

Figures of Thought – The Use of Diagrams in Science and Art

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The article is divided into the following sections:

Use of Term – Diagrammatics Study
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figura, Figure, Figuration
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The term "figure of thought" is found in the most diverse disciplines. Several variations to exemplify this include:

epistemological figure of thought, philosophical cognitive theory figure of thought, hermeneutic figure of thought, difference theory figure of thought, systemic figure of thought,
figure of thought in Modernism, Kantian figure of thought, psychoanalytical figure of thought, ... etc.

In a sense, figures of thought unlock the *toolbox* of a discipline. This article is intended to explore the toolboxes of image sciences and, in particular, of diagrammatics/graphematics.

In the context of research on "diagrammatic thinking" and how diagrams are concretely implemented in drawing, the term "figure" of thought appears in an expanded field of meaning.

To begin with, I would like to briefly explain how the term "figure of thought" came to be productive in my studies:

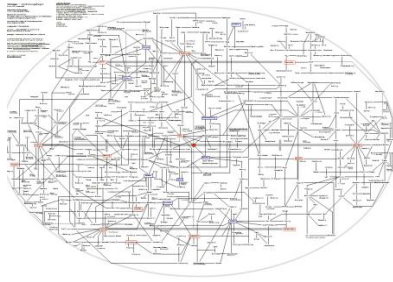
Use of the term in the diagrammatics study "On the Benefits of Schematic Drawings"
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The term "**figure of thought**" is already found in the diagrammatic study "On the Benefits of Schematic Drawings" (2004) on the first page of the introductory chapter ([LINK](#)) .
For over two years (*following the first mapping exhibitions in TransPublic Linz / 2002*), I had attempted to base my diagram collection on a manageable group of basic types. Degree of order and explicitness of order were defined as the *coordinates of order*. Then the term "forms of order" developed from this and subsequently the term "**figure of order**".

Quotation from the study: "These non-mimetic forms of order can be seen in the most diverse questions of content as a foundation from the perspective of representation technique. From the perspective of content, they are generally quite neutral, even though certain content-defined figures of thought have proven useful in terms of an ordering technique within the framework of application."

From the "figure of order" to the "figure of thought":

It was certainly the development of the poster with the title >Form Questions - as Questions of Order< (August 2004) ([LINK Fig. 1](#)) that provided the background for the choice of the term "**figure of thought**".



(Fig. 1)

In her letter from 24 August 2004, Astrit Schmidt-Burkhardt commented on this poster with the words "elementary ... fundamental ... inexorable", and she continued: "**form questions/figures of thought**, these must be seen together." From my response, it is clear that I owe the term "figure of thought" to this commentary.

In this poster (on the form question), an attempt was made to compile all the figures of order that can also be grasped well in verbal terms. These include, for instance: row, network, tree, rhizome, matrix, album, atlas, collage, ... etc.

The central idea in this collection of terms was that it had to deal with *patterns* or *figures* that could also be implemented in drawing (or gesturally), in other words *illustratively*. Hence there was no room in this collection for metaphors, or they were only allowed as an additional reading.

Quotation from the study: "In a further poster work (*Form Questions – as Questions of Order*), an attempt was made to arrange a collection of illustrative figures of thought. In this way, it is possible to show how deeply diagrammatic figures of order in thinking are also verbally anchored.

In the quoted excerpts from the study, one thus finds the formulations "content-determined figures of thought" and "illustrative figures of thought". Even though the diagrammatic patterns of order were intended to be open to any content and were therefore consistently imagined a-semantically, it was clear from the beginning that, for example, in treatments of politics of power terms like *hierarchy* and *centrality* were usually visualized with tree structures and concentric circle forms. It is important to take these content-related preferences and special application contexts into consideration from the beginning, in order to learn to assess spontaneous associations and application advantages. This approach is to be covered in more detail elsewhere in "Rhetorics of Graphical Elements" (DG/2010). ([LINK](#))

A closer analysis of the last two quotation sentences indicates that in these initial considerations in 2004, the relationship between "illustrative figures of thought" and "diagrammatic figures of order" was not yet really clarified.

The majority of forms assembled on the poster deal with designations of figures of order. Clarification is still needed on how figures of thought are related to the figures of order.

Terms of Thought in Networked Form

In addition to the diagrammatic studies, there is also another reason why I am so fascinated by the concept of the 'figure of thought'. From 1996-1998 I developed a collection of concepts of thought and assembled them in a networked form (with 7000 edges) on thematic plateaus. Since 2004, this networked structure has also been available (*thanks to the software Pajek*) as an integral poster (LINK Fig. 2). The poster includes concepts such as:

networking thinking, rhizomatic thinking, system-oriented thinking, ordering thinking, geometrical thinking, logical thinking, typographical thinking, topological thinking, conceptual thinking, pictorial thinking ... and also the diagrammatic thinking that is to be found in this collection ([LINK](#)).



Fig. 2

This attempt at conceptual clarification led to a paradoxical insight: with every further finding (600 were found in book titles alone), the verb 'thinking' dissolved into increasingly detailed aspect variations. What ultimately remained was the fascination with the semantic range of the adjective-supported field of meaning and the certainty that that we do not really know, even in the age of AI research, how thinking could be grasped in the operative sense.

Therefore, the question arises for me as to whether the concept of the 'figure of thought' now presents a reasonable chance of coming closer to "diagrammatic thinking", or whether we have again wandered into the mists of a gigantic field of meaning.

Figures of Thinking in Rhetorics

Perhaps design theory will help us to develop a pragmatic approach: in his study 'Visual Verbal Rhetorics', in the section "Rhetorical Figures", Gui Bonsiepe introduces the concepts '**word figures**' and '**figures of thinking**'.

"The defining characteristic of a rhetorical figure is – according to conventional understanding – the deviation from normal usage to increase the communicative effectiveness. The figures can be divided into two classes:

- word figures that relate to the meaning of a word or the positions of words in a sentence;
- figures of thinking that relate to the forming and organization of information."

In rhetorics the 'figure of thought' serves to structure the thought process. These figures of thought are recognizable by a certain syntax. In his compact representation of the concept of the figure of thinking, Bonsiepe manages to make it diagrammatically useful through the aspect of organization. In addition to the '**figure of thought**', the concept of the '**figure of thinking**' is additionally available to us.

It thus remains to be clarified how the structuring of the thought process (i.e. the figure of thinking) can be reflected on paper in concrete application as an 'ordering figure'.

Of course, everything would be much simpler, if we could already formulate (with C.S. Peirce) what is to be understood as 'diagrammatic thinking' in detail. For now, however, we must make do with the analysis of forms of the figures of order that can be grasped (on paper).

In his formulation, "*figures of thinking that relate to the forming and organization of information*", Bonsiepe elegantly evades the question of implementation as well. This relatedness of the figure of thinking – to concrete organization (as a pattern of order) – is not explained in more detail.

figura, Figure, Figuration

Similarly colorful as in the case of concepts of thinking is the concept of the 'figure' or 'figuration'. A first insight into this is conveyed by the essays in the book *Figure and Figuration – Studies on Perception and Knowledge* (2007).

In his article 'The Iconic Figuration' (GB/2007), Gottfried Boehm focuses in the introduction on the **flexibility of figuration** in relation to form and schema:

"The new concept of figuration reinforces aspects that are already found in the old word 'figura', first found in the 2nd century BC in the writings of Terence. In his seminal analysis, Erich Auerbach investigated Greek pre-concepts and their further semantic development until the end of the Middle Ages. Along with the *plastic*, he especially emphasizes the dominant flexibility of the figura, which clearly distinguishes them from statically conceived concepts like 'forma', including the Greek word formations 'schema', 'morphé', 'typos' or 'eidos'.

He could not even have dreamed of the current rediscovery of this latency and its eminent rise, because it is based on specifically modern or postmodern premises, most recently on the topicality of the *performative*. This also circumscribes the orbit, in which the most recent debates about figuration have moved."

This aspect of flexibility is, in any case, helpful for further clarification.

Another form of flexibility is addressed in the picture caption for the project "Memoseum" (N. Gansterer/2009): "The Technical Museum Vienna, rearranged according to figures of thought in the process of their hardening." This turn is based on a formable or fluid figure.

