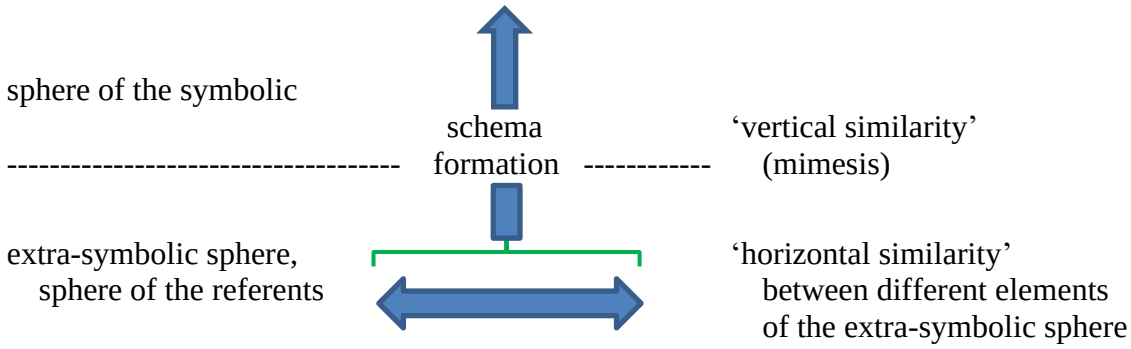


Mimesis and imitation would belong to the 'vertical' type. But what is then gained by my restriction? Don't mimesis and world reference then simply fall out of my consideration?

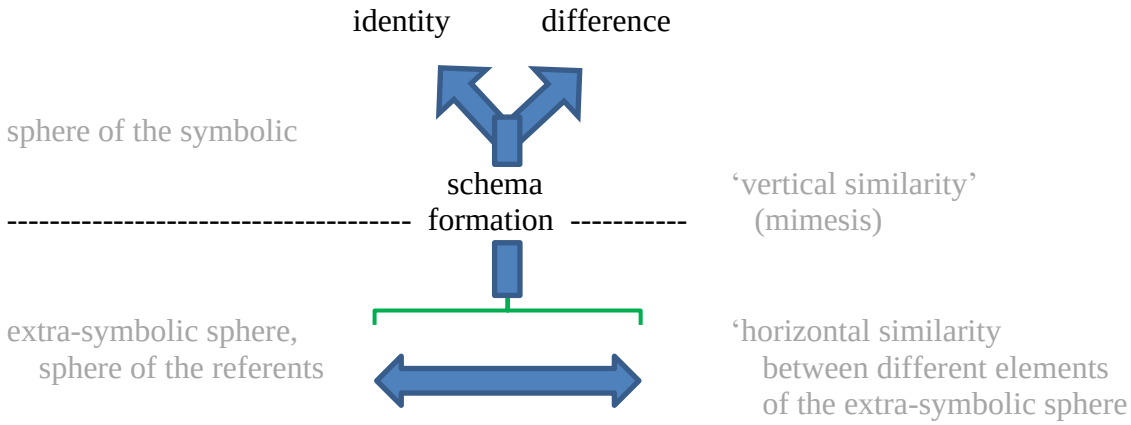
Indeed, I think that only an indirect path leads from horizontal to vertical similarity and to mimesis. If perception detects similarity between two elements it finds in the perceptual field, then this similarity remains 'horizontal.' But if this perception repeats itself and solidifies step by step into a *schema*, it will cross the boundary at some point, simply because schemata in general are symbolic. Horizontal similarity, that would be my thesis, turns into vertical similarity.

