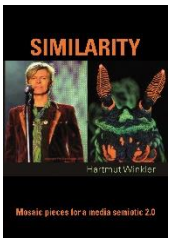
Taken from the book:
Winkler, Hartmut: Similarity. Mosaic Pieces for a Media Semiotic 2.0
Online publication 2024
https://homepages.uni-paderborn.de/winkler/Winkler--Similarity.pdf
First published in German: W., H.: Ähnlichkeit. Berlin: Kadmos 2021
The German text is available online:
https://homepages.uni-paderborn.de/winkler/Winkler--Aehnlichkeit.pdf



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.

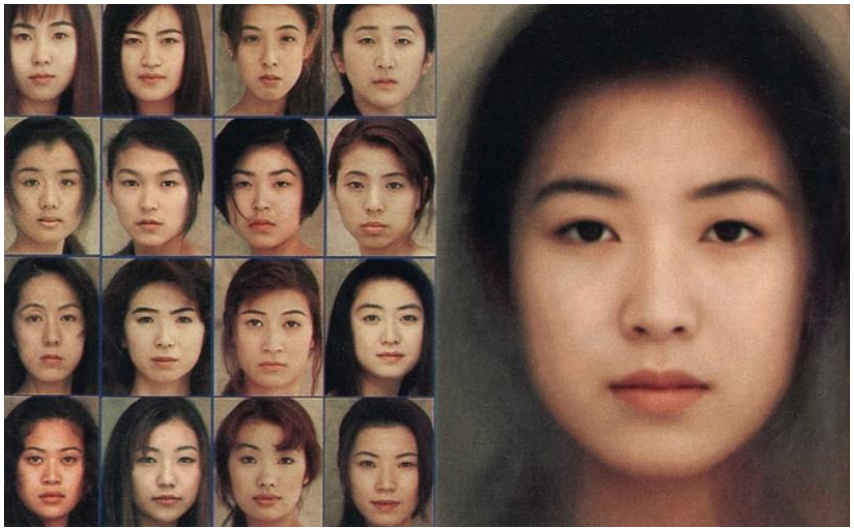
But is this really all there is to be said? First of all, it is striking that photography and film proceed quite predominantly *exemplarily*. The respective individual almost never stands for itself, or only for itself, but in the overwhelming number of cases the presented, in its respective concreteness, 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.

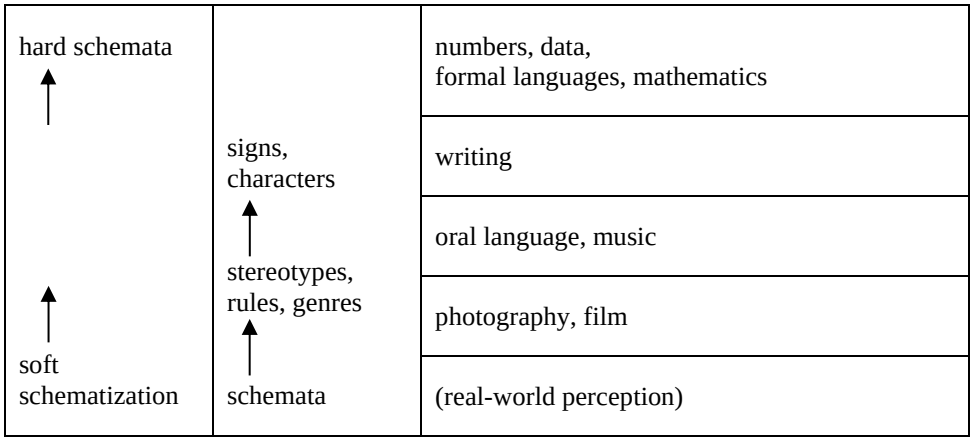
At the same time – and this is indeed more than important – *composite photography is a process which autonomously establishes the tertium comparationis.* This suggests that in *any material,* schema formation can begin solely according to the scale of empirically occurring similarity/ repetition.[43] 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]



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 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.

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[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.).