Diagrammatic "Figurations" and "Figural Means"

The concept of the 'figure' (as 'figure of thought') is not easily to be grasped in the central art historical texts on diagrammatics either. The formulations leave unanswered, whether a mental figuration is involved or a drawn/painted figuration. Compare this with the statement from S. Bogen and F. Thürlemann (BT/2003):

"Because diagrams conjoin together linguistic and figural means,"

Similarly H.U. Reck: he regards "diagrams as figurative organization".

Figura as a Means of Expressing an Assemblage of Thinking

A. Patschovsky's approach of understanding diagrams as a "medium of the intellect" suggests the idea of reading the 'figura' as a figure of thought. Yet Joachim of Fiore brings the concept back to the material level of the drawing paper again:

Alexander Patschovsky (AP/2003) on the image world of Joachim of Fiore's diagrams: "The focus is more on the question of the specific 'cultural dimension' of Joachim's mental construction, which takes shape in the media form of the diagram that is typical for Joachim, the figura, as Joachim himself calls this means of expressing a complex assemblage of thinking. What remains to be clarified is therefore what the diagram as a medium of the intellect provides for conveying Joachim's construct of history."

Graphical Figures

In this consideration, I principally want to avoid mixing questions of the 'figure of thought' with a breakdown of basic types of diagrams. However, Christel Meier's use of language (on 'figuration') makes it seem meaningful to quote this (one) typization approach from Medieval diagrammatics.

Christel Meier 'The Quadrature of the Circle – Diagrammatics of the 12th Century as a Form of Symbolic Thinking and Representation' (CM/2003):

"Based on formal criteria, basically four types of diagrammatic figurations can be distinguished:

- 1) Geometrically and mathematically defined figures, such as circle, rectangle, triangle, cube, sphere, etc.
- 2) Figures that are natural or man-made objects, but can be stylized into diagram forms due to specific forms and characteristics, such as tree, ladder, wheel, wagon, building, human form, cherub, etc.

- 3) Figures that assemble a selection of concepts and relate them to one another with the help of a regular graphical form, i.e. as relational figuration, e.g. Ten Commandments or ages of life in a circle, four or twelve winds in a quadrant, etc.
- 4) Graphical Figures, in which logical operations or relations are illustrated."

On the Relationship of the Figure of Thought to the Form of Order

To avoid further complicating the issue, I will simply assume (with Gottfried Boehm) that the (dynamic) figure of thought to be mentally carried out can *not only* be a (static) form of order. The figure of thought thus becomes an operative figure of process that is applied in a (diagrammatic) performance.

The *illustrativeness* of a figure of thought can be grasped in different ways. I will start from operations that can be executed in *space* (or spatially imagined), whether through drawing, mentally tracing, mentally drafting or algorithmically simulated (shifted to virtual space, so to speak).

This basically involves a strange experiment:

To assess the illustrativeness of a thinking process that is hard to grasp (= not illustrative), we shift this process (to the outside) to a piece of paper and now observe this decelerated thinking process in a drawn implementation. In a sense, we watch ourselves over our own shoulder while 'thinking in drawing'.

Cf. C.S. Peirce (BT/2003): "In his diagrams he sees means for slowing down, controlling and revealing the motion of thinking."

Figures of thought can be located in different layers of abstraction. I do not want to start here from mathematically abstract operations of thought or those that can be followed purely *verbally*, but rather only include formulations that can also be grasped in a drawn implementation as a concrete description of the operation (or description of the procedure).

At the same time, familiar entities (such as framework, relations, fields, cuts, knots ...) should be addressed to enable an illustrative implementation or mental visualization.

The use or application of these (as earlier specified) figures of thought thus leads to forms that can be grasped (in drawing).

What does this mean for the study cited in the beginning?

In the poster study >Form Questions – as Questions of Ordering<, the concrete result forms (i.e. order forms, order shapes, order figures, order formations or order patterns) are assembled.

The forms named in the poster are the result of operatively applied figures of thought. In their application, or as they are captured in drawing, these figures of thought lead to diagrams.

This also congruent with André Reichert's approach (AR/2009):

"... It is the reality of movements of thought and figures of thought. They can be recorded in diagrams ..."

Figures of thought are also applied in the visualization of measurement data in the conception (and programming) of measurement arrangements.

The (measurement data) graphs resulting in the course of measuring or simulating can be called data figures. In general, the figures of thought applied can no longer be directly comprehended in these data figures.

I think the field is now sufficiently prepared that a set of figures of thought can be discussed in detail.

Collection of Figures of Thought

Interstitiality as a Figure of Thought (S. Krämer, D. Mersch, U. Ramming)

Spatiality / interspatiality / spatial localization

Analyses of the 'domain of image' (J. Elkins) have shown that practically all image classes (including diagrams and graphs) can be covered by the principle of interstitiality.

D. Mersch in 'Knowledge in Images' (DM/2009): "Diagrammatic structures use >interstitialities<, as the basic principle of spatiality is called."

See also Michael Andreas (MA/2008): "**Spatial Figures of Thought**"

Relationality as a Figure of Thought /

The Third as a Figure of Thought (B. Latour, M. Serres)

If one takes the view of relations seriously, one develops an eye for connecting elements, in other words for the units and phenomena that are in between, that spread out in between or (*as M. Serres says*) that impact the in-between (parasite concept).

Cf. also research on: '**Figures of the Third**' (Graduiertenkolleg),

Relational Spaces as a Figure of Thought (Olaf Breidbach – see: [OB/2001]) and **Structurality as a Figure of Thought** (M. Serres)

Field-like Correlation as a Figure of Thought (G. Dirmoser, D. Offenhuber)

Field-like Between as a Figure of Thought (V. Flusser)

The point of this mental exercise is to imagine every situative correlation (of real-world objects) as visualized field lines. On this, cf. also the visualizations of the William Forsythe Dance Company.

See also: Nicole Haitzinger (NH/2007) 'Choreography as a Figure of Thought – An Attempt at a More Complex Elucidation of the Concept'

The Form of Correlation as a Figure of Thought (G. Dirmoser, G. Spencer-Brown)

Since the concept of the 'between' was able to contribute to clarifying diagrammatics, the following question subsequently suggested itself: Does the 'between' have a form? A detailed consideration demonstrates that attempts to grasp the 'between' conceptually actually involve a 'correlation', which is to be further pursued within the framework of diagrammatic detailed considerations.

The guiding question is therefore to be formulated thus: Does the correlation have a form? Then a 'logic of the form' would be juxtaposed with the 'logic of space'. Suggestions for this can be found, among others, in George Spencer Brown's writing on 'Laws of Form'.

See the details of the study 'Does the Correlation Have a Form?' (FU Berlin 2009)

Interscription as a Figure of Thought (P. Gehring)

The concept of 'interscription' comes up in Petra Gehring's contribution to the symposium 'Diagrammatics and Philosophy' (1988), although she does not distinguish between discrete relation elements and continuous traces. This concept has served for years as the leitmotiv for my diagrammatic studies.

P. Gehring (PG/1992): "If it is a matter of finding a >good< metaphor for the theoretical invention of a dynamic constellation, why should one not speak of >interscription<, and perhaps even better than >inscription< (as the poetic thinker J. Derrida, influenced by structuralism, does), rather than of *grammein* from *diagrammein*?"

In the course of diagrammatic analyses of typographical concepts, I came to the following view (DG/2009): "In terms of media, the (primary) criterion of interstitiality connects writing and the diagram. Here the diagram offers graphical means for explicitly developing this interstitiality. This explicit development is generally an interscription, which can have both a separating and a connecting effect."

Interpictorialness as a Figure of Thought (B. Nieslony, A. Müller, L. Wittgenstein)

With Wittgenstein, 'intermediate forms' and 'interlinks' are to be addressed.

In his 'Philosophical Investigations' (LW/1984), Ludwig Wittgenstein writes in ¶122:

"A perspicuous representation produces just that understanding which consists in 'seeing connexions'. Hence the importance of finding and inventing *intermediate cases*." Complete

¶, see: **Perspicuous Representation as a Figure of Thought**

At this point, the image analyses by Boris Nieslony and Axel Müller (AM/2005) should also be mentioned. They attempt to cover forms of 'interpictoriality' in their studies.