Accordingly, the sketch attempted above would have to be modified:

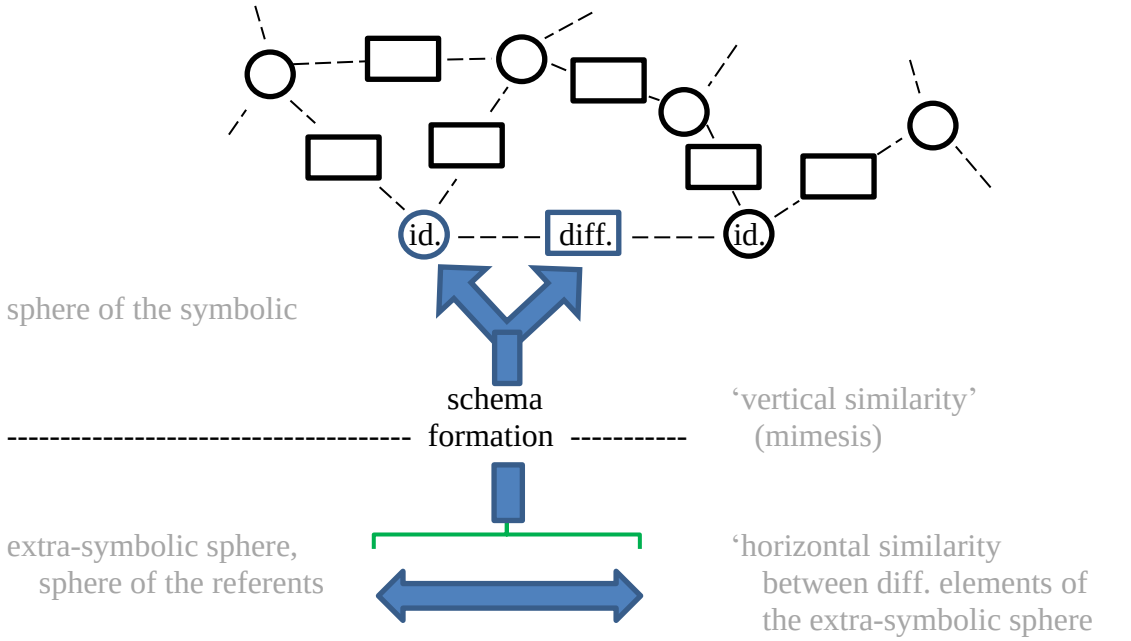
[12] "The natural resemblance of an image to the reality it represents is theoretically expressed by the term 'iconic sign.' Now this concept is repeatedly subjected to *revision* [...]. [...] The conviction that the iconic sign seemed to be unassailable in contrast to the arbitrariness of the linguistic sign collapses, leaving us with the suspicion that the iconic sign, too, is entirely arbitrary, conventional, and unfounded." (Eco, Umberto: Die Gliederung des filmischen Code. In: Knilli, Friedrich (ed.): Semiotik des Films. München: Fischer Athenäum 1971, pp. 70-93, here p. 73f. (transl. and emph. H. W.)).



In this sense, vertical similarity is in no way dependent on the fact that the signifiers and the signified actually 'resemble' each other (and certainly not individual things and individual signs, as 'iconicity' assumes). *Rather, the assertion of 'similarity' is a matter of structure:* signs and schemata are related to reality because they record similarity. Schema formation reworks similarity into schemata. *What emerges is a system of differential schemata that records similarity at the pole of 'identity' and distinction at the pole of 'difference.'*



Identity and difference harden in repetition; and it is in the interplay between identities and differences that the network of symbolic representations is articulated, which – taken as a whole – contains a very large number of identities and differences:



Only this network can claim to represent reality (the sphere of the extra-symbolic) and to be 'mimetic.' And this also only because an infinite number of perceptions, observations, acts of thinking, and distinctions – in condensed form – have been laid down in its structure.

Whether the net represents the reality adequately or inadequately is another matter. But in any case: Since it takes its path via schema formation, vertical similarity can be only a *"nonsensical"* one.

8. The Process of Semiosis

The semiotic, the world of signs, is not based on the world as it is, but on perceptual schemata, and more generally: on schematization processes. Signs benefit from the fact that the world is always already a structured and schematized one; and they carry this structuring and schematization further by reifying the schemata themselves. The material signifiers provide the schemata with tangible labels in order to stabilize them and to fix their 'identity.'

And because signs are dependent on the use of signs (and thus again on iterations), the double movement also continues in the semiotic sphere: Every single iteration fosters the identity and stability of the individual sign and its differentiation from other signs.