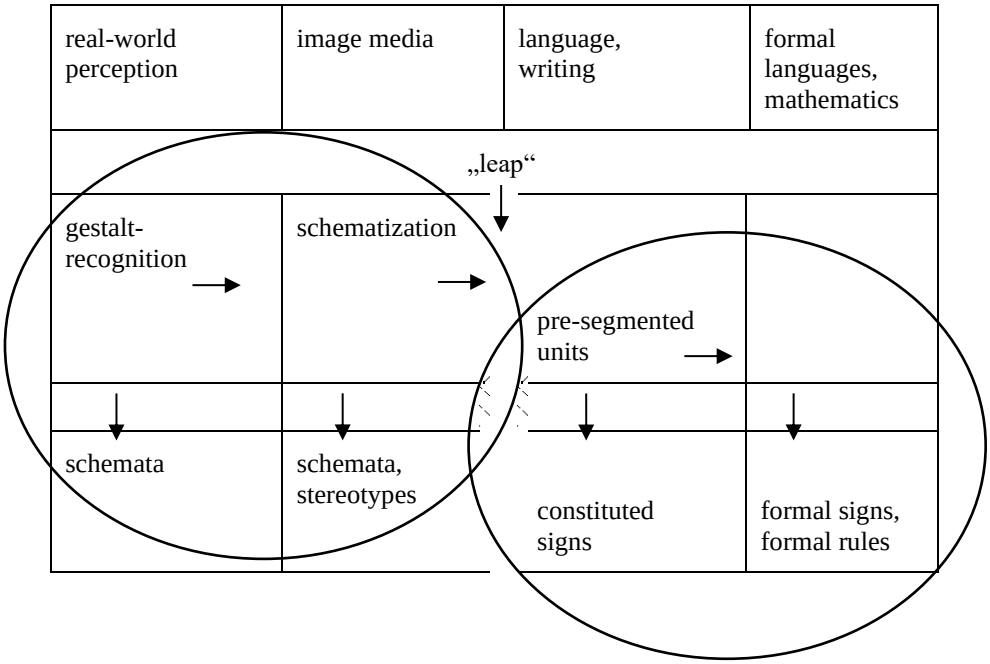
[44] I have taken the figure from my book: W., H.: Basiswissen Medien. Frankfurt am Main: Fischer 2008, p. 258.

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]

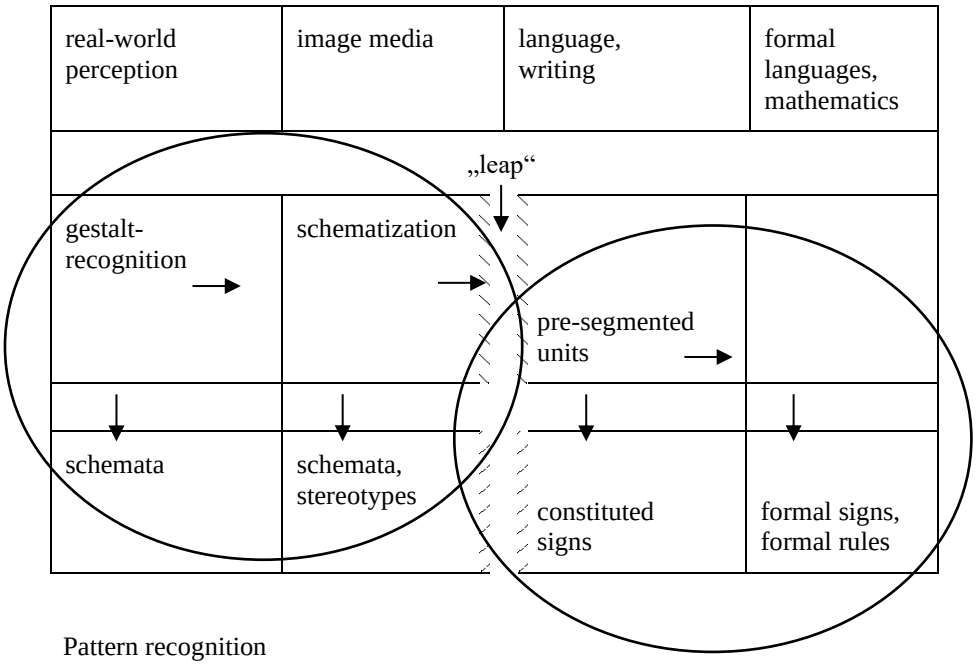


[45] Ibid, p. 271.

[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 institutionalized into a code. The difficulty here is that once the code is constituted, its 'soft'

[47] Ibid.

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.