To Draw a Distinction – as a Figure of Thought (G. Spencer-Brown, P. Maynard)

Spatial Differentiations (I)

In the study 'Laws of Form', G. Spencer-Brown (SB/1972) develops a logical notation that makes it possible to think of logical operations in a plane. His logic is based on a special form of bracketing, but also includes diagrams for complex dynamic processes (demonstrated with the example of a modular function).

See also: Patrick Maynard (PM/2005) Drawing Distinctions – The Varieties of Graphic Expression

Critical commentary from D. Mersch in 'Knowledge in Images' (DM/2009):

"It is not distinction in George Spencer-Brown's sense nor >observation> in Niklas Luhmann's sense that is the central theme of diagrammatics, but rather *deixis*. Form, appearance (*eidōs*) and *deixis* mutually interplay."

Framing as a Figure of Thought (V. Beyer, W. Kemp)

Vera Beyer shows in her study (VB/2008) the diagrammatic use of framing constructs in the art historical analysis of artefacts.

"Considering framing in this way implies understanding primary relations under >framing< – but without losing sight of the form, in which these relations are revealed in the object of the picture frame. Understanding this approach of framing as relation as an >interval< has been most extensively formulated by Louis Marin. He writes for instance: >The frame can be understood as an interval between three spaces, which connects a painting (the depicted space, the space of representation [the picture surface V.B.] and the space of presentation)<."

In the course of her image analyses, Vera Beyer superimposes diagrammatic frame constellations on the works to be studied. Central ideas of composition are reconstructed and visualized in this way.

See also: Figure and Ground (Gestalt psychology)

The Spatialization of Time as a Figure of Thought (T. Macho)

Nearly all basic types of diagrams (with one exception) are suitable for representing temporality. Research on a *diagrammatics of time* is being conducted by Thomas Macho, among others.

Continually drawing a line offers an approach to subjecting spatiality and temporality to a common view. I am indebted to Sybille Krämer and Johannes Schüle for the following quotation from Fichte (§5 of the *Foundations of Natural Right*):

"... the I that intuits itself as active intuits its activity as an act of drawing a line. That is the original schema for activity in general, as will be discovered by anyone who wants to awaken that highest intuition within himself. This original line is pure extension, that which is common to time and space and from which they first emerge through differentiation and further determination. This original line does not presuppose space, but rather space presupposes it."

See also: **Gnomon as a Figure of Thought**

Gnomon as a Figure of Thought (S. Bogen, M. Serres, G. Meynen)

Gloria Meynen demonstrates in her article (GM/2007) how it is possible to bridge a gap between a plane figure of the enumerative mathematics of antiquity, the construction of the Egyptian harp, and how it functions as a dial on a sundial with the figure of the 'gnomon'. Surveying, time measurement, music theory and illustrative mathematics meet in a figure that has also been used by Steffen Bogen as the starting point for his diagrammatic observations (SB/2003): 'Silhouette and Sundial: Forms of Art and Science Between Image and Diagram'

The Cut as a Figure of Thought (relations of overlaps) (B. Nieslony, G. Dirmoser)

This approach involves grasping diagrammatics & graphematics as the art of cutting (this approach covers topology and projection).

"It is not the topological detail observation that first makes it clear that the view of cutting has something to offer for diagrammatics. When different media come together (touch, overlap or permeate one another), then visually comprehensible borderline processes occur.

Purposely placed framework positionings and cuts mark an inside and outside.

With virtual cuts one imagines landscapes dug out and marks each position as a contour line. Or one imagines the contour lines as marking a water table (as though a river were flooding a valley)." (DG/2009)

Detailing as a Figure of Thought (W. Pichler) (“figures of the details”)

Wolfram Pichler addresses “discontinuities that found meaning”, which provide starting points for semantic interpretations in complex images. He describes the etymological connections between ‘cut’ and ‘detail’ in a way that is diagrammatically informative. See his article ‘Details of the Image’ (in the book: *What Falls out of the Picture – Figures of Detail in Art and Literature*)

Topological Differentiability as a Figure of Thought (M. Heßler, D. Mersch, W. Pichler, W. Kemp)

Spatial Differentiations (II)

Topology (as a branch of mathematics) provides important concepts to describe position relations (as qualitative space reference) in more detail. Topology is abstracted here from all metrics.

Topological basic concepts can help to grasp the proximity of elements, describing whether the elements touch or permeate one another (and are thus connected), whether elements are surrounded by something or themselves surround something else.

Mersch/Heßler (Logic of the Pictorial) (HM/2009): “Furthermore, the structure of image knowledge is characterized by a logic of contrast, which is indebted to ‘spatiality’, the ‘interstitial’ constitution of visual media, as well as (by) a ‘topological differentiability’ that virtually provides the forming of the picture space.”

On this, see also the book: *Falten, Knoten, Netze, Stülpungen in Kunst und Theorie*, article by W. Pichler: ‘Topologische Konfigurationen des Denkens und der Kunst’

Contact Relations as a Figure of Thought (G. Dirmoser)

Topology as contact relations:

“I first realized the power of the contact view in treating the topology concepts. Through the analysis of foldings, I noticed that the concept of ‘contact’ (or ‘touching’) can be considered as the counter-pole to ‘interstitiality’ (contact thus as an extreme case of interstitiality).

In topology, the ‘touch’ relationship is also addressed as ‘meet’. ‘Touch’ also forms the foundation for ‘connectedness’. Overlaying, superimposing and permeating, in other words ‘overlap’ and ‘cross’ are also based on touch or contact. This also applies to many cases of encasing, as long as the casing touches what is encased.” (DG/2009)

Projection Relations as a Figure of Thought (J. Willats, S. Bogen)

Projection as fundamental view in the classification of diagrams:

Topology (as a branch of mathematics) provides important concepts to describe position relations (as qualitative space reference) in more detail. Topology is abstracted here from all metrics, however. For this reason, it is absolutely necessary to include the view of projections for some types of diagrams. This means that projections supply the position that can be mathematically exactly determined.

A whole range of projection approaches is presented by John Wallats as ‘drawing systems’ in his book (JW/1997) *Art and Representation*. In addition, an entire system of map projections should also be noted.

Silhouette as a Figure of Thought

Shadow Images as a Figure of Thought (T.O. Roth)

Steffan Bogen also indicates in his gnomon study (SB/2003) that there is little point in stylizing a categorial boundary between (*allegedly* non-mimetic) diagrams and ‘mimetic images’. He writes: “... From the perspective of the considerations presented here, a connection between diagrammatic and pictorial aspects under the auspices of mimetic art is also to be recognized in this: a >picture< constructed according to the rules of central perspective can always also be viewed as a diagram in terms of its principles of construction. It is the image of a spatial world and simultaneously the diagrammatic depiction of optical rules, which should be valid in both the fictive and the real world. One can also say that a specific type of diagram generates images – the images are the figural dress of a diagram.”

Logical Form and Logical Image as a Figure of Thought (L. Wittgenstein)

Logical Structure as a Figure of Thought (D. Mersch)

Logical Correspondence as a Figure of Thought / Logical Framework as a Figure of Thought
In working on the ‘Tractatus logico-philosophicus’ (LW/1963) in poster form, it became clear that Wittgenstein’s formulations on ‘logical form’ and ‘logical image’ provide key passages for diagrammatics.

In the text 'Knowledge in Images' (DM/2009), D. Mersch writes: "... Consequently, diagrammatics generally contains all visual-graphical forms that allow for arguments and derivations, logical relationships or arrangements and the like in the medium of the visual. Graphematics forms a subsection of this."

In the volume 'On Certainty' (LW/1984) there is an important motto for every diagrammatic project: "A thinker is very much like a draughtsman whose aim it is to represent all the interrelations between things."

Structural Correspondence as a Figure of Thought (C.S. Peirce, L. Wittgenstein)

S. Bogen and F. Thürlemann quote C.S. Peirce: (BT/2003) "Many diagrams resemble their objects not at all in looks; it is only in respect to the relations of their parts that their likeness consists."

Elsewhere Peirce accordingly defines the diagram as an icon, "in which the relations of the parts of a sign are represented by analogous relations in parts of the sign itself."

Transplanal Images as a Figure of Thought (J. Schröter)

In any case, the formulations 'spatial correlation' and 'interstitiality' already suggest that there is not point in limiting diagrammatic and graphematic forms of order to the plane. This can be easily comprehended through the field of application of exhibition design and the field of 'diagrammatic architecture' (taking the examples of Peter Eisenmann, Greg Lynn, VanBerkel and Bos, et al.). Jens Schröter's line of reasoning – in his book on the concept of 'transplanal images' – also clearly goes in this direction. See (JS/2009): 'On the History, Theory and Media Aesthetics of the Technically Transplanal Image'.