And finally, the abstract character of signs also goes back to schematization: If it is possible to make accessible a very complex world with the help of a relatively small number of signs, it is only because the signs are highly typified, more schematic and more abstract than what is signified. Abstraction, too, is the result of the process of conventionalization and typification outlined here; and thus it seems possible to discuss even problems of *form* and specifically 'abstract' systems like formal languages or even music[13] in compatible terms.

This is – in my eyes – the basic mechanism of semiosis,[14] the rule on which everything that has to do with signs has its foundation.

9. Similarity

So what does this mean – vice versa, so to speak – for similarity? I think that also here an answer is now possible. *Semiosis is a machine that splits up the similar and decomposes it into identity and difference.*

If theory rejects similarity and favors identity and difference,[15] then it only reenacts what takes place within the media themselves, which – ever since media have existed – is their main process, their characteristic, the actual work that they do: *the media constantly rework similarity into identity and difference*.

If similarity is threatening, buzzingly ambiguous and hardly capable of being theorized, identity and difference must appear as a secure bulwark. Schema formation, sign processes, and sign systems, which, as I have shown, depend on similarity for their functioning, therefore simultaneously stand for the overcoming of similarity; for its transformation into something solid that is no longer threatening or not quite so threatening.

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[13] ...clarifying this would certainly be a more than interesting task in its own right...

[14] Once again: 'Mechanism,' as I have said several times, is a metaphor, because the matter – of course – is not a mechanical one; it is meant to draw attention to the fact that it is about regularities; about an interplay of many factors that are functionally interconnected and that itself has a stably conventionalized character. (In the same sense, Freud, for instance, spoke of a 'psychic apparatus'...).

[15] ...difference more than identity; that was the thesis in my third chapter.

And at the same time this solution is illusory because the similarity – having barely been banished – returns like something repressed. Firstly, insofar as there is no actual 'identity,' because identity is nothing but an extreme in the spectrum of similarity, and in the process of identifying there is always something left that remains dissimilar after all and undermines any 'identity'; secondly, because – even if this is more controversial – the same ultimately holds true for difference; and finally, insofar as the iterations by no means only stabilize the signs; because each new iteration, this was Derrida's argument, exposes the sign to the challenges of a new context, which opens up the game of identity and difference anew.

If there is any truth in this, *signs emerge from the material of similarity, which they simultaneously leave behind and make forgotten*. Identity and difference are the result of over-accentuation; 'identity' exaggerates the aspect of similarity until – at least seemingly – every trace of difference evaporates; 'difference' over-accentuates the differences that separate things, even if they are similar in other respects.[16]

As an exaggeration/over-accentuation, identity and difference are less stable than thought. Similarity haunts them. In this respect, too, similarity proves to be surprisingly vital...

10. Media

Schema and sign – and one will have to emphasize this again, because it is by no means a consensus or standard in media studies – thus move into the center of the media definition. Not communication or technology, not the individual media, which in their diversity always draw attention to themselves, not 'information' or 'the digital,' but alone the common/comprehensive property of operating with schematization is what constitutes media.

Media, that would be my concluding thesis, organize similarity. Or more precisely:

1. *Media are social machines that reduce complexity by observing similarity, that schematize/ typify it, and make it available to the discourse in typified form as a set of signs.*

2. *Media banish the uncanny inherent in similarity by splitting it into identity and difference, through the creation of signs as quasi-objects, through conventionalization and reification.*

3. *And at the same time, every new text, every new image, every algorithm raises the problem anew and constantly restarts the game between similar and dissimilar, identity and difference – testing the already established signs again and again.*

[16] "Rosch et al. (1976) argue that *the distribution of features among concepts results in natural clusters that maximize within-category similarity and minimize between-category similarity."* (Ramscar, Michael; Port, Robert: Categorization (without categories). In: Dabrowska, E.; Divjak, D. (eds.): Handbook of Cognitive Linguistics. Berlin/Boston: de Gruyter Mouton, pp. 75-99, p. 81 (emphasis H. W.)). The passage has already been quoted in the chapter 'Identity.'