Gaze Relations as a Figure of Thought (E. Schürmann, G. Didi-Huberman)

Here it is a matter of clarifying (with Eva Schürmann [ES/2008] et al.) which role the gaze plays in image perception and thus in the perception of diagrams. This also addresses how every perceiving 'formation' is to be understood as an active process (which is also addressed by the *projection opened to the outside* of our remote senses).

Perception of Gestalt as a Figure of Thought (W. Metzger, M. Wertheimer, S. Palmer)

Detailed observations on concrete diagram forms are recalled by gestalt laws or the grouping laws of gestalt psychology.

The ten gestalt laws offer an important access to diagrammatic forms.

Logic of Contrast as a Figure of Thought (G. Boehm – Logic of the Contrast)

Spatial Differentiations (III)

Mersch/Heßler (Logic of the Pictorial) (HM/2009): "Furthermore, the structure of image knowledge is characterized by a logic of contrast, which is indebted to 'spatiality', the 'interstitial' constitution of visual media, as well as (by) a 'topological differentiability' that virtually provides the forming of the picture space."

This is also affirmed by S. Bogen and F. Thürlemann (BT/2003).

On A.J. Greimas' approach they write: "... Diagrams – as the examples we have analysed prove – also specifically aim to depict content structures at the level of expression in binary relations and oppositions, i.e. sensually perceptible analogies and contrasts, or to first constitute them in this way. Very different categories are employed here: for instance, topological (meaning distinctions such as left/right, up/down, central/peripheral) or typographical (e.g. the opposites of majuscules vs. miniscule or italics vs. non-italics)." On this see also the study 'DIAGRAMMATIC LAYOUTING'

A central proponent of this logic of contrast is G. Boehm (GB/2007 – *Section: A Logic of Contrasts*): "Every figure, even the verbal figure, silently claims a contrast for its plastic and vivid appearance. The >figura< sets itself apart from the context, e.g. of the speech. It is only thus that it gains specificity and a clear profile. It must appear *sufficiently different* to be recognized as itself. If there were a tumult of figures, they would rob themselves of their visibility, creating an impression of confusion and overloading."

Field-like Relations of Meaning as a Figure of Thought (V. Flusser, F. de Saussure, S. Krämer)

Field of Meaning as a Figure of Thought

In terms of visualization technique (with V. Flusser), there is a point in imagining every concept embedded (or fixed) in a field of other concepts. Being embedded in this way also *realizes* the meaning of the concept. Thus no definition nor attributed *label* is needed to convey this meaning.

This figure of thought is, among other things, the basis for studies in the form of 'semantic networks'.

Sybillie Krämer on the question of meaning (SK/2001) section 'What is >language<?': "Language signs have no meaning. Since language must consist of at least two signs, so that the value of one element is determined through its relation to other elements, there can be no single language sign.

This has implications for the theory of meaning:

There is no point in regarding language signs as carriers of meaning.

Meaning emerges between the signs and cannot be localized in the sign."

Olaf Breidbach in his study on internal representation (OB/2001): "Meaning designates ... a self-generated quality of the relational system."

Sense of Situation as a Figure of Thought (G. Dirmoser, G. Hasenhütl, C. Bartel)

Contextuality as a figure of thought

Dirk Rustemeyer's studies outline a large field of activity. Among other questions, it needs to be clarified how the concepts of singularity and the 'logic of sense' (G. Deleuze) can be harmonized with this view.

Sense Relations as a Figure of Thought (P. Gehring, M. Serres, G. Deleuze – "The Logic of Sense")

I would like to begin with the article 'Paradigm of a Method – The Concept of the Diagram in the Structural Thinking of M. Foucault and M. Serres' by Petra Gehring (PG/1992). The second chapter is entitled:

Topology as a Grammar of Sense: Thinking in diagrams with M. Serres

P. Gehring thus links one of the fundamental diagrammatic approaches (*topology*) with the sense view. Topology (*as a spatial arrangement of partial structures*) is discussed as a grammar of sense, in other words, brought into play as a grammatical or structural foundation for sense.

Gehring: "Beyond this, it can be shown that it is not solely the praxis of philosophy that can be imagined from the basic motif of the diagram, but that it is the processes of sense altogether that must be imagined according to a thoroughly diagrammatic model."

Gehring: "In fact, it seems to be exactly the boundary between structural mathematics and that which is called, for lack of a better term, post-structuralism, along which Serres diagram model moves:

Sense appears here as a purely relational matter and entirely in the sense of structural mathematics – to a certain extent as a connecting path or connecting line between at least two points (two sentences or assumptions)." ...

Every concrete sense relation a singular determination, a point-defining and relation-transforming arrow, a vector in a space – and all of this against the backdrop of tremendous possibilities: this results in a general model that can be played with."

Another important point of connection is provided by G. Deleuze in his study 'Logic of Sense' (GD/1993). As Deleuze describes sense relations: "*Sense is both the expressible or the expressed of the proposition, and the attribute of the state of affairs.* It turns one side toward things and one side toward propositions. But it does not merge with the proposition which expresses it any more than with the state of affairs or the quality which the proposition denotes. It is exactly the boundary between propositions and things."

Family Similarity as a Figure of Thought (L. Wittgenstein, A. Warburg)

"Clusterings are used to call attention to the similarities of presented elements. The different partial assemblies (of the ensemble of order) respectively show groups of elements, which are mutually similar. These kinds of assemblies of similar elements are often apparent at first glance – we immediately recognize the motif of the assembly, in other words, the aspects on which the assembly is based.

The maximum range of 'visually implicit attribution' can be studied through Aby Warburg's Mnemosyne Atlas. At first glance, his lapidary photo arrangements on the surface provided by the display surface simply seem to be saving space. It is only at a closer look at the pictures that we recognize that the composition of the pictures in each panel depends on certain questions. The knowledgeable observer recognizes the correlation of the pictures as a consciously set context. The pictures mutually explain one another. In the course of expert discussions, Warburg himself visualized the respectively relevant correlation with threads of yarn. In this way, his network of thoughts also became explicit in visual form. Here it should be mentioned that Warburg realized drawn networks of concepts on overview pages, so he was quite familiar with networking techniques. The smooth

transition from cluster structures to network structures can be shown very well with Warburg.
The display order in the Warburg Library also follows the principles of order described here." (DG/2009)

Formal Sequences as a Figure of Thought (G. Kubler)

G. Kubler's approach is the opposite of purely genealogical approaches. It is well suited for imagining complex parallel developments and their reciprocal influences. Kubler's approach provides a basis for the diagrammatic implementation of complex (networked) synchronopses.

G. Kubler (GK/1982): "Primary forms of expression ... occur in formal sequences. This conception is based on the presupposition that inventions are not isolated incidences, but rather mutually connected positions ..."

"Solution chains – Since it can be concluded from a sequence of artefacts, one can call the problem its intellectual form and the solution chain their category of being. This unit, which is composed of the problem and its solutions, constitutes a category of forms."

"There can be no solution chains without a concomitant problem."

Perspicuous Representation as a Figure of Thought (L. Wittgenstein, A. Warburg, A. Pichler)

In the *Philosophical Investigations* (LW/1984) Ludwig Wittgenstein wrote in ¶122:

"A main source of our failure to understand is that we do not *command a clear view* of [übersehen] the use of our words. Our grammar is lacking this sort of perspicuity [Übersichtlichkeit]. A perspicuous representation [übersichtliche Darstellung] produces just that understanding which consists in 'seeing connexions'. Hence the importance of finding and inventing intermediate cases. The concept of a perspicuous representation is of fundamental significance for us. It earmarks the form of account we give [unsere Darstellungsform], the way we look at things. (Is this a 'Weltanschauung?')"

Alois Pichler writes in his Wittgenstein study (AP/2004): "From the perspective of the *Investigations*, Wittgenstein's collaging was less a means along the way to the *single correct arrangement* than an excellent vehicle for the activity of synoptic representation, which was to allow a *re-composition* and hence also a *re-seeing* of the previously created and a new recognition of connections.

On this, see the poster with further passages from Alois Pichler.

Schematizing as a Figure of Thought (S. Krämer)

A multitude of schematic representations are found especially in academic textbooks. They are based on: reduction, simplification and a limitation to the essentials.

Display Gesture as a Figure of Thought (G. Dirmoser)

The concept of the 'display gesture' indicates possibilities for how the concept of the "rhetorical gesture" could be understood in the field of diagrammatics. Display gestures are characterized in that they can largely be applied in a way neutral to content (i.e. a-semantic). The communicative contribution is limited to indicating that potentially relevant contents are conveyed at a certain place.

This gesture can only be effective, if it is able to prevail in visually complex situations. These gestures must therefore detach themselves (from their surroundings), jump out, so to speak. They must get in the way, come into view, capture the gaze, neutralize the surroundings or physically cover them up. These pure display gestures thus serve to convey contents, but without themselves supplying a contribution to content. They are an interface, or they point to available contents.

These display gestures mark a framework situation or can also function as frames themselves in their physical form.

Linkage Form as a Figure of Thought (H.G. Grassmann, G. Chatelet)

The main reason for my current interest in the form issue is found in Hermann Günther Grassmann's writings. His 'Expansion Theory from 1844' includes the following electrifying statements (HGG/1844):

"Everything that has become through thinking (...) can have become in two ways, either through a simple act of generating, or through the twofold act of positing and linking.

What has become in the first way is the constant form or the magnitude in the narrower sense; what has become in the latter way is the discrete or linkage form."

In my explanations (and posters), I want to show that the two form classes formulated by Grassmann provide a basis for placing graphematics alongside diagrammatics.

Systemic Network as a Figure of Thought

Cellular Setup as a Figure of Thought (S. Ulam, J. von Neumann, T.O. Roth)

Cellular automata serve the modelling of spatially discrete dynamic systems.

Cybernetic Operative Connections as a Figure of Thought (S. Krämer)

Sybille Krämer writes in her thesis paper 'Travesties of Cybernetics ...':

"Just as the early modern quantification is unimaginable without the conjunction of scripturality and visualization (of the invisible: e.g. null), cybernetics is rooted in the conjunction of diagrammatics and visualization (of the invisible, e.g. the black box). What the lacuna made representable through visualization means for early modernity (vanishing point, central perspective, null, vacuum), is disruption, white noise for the cybernetic flow diagrams of communication. Cybernetics is thus also a field of realization of the – as yet still unrecognized and neglected – role of the diagrammatic. *Can cybernetics be reconstructed as diagrammatology?*"

System Differences as a Figure of Thought (N. Luhmann)

Even though Luhmann cannot be directly associated with diagrammatics, his foundation in approaches from Spencer-Brown suffices for him to be named. Luhmann's program concept, the explicit visualization of system boundaries (in other words, their interfaces) and the outlined interplay of subsystems offer models that can also be made productive in applied diagrammatics.

His famous file card system (as a complex networked structure) should also be mentioned.

Rhizomatic Root Network as a Figure of Thought (G. Deleuze, F. Guattari, André Reichert)

The figure of thought of the rhizome has become incredibly widespread.

Gilles Deleuze and Félix Guattari (DG/1977) succeeded in overcoming the corset of crystalline structure thinking in their polemic writing. This metaphor for organic complexity is also taken up in diagrammatic network visualizations (W. Bradford Paley, Benjamin Fry, Casey Reas, John Maeda, Golan Levin, Barrett Lyon, Simon Greenworld, Niels Willems, Danny Holten). See also the artworks by Julie Mehretu, Joao Modé, Ernesto Neto, Leonardo Solaas, Nina Katchadourian.

André Reichert also refers to 'rhizomatic thinking', among other things, in his dissertation proposal (AR/2008) 'Diagrammatics of Thinking. On the Beginning of Thinking and Thinking of the Beginning with Descartes, Heidegger and Deleuze'. In his study, however, he does not intend to "paint a different picture of thinking, but rather to draw diagrams of thinking along figures of thought and consider them in terms of their operativity in thinking."

Folding as a Figure of Thought (G. Deleuze, A.F. Möbius, G.W. Leibniz)

Even though most examples in the diagrammatics studies show two-dimensional forms, objects from knot topology (like the Möbius strip) indicate that all of these constellations can also be transferred to spatial angle forms and complex curved three-dimensional planes. An optimal introduction to the view of folds is provided by G. Deleuze in his book *Fold – Leibniz and the Baroque* (GD/1995).

In my diagram collection, the category of folds comprises many of the complexly formed examples that suggest it makes sense to pursue graphematics along with the view of diagrammatics.

Curve Character as a Figure of Thought (G. Lynn, G.W. Leibniz)

Since continual lines and complexly curved planes do not (may not) have any instability at their disposal, the question arises of how "continual correlation" can be used in terms of techniques of representation. Here it should be briefly mentioned that maxima, minima, zero crossings, turning points, curvatures (as a character of the curve), saddle points, etc. have a number of things to offer for scientific visualizations.

Looking at the '[curves discussion](#)' in mathematics, the view of folds (and clothoids) becomes even more fascinating. The first derivation of differentiation provides the minima and maxima of continual implementations. The second derivation of differentiation provides the turning points. The third derivation enables grasping the character of the curve. This means that there is a powerful approach to the view of turning points and clothoids that can be mathematically described.

Complex Knots as a Figure of Thought (J. Lacan, M. Epple)

A very special concept of knots is pursued within the framework of [knot topology](#).

Knots are found visualized in specialist literature, which belong to the same knot group or are topologically equivalent, but which are visually dissimilar to a degree that an amateur can find no basis for comparison and becomes more uncertain about the form question as well. For details, see Moritz Epple (ME/1999): 'The Emergence of Knot Theory'

From the view of the form question, we can expand the list of rows, chains, trees and networks with topological knots, plaits and stitch structures, even though they often only serve to visualize the theme of 'complexity' as such in concrete diagram application.

Smooth and Striated Forms as a Figure of Thought (G. Deleuze, F. Guattari, H.G. Grassmann)

On the relationship between continuity and discontinuity:

The first sentence of Deleuze's writing begins with "smooth space and striated space ...".

On the first page, based on art historical approaches, Deleuze discusses the coupling "abstract line / concrete line" and terms such as "forms of expression". About the abstract line he writes: "A line with variable direction, which draws no outline and delineates no form".

(DG/2009): "What does this mean for the question: Does 'spatial correlation' have a form? To avoid getting stuck in diagram typology, it is necessary to study the 'correlation of graphical elements' in detail. With Grassmann and Deleuze, here two classes of forms are to be considered in their correlation:

(I) the discrete correlation (with Deleuze: the striated / with Grassmann: the form of linkage) and (II) the continual correlation (with Deleuze: the smooth / with Grassmann: the constant form)."

Data Physiognomies as a Figure of Thought

In conjunction with the complexly curved *smooth* forms, it is meaningful to speak of physiognomies. Our perception tends to grasp physiognomies as expressive entities. This results in issues that are interesting for scientific visualizations (e.g. the emotional effectiveness of data figures and the aesthetic consequences of color attribution).

The Development of Graphematics (side by side with diagrammatics)

In conjunction with atmospheric studies, through articles by Hans-Jörg Reinberger (JR/2001/2005) I stumbled across the concept of 'graphematics', for which the background is found in Derrida's grammatology. Rheinberger's articles made it clear then that diagrammatics (and also my own diagram collection) hardly has anything to add in relation to natural sciences and technical disciplines – in other words for the field of 'technical images'. In December 2005 I made an initial attempt to place a graphematics alongside diagrammatics.

On a starting point poster (for a lecture in Vienna) I formulated the oppositions "dia(gram) / vs / graph", "discrete / vs / analogue" and "striated / vs / smooth". This means that the

text '1440 – The Smooth and the Striated' by G. Deleuze and F. Guattari stood for this division or opposition from the beginning.

Liquefaction as a Figure of Thought (G. Dirmoser, B. Siegert, G. Gramelsberger, R. Descartes)

A study on 'atmospheric design issues' (light design, use of material, ...) directly affected the diagrammatic question to the extent that I attempted to formulate an an-diagrammatic as a counterpoint to diagrammatics. The study was titled: On the Use of Liquefaction – An AnDiagrammatic.

(DG/2009): "Through the developed image collection it became clear that formations were coming into play that were much more difficult to grasp than the graphical structures of diagrammatics:

Mist-like shapes characterized in their density, moving fluid structures, complex patterns of movement, all the way to explosion-like developments, dynamic weather manifestations, etc.

In the course of this image collection I also became aware of attractor shapes and swarm structures, or in more general terms – process forms that were mathematically framed.

This expansion in the process view was also significant for the diagram collection, because it opened up a new access to the basic type of 'process structures' and 'folds'."

On this, see also: Fluid Worlds. On Mapping Time and Movement (eikones 2007)

See also: **Simulation as a Figure of Thought**

Energetic Mapping as a Figure of Thought (G. Widmer, P. Gallison, G. Deleuze)

The studies by Peter Gallison, Lorraine Daston (PL/2007) and H.-J. Reihnberger showed that most diagrammatics studies still have little to offer for the view of natural sciences.

A first starting point is provided by Deleuze with his term of 'singularity'.

This concept of 'singularity' indicated that my formulations and questions were still too strongly oriented to conventional visual manifestations. Through the concept of singularities it became more easily possible to include sound events and to take energetic events into consideration, which are not based on photons (i.e. the most diverse imaging technologies and sensor types).

This brought issues of data transformation into focus, and subsequently also the discussion from Hans-Jörg Rheinberger, who does not regard certain visualizations as belonging to the class of images.

With the example of his music analyses, Gerhard Widmer was able to most clearly convey what the future of a sub-symbolic (energetic) analysis of complex dynamic processes and their graphematic characterization could look like.

(DG/2009) "Complex procedures are available in the natural sciences to measure the most diverse energetic singularities (light occurrences, occurrences of quantum objects, radioactivity, sound occurrences, etc.) as well. The visualization approaches are then based on translating 'energetic singularities' into 'form singularities'.

Here there is a translation of the different energetic occurrences (e.g. of the electron) into spatial positions (or probabilities of stay) or into the 'occurrence format' of photons (i.e. into frequency fields of light [and thus also into color manifestations, among others]), and possibly into form singularities simulated with software techniques.

The transformation procedures used are based on the respective mathematics field and are implemented as software and measurement hardware in complex research machines.

Here I can only refer to Peter Gallison's writing and the relevant literature of the various 'imaging procedures' (e.g. magnetic resonance tomography or nuclear magnetic resonance tomography)."

Constellations of Elementary Forms as a Figure of Thought (R. Descartes)

Descartes form theory is the foundation for his theory of matter.

In detail see: Claus Zittel / *Theatrum philosophicum*

A highly contemporary form of the treatment of visual data is described in Bela Julesz' 'texton theory' (BJ/1995). Through the application of elementary primal text fragments, any amount of image data can be transferred to contour drawings. These algorithms also make it possible to calculate spatial constellation through lines of flight following the calculation of object contours.

Geometric Proofs as a Figure of Thought (S. Bogen, F. Thürlemann)

S. Bogen, F. Thürlemann (BT/2003): "Diagrams were employed surprisingly often in antiquity and throughout the European Middle Ages. Greek antiquity coined the terms *schema* and *diagramma*, which we still use today. However, an extensive and coherent

theory was never developed. The reason for this was that the two terms covered a very broad spectrum ranging from geometrical proof to legal decree."

Geometrical Proof Figure as a Figure of Thought:

S. Bogen, F. Thürlemann (BT/2003) on C. S. Peirce: ">What exact logicians do on paper, the vague logicians do in their imagination<, it says in one of Peirce's late manuscripts. For Peirce the diagram is initially and primarily a medium of thinking." ...

"Important historical evidence for Peirce's thesis is the core meaning of the term 'diagram' in antiquity as a geometrical proof figure'."

Visualized Inference Logic as a Figure of Thought (C.S. Peirce, S. Bogen, F. Thürlemann)

S. Bogen and F. Thürlemann quote Peirce:

(BT/2003) ">All necessary concluding is diagrammatic<. Peirce draws a conclusion from this statement and deals in his later writing, which revolves around the essence of conclusions, primarily with diagrams. He develops a system for diagrammatizing statements, which is intended to illustrate the course of thinking and exactly represent it. He calls his diagrams a question about the nature of logical relations." On this, cf. Wittgenstein (See also: Logical Form and Logical Image as a Figure of Thought)

S. Bogen and F. Thürlemann (BT/2003) on Peirce: "In his diagrams he sees the means of slowing down, controlling and revealing the movement of thinking."

"An approach of this kind implies a very broad diagram concept: No static graphical forms are called diagrams, but rather their construction phases and the accompanying process of reception. The producer (also called graphist by Peirce) produces the graphical form according to general rules and changes it."

Virtual Structuring as a Figure of Thought (A. Reichert)

In the abstract 'Diagrammatics as Virtual Politics' for a conference in Leipzig, there is the following text passage by André Reichert: "Politics as the intervention of the individual in the whole, as a confrontation with the circumstances and as an arrangement of order, is located for Deleuze and Deleuze/Guattari in the virtual. ...

It is the reality of movements of thought and of figures of thought. These can be recorded in diagrams, whereby every recording is also a striking through (Greek meaning of 'diagrammeîn'). Virtual reality is thus essentially diagrammatic, which means

1. structuring does not lie behind the phenomena, but rather in them,
2. it is local and not universal, and
3. structurings do not depict anything, but are instead characterized by interventions.

The diagram forms the flaring space, in which the most diverse interventions can be developed: interventions in other structurings of the possible, as well as interventions in actualizations. Unfolding and varying this play of interventions is the task of political diagrammatics. In a first step, I want to develop the concept of the diagram as virtual structuring along the ideas of Foucault (the diagram as plan and map), Serres (the diagram as a model of thinking), and Deleuze/Guattari (the diagram as an abstract machine)."

On the meaning of 'diagrammeîn', see also Petra Gehring (PG/1992) (Interscription as a Figure of Thought)

Transformation Relations as a Figure of Thought (D. Mersch, H.J. Rheinberger, P. Galison)

In his article 'Knowledge in Images', Dieter Mersch (DM/2009) writes: "However, the strategies of visualization and visibility that are used are themselves highly disparate. Although they cannot be sharply separated from one another, they can be provisionally ordered in three basic classes:

First, those modes of representation, the essential function of which is *witnessing* and which use the visual as proof,

second, those which *arrange* knowledge on abstract tableaux and first generate it as such, sometimes transforming it in reference to a foundational data set into logical or calculable figures, finally

third, *things* and their surfaces such as preparations and the like."

In the same article, Dieter Mersch (DM/2009) writes: "Sometimes cartographic approaches come into play here to impress on them directions, distributions or spatial arrangements, but regardless of what they are rooted in, what they are >traces< or >imprints< of (Heßler ...), they do not reveal anything real, but at the most a mathematical topology or relations, which cannot be taken as samples or proof of >something<, but must be read, independent from their aesthetics, as abstracts, on which properties such as symmetry or structural similarity and the like are noticeable. Consequently, they also assume no representational or denotative status, but rather a

diagrammatic or graphematic status. Rather than being >imprints< or >indexes<, they represent ordered syntaxes, whose epistemic function is not found in the proof of existence – as is still the case for analog scientific photography and x-ray technology – but rather in the digital >sculpture<, the virtual modelling of figural forms that remain entirely immaterial.”

On this, see also the theory articles for the exhibition: “See This Sound”.

Dimension Reduction as a Figure of Thought (D. Offenhuber, S. Krämer)

Two-dimensional visualizations suffice for many questions. Every mathematical representation that starts from more than three dimensions, must be reduced in the spatial/surficial visualization to two or three dimensions. In dynamic simulations or filmic representation (including animation), the dimension of temporality can be taken into consideration as the fourth dimension in the visualization.

Since most media interfaces are implemented as surfaces, the third dimension is only evident through the *standpoint* (or perspective) of the virtual camera or through the lines of flight (vanishing point) resulting from the respective projection.

See also: **Transplanal Images as a Figure of Thought**

Model Paradigms as a Figure of Thought (D. Mersch, B. Mahr, T. Macho, G. Gramelsberger)

In his lecture ‘Diagrams, Graphs and Models’ (Munich May 2005 – for researchers from the field of *social network analysis*), Dieter Mersch discussed the model theory for the first time in the context of graphematics and diagrammatics.

Since model theories are relevant for all fields of knowledge, to a certain extent they intersect the methods of diagrammatics and graphematics.

Among other things, models form the basis for informatics-based simulation projects (see: Simulation as a Figure of Thought [GG/2010]). Further considerations would be desirable on:

Dimensional Accuracy as a Figure of Thought / Scaling Systems

Simulation as a Figure of Thought (G. Gramelsberger, S. Krämer)

Gabriele Gramelsberger in the study “Computer Experiments” (GG/2010): “In addition to theory, experiment, observation and measurement, in the 1950s, increasingly from the 1970s on, there is also now the simulation as a new instrument of insight.”

Simulations (from the most diverse discipline directions) generally merge into graphematic or diagrammatic visualizations. Through the use of extremely powerful computer systems, dynamic visualizations are now also feasible.

A-semantic Relationality as a Figure of Thought (G. Dirmoser, D. Mersch, G. Kubler)

In analyzing diagrammatic and graphemic formations, it was previously very fruitful to take (*as long as possible*) a-semantic positions. It is only in this way that the structural aspects come into view that are too often covered up by semiotic/symbolic approaches.

G. Kubler (GK/1982): "Structures can be perceived independently from meanings."

Form-Content Distinction as a Figure of Thought (V. Flusser)

In Vilém Flusser's letters to Alex Bloch (VF/2000) there is the following passage:

"... what is the sacrifice of relinquishing the content of the world and limiting oneself to its structure? How is this sacrifice made and what is its result? How does the separation of content and structure even arise, and how can one describe these two aspects of the world?" ...

"As in most abstract cases, it is easier to recognize the sense of the words >content and structure< than to express their meaning. To say that one describes the world structurally, when one describes how it is built, is to say nothing, because every description is a structural description.

One arrives at the content of things by directly grasping it, not by means of symbols like words, etc.

In this lies the contentlessness of logic, of mathematics, of language, indeed of every symbol, namely that a symbol *substitutes for* the content of the phenomenon described; in other words it becomes itself the object of the description."

Order Hybrids as a Figure of Thought (G. Dirmoser, M. Serres)

Hybrid interweavings of the pattern of order as a figure of thought

My motto (DG/2009): "Taking hybridity seriously – grasping diagrams as hybrids.

It is important to me not to condemn or repress hybrid forms as analytically blurred, but rather, on the contrary, to presume that hybrid forms are the normal case and that the >pure< forms are an exception. How do I arrive at this understanding? My diagram collection consists of 121 portfolios. Laying out these portfolios results in a matrix of 11 x 11 positions.

In the course of the material development of about 6000 examples, it quickly became clear that more than 80% of the concrete examples are not to be assigned to only one order form (imagine maps containing network structures; maps with animal depictions inscribed in them; maps in circular/quadratic ideal forms, etc.).

In the analysis of diagrams it is therefore a matter of studying forms of composition and thus promoting a differentiated thinking of aspects.

It consequently also became clear that the reference structures, scales, gridding of the technical/scientific graphs could also be derived from diagrammatic order forms (or developed historically from them)."

Mixture Relations as a Figure of Thought (M. Serres)

As Michel Serres already realized twenty years ago: what is blurred, fluid, mixed ... should no longer be stylized as inimical to discursive precision. What is useful for mathematically grounded natural science should also be tested in the treatment of humanities data.

Blurred Forms as a Figure of Thought (G. Gamm, W. Ulrich, P. Garnier)

In some technical/natural science disciplines, fog-like structures are studied and visualized. This involves the visualization of density relations and the calculation of artificial entities by smoothing or calculating artificial *surfaces*. In the course of considering these *transient forms*, it becomes clear that these dynamic, fluid, fog-like structures can facilitate key questions in terms of perception. Briefly outlined:

Our perception evinces a tendency to 'produce' forms.

Every 'correlation' prompts us to see forms.

Our perception evinces a tendency to 'spatially comprehend' visual offers.

In detail, see the experimental arrangements described by G. Bateson.

Mental Architectonics as a Figure of Thought (I. Kant, H. Bergson, M. Mullican, B. Nieslony)

In I. Kant's *Critique of Pure Reason* (IK/1966), there is a passage in the section "The Architectonics of Pure Reason" that outlines in master builder terms what Kant and his contemporaries understood as mental architectonics: "It is unfortunate that, only after having occupied ourselves for a long time in the collection of materials, under the guidance of an idea which lies undeveloped in the mind, but not according to any definite plan of arrangement- nay, only after we have spent much time and labour in the technical disposition of our materials, does it become possible to view the idea of a science in a clear light, and to project, according to architectonical principles, a plan of the whole, in accordance with the aims of reason."

See also: **Bergson's Cone as a Figure of Thought** (H. Bergson)

Memory Theater as a Figure of Thought (Giulio Camillo Delminio)

Very well known ordering forms are those that can be called memory theaters. Frances A. Yates presents Giulio Camillo Delminio's memory theater concept in 'The Art of Memory'. I also used the sectoring method Delminio proposes in several of my studies.

Parasite Relation as a Figure of Thought (M. Serres)

For influence relations (including disturbances), M. Serres proposed visual representations in his observation of parasite structures. He draws arrows that directly affect other arrows, whereby this relation consists solely of edges, so it has no knots (as points of intersection). In this way he proposes a network structure that only consists of edges/arrows. A net without knots, so to speak. Structurally and in terms of visualization technique, this also corresponds with Deleuze and Guattari's rhizome concept.

Showing and Appearing as a Figure of Thought (D. Mersch, eikones)

Dieter Mersch characterizes the role of *deixis* in his text "Knowledge in Images" (DM/2009) quite forcefully: "Not distinction ... nor observation ... is the central theme of diagrammatics, but rather *deixis*. There is an interplay of form, appearance (*eidos*) and *deixis*."

In the invitation to the eikones annual conference 2007, the following passage is found under the heading "Showing. The Rhetorics of the Visible":

"With the discussion about the preconditions and the range of pictorial representation, showing also comes into view in a new way. Although DEIXIS has long been part of the conceptual repertoire, especially in philosophy and rhetorics, showing was nevertheless not really able to capture scientific attention, let alone take on the role of a leading concept. On the contrary: something primitive adheres to showing, what is tangible about body language or gesture, the helping function of a pointer or sign. In comparison with language or thinking, showing seems to be less complex as a mere indication. The exploration of the image as a non-verbal symbol system per se first enables a more intensive study of showing. ...

Showing as directing attention plays out at the margins of evidence. From there, it establishes forms of the visible that often do not come into view, do not themselves become object. This >rhetorics of the visible< oscillates between showing and appearing."

In the section 'Show - Prove' there is an explicit investigation of how "diagrams or simulations fulfill deictic tasks." In the section 'Dispositive of Showing', art and curiosity cabinets, picture atlases and hanging strategies for pictorial works were discussed, in other words diagrammatic patterns of order.

Very different techniques of marking and referencing are also investigated in my diagram studies. The layer techniques and symbolic marking approaches that are used are assembled according to particular emphases in one of the eleven basic types of diagrams (on this, see: BodyMapping). The study 'Rhetorics of Graphic Elements' (DG/2010) provides a collection of the strategies of forceful showing (in other words, 'deictic figures').

Marking and Tracking as a Figure of Thought (J. Derrida, H.-J. Rheinberger)

Methods of radioactive marking and tracking are vividly presented in Hans-Jörg Rheinberger's writing. At this point, it would be productive to go into more detail on the concept of tracks, but that would go beyond the limitations of this framework.

Genealogical Conjunctions as a Figure of Thought (A. Schmidt-Burkhardt, T. Macho, S. Weigel)

The image historian Astrit Schmidt-Burkhardt presents a comprehensive study on the use of tree structures in the self-presentation and self-historicization of the art field in her book 'Family Trees of Art – On the Genealogy of the Avant-garde' (2005).

Combination Mechanisms as a Figure of Thought (Raimundus Lullus, Athanasius Kircher, C. Alexander, G.W. Leibniz)

Olaf Breidbach (OB/2001): Athanasius Kircher developed "... the principles of an art of combination, which is to be found through the depiction of all possible references of the basic terms he found for describing the world."

Even before Athanasius Kircher, it was Raimundus Lullus in his 'Ars Magna', who laid the foundation for an 'ars combinatoria', which was consequently taken up by others, including G. W. Leibniz in his 'Dissertatio de Arte Combinatoria'. Leibniz wanted to create (following Rene Descartes) an alphabet of human thinking.

For the field of architectural design, Christopher Alexander developed a 'pattern language' (CA/1995), which as an elementary system was intended to serve the parameterization of every kind of useful architecture. This concept inspired computer scientists to develop object-oriented programming languages and database concepts.

Pattern language as a Figure of Thought (C. Alexander)

Constellations of Four Elements as a Figure of Thought (Empedocles / four-element theory)

The semantic exception (*to the a-semantic limitation rule*) is listed here to represent many other figures charged with the history of culture. This figure has been used (*independently from content*) in countless variations.

Rhetorical Gestures as a Figure of Thought (G. Bonsiepe, G. Joost, G. Dirmoser, D. Offenhuber)

In the study 'Rhetorics of Graphical Elements', an attempt was undertaken to investigate moments of designing diagrams in terms of a rhetorical effectiveness. The formations described here are directly accessible to perception. Cf. also: **Display Gesture as a Figure of Thought**

The following possibilities of design are treated there in detail: visual metaphor, framing, color gestures, exaggeration, selective emphasis, weighting, centrality, balance, symmetry, harmonious order, Golden Mean, hierarchy, architectural order, reading direction, void, pause, complexity, multi-layeredness, logical stringency, precision, contrast, confrontation, staging the gaze, degree of order, distortion, emphasis, etc.

Typographicality as a Figure of Thought (S. Krämer, Graduiertenkolleg "Schriftbildlichkeit")

Since writing processes are carried out on a surface or in space, this extensive field of research can also be used as a figure of thought that can be concretely realized.

See also: **Interscription as a Figure of Thought**

In a recently realized observation of typographical designing, I first became conscious of how close to one another diagram and writing actually are. I am therefore convinced that it will be possible for research on 'typographicality' to be used directly in more precisely to be defined 'diagrammatics'.

Pictographality as a Figure of Thought (D. Mersch)

D. Mersch in the text 'Knowledge in Images': "Diagrammatic forms like maps, graphs, networks and the like thus form in-between forms, which equally participate in visuality and discursivity and so interlace visibility and legibility that transfers result, and it becomes possible for the discursive to be received as the iconic and the iconic as the discursive. The aforementioned concept of >pictographality< – in contrast to typographicality – denotes this specific interlacing, so that pictorality and scripturality no longer appear as separate registers, but rather each becomes absorbed by the other."

(DM/2009): "In fact, >typographicality< and >pictographality< refer to one another, but they differ in the type of operationality they are based on, even if the boundaries blur."

Schematism as a Figure of Thought (I. Kant, S. Krämer)

The *diagrammatic scope* of Kantian schematism has not yet been clarified. In the operative sense, schematism could be the foundational mechanism for every diagrammatic figure of thought. This can be briefly sketched with ideas from Sybille Krämer:

(SK/2009) I.Kant: "Now pure concepts of the understanding, however, in comparison with empirical (indeed in general sensible) intuitions, are entirely unhomogeneous, and can never be encountered in any intuition."

"In light of the complete unhomogeneity between intuition and 'pure' category, how can a connection nevertheless be established?"

At this point, Kant maintains that >there must be a third thing, which must stand in homogeneity with the category on the one hand and the appearance on the other<. And it is precisely this mediating and middle thing between concept and sensible intuition, we could even say: precisely this medium, which Kant calls 'transcendental schema'. This also has the characteristic of being >*intellectual on the one hand and sensible on the other*< (emphasis SK). We therefore conjecture that schematism, as a third thing mediating between sensibility and category, assembles essential determinations that Peirce attributes to the diagram and which, at the same time, bear witness to us of the diagrammatological foundations of reason."

Image/Text Binomial as a Figure of Thought (G.E. Lessing, S. Bogen, F. Thürlemann)

A figure of thought that is called into question in conjunction with diagrammatics.

S. Bogen, F. Thürlemann (BT/2003): "The aim of the following explanations is to fundamentally question the image/text binomial. An important means of expression is sacrificed to binary reflection oriented to the comparison and confrontation between image and text, the diagram, or more precisely – to avoid a too narrow demarcation of the field from the beginning – the various forms of diagrammatic arranging and arguing. Because diagrams frequently conjoin linguistic and figural means, one could be predisposed to consider the genre of the diagram as a synthesis of text and image. Yet the diagram is not merely a hybrid form that could be understood as the merging of text and image elements. From a formal and especially from a functional perspective, diagrams have highly specific semiotic properties, are communicative instruments with non-substitutable performance features."

S. Bogen, F. Thürlemann (BT/2003): "Crucial for the argument presented here is that the figural elements of the schema can be included in the same diagrammatic system as the concepts. Like writing, they are attributed to topologically and geometrically precisely defined fields and framework forms, and in addition, they are reciprocally related through formal analogy/oppositional relationships."

S. Bogen, F. Thürlemann (BT/2003): "A ... research project that queries the significance of topological-geometrical relations and contrastive design principles as well as the basic forms and basic figures of the diagram and its tradition, is dependent on the text-image binomial."

The Image as a Figure of Thought (Johannes Grave, Arno Schubbach, Christoph Asmuth)

I would hardly have dared to use the image (*in general*) as a figure of thought, had not the *eikones summer school* announced a relevant course title:

Eikones – Course 3: The Image as a Figure of Thought (thinking images – eikones summer school 2008). A key question was: "Which relations or constellations can be grasped with the figure of thought of the image?"

We are left to happily anticipate two announced books: *The Image as a Figure of Thought: Function of the Image Concept in the History of Philosophy from Plato to Nancy* (Fink-Verlag / June 2010) and *Thinking with the Image* (A. Schubbach, J. Grave / 2010).

"Figural and mental images enable and structure thought processes. Making images is an important part of thinking."

"The current interdisciplinary discussions about images are essentially due to an increased interest in the visible image in all its forms of manifestation. ...

Therefore, philosophical traditions should be looked at in return, which have employed the image as a figure of thought in the context of abstract questions. The fact that recourse to the image is repeatedly taken in theoretical reflections suggests its special conceptual potential. At the same time, the concept of the image is developed and enriched through its operative use in philosophical thinking, which can call attention to aspects that are otherwise often overlooked. As early as Plato, the image is often less the given object of a philosophical reflections than a concept, with which the constitution of the world and the reality of human beings is conceived. Plato is thus at the beginning of a tradition, in which accesses to the world are imagined pictorially.

The Diagram as a Figure of Thought

If grasping 'the image as a figure of thought' succeeds (at eikones in Basel), then this also resolves the question of the extent to which a diagram can be considered a figure of thought.

The Media Schema (of diagrammatics) as a Figure of Thought

In the course of diagram analyses, several schematic representations, such as the 'media schema' have proven themselves useful. Ongoing use and revision have led me to continually attempt to comment on text passages in specialist literature with this schema or to apply them to this schema. This occurs in the form of small commenting sketches on the edge of the book page.

In other words, I have learned to think with this schema! This would mean that this simple configuration is definitively a 'figure of thought'.

Along with Astrit Schmidt-Burkhardt, one could distinguish between 'thought diagrams' and 'knowledge diagrams'. Thought diagrams must be semantically very compact (or semantically almost empty). In comparison with thought diagrams, however, knowledge diagrams are offers rich in content, which are provided in a certain ordering pattern.

When frequently applied, these 'thought diagrams' tend to become 'figures of thought'.

In conclusion, the question arises as to whether we have now been able to develop a clear 'image' of figures of thought. To the extent that we have only been going in circles, we are left with the consolation from Georges-Arthur Goldschmidt (GG/1999). He writes: "There is no greater stupidity than to speak of the abstract character of German: no other language is so concrete, so spatial; to be precise, German is incapable of any abstraction. It derives its abstract concepts from French or constructs them following the French."

In any case, we should learn to apply the spatially saturated concepts in concrete diagram analyses.

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Appendix I

Dissertation Proposal "**Diagrammatics of Thinking.** On the Beginning of Thinking and Thinking of the Beginning with Descartes, Heidegger and Deleuze" / André Reichert (2008)

Appendix II

Nikolaus Gansterer

Die Denkfigur 2009 – ein zündender Gedankenblitz als Preis und Give Away