

## THE RECEDING “GEOGNOSTIC” HORIZON (RH)

—some critical observations on the changing place of natural horizons in drawing and environmental portraits, based on Keilhau’s mountain journey in 1820.

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BACKGROUND—*diagnostics, prognostics, geognostics!*

1 As marked at the bottom left of the slide, I have been working on this contribution—in bits—from early this year. The point of departure, indicated in my title, was *intuitive*: if we are querying the geological contents in Keilhau’s (K.) drawings, it is intuitively here that we will spot and track the geognostic horizon. The drawings are not isolates: they are part of a survey, not only to map.

2 At the other end of K.’s life, after the bold trip in **1820**—symbolically represented by the view from a mount by Falketind—we read the account of the life of an exhausted man ‘getting his affairs in order’. *Professor Keilhau’s Biographie—von ihm selbst*, published at Johan Dahl’s *Buchhandlung* in Christiania (Oslo) 1857, is his resignation-application from his professorship. He died in **1858**.

3 He here relates that he i.a. was elected into the management of the Drawing-school in **1840**—20 years after the trip—the selfsame year the *meter* established itself as the stable metric in mainland Europe. Despite the instability of political regimes, or because of them. Arthur Tennøe has let me understand that the annotation on the drawings mention both the Paris-foot and the *pied du roi*.

We must remember that when K., Boeck and Urden were journeying in **1820**, Louis XVIII was the king of divine mercy in France. He was succeeded by the *Constitutional* monarch Louis Philippe in **1830**. Toward the end of his life K. had also lived a few years during Napoleon III’s reign, first as a President in France **1848**, and then emperor from **1852** on. France was then like the USA today.

The meter is interesting since it no longer referred to the body/foot—or, the *king’s foot*—but constitutes a *planetary metric* referring to the earth’s circumference, the distant to sun and moon. It is the metric of science (not the king’s). To K. and his generation science had a significance for the *world-view*, while the generation after, i.e. his successor Prof. Kjærulf followed the *developments*.

By this I mean that a system had been established to manage & exploit natural resources. The drift had started even as K. was a student—the time with *literary exposés* on mathematical and scientific subjects in the Physiographic Society (where K.’s friend Niels Henrik Abel also was a member)—till he toward the end of his career and life was dismissed by Kjærulf as an *alchemist*.

The developments were initiated already in **1814** as the Rock-studies were moved from the seminar in Kongsberg to the Christiania University, where *drawing* was not taught—descriptive geometry, machine drawing, construction and mapping—and at the initiative of Rock-counsellor Christian Collett, already in **1819**, this part of the education was assigned to the Drawing School.

According to Øistein Parman’s book *The Drawing School 150 years*—that was published in the wake of the jubilee in 1968—there some upheavals concerning the polytechnical part of the education of rock-men at this time, that may have been linked to the development of photo/graphic techniques, but mainly with engineering adrift to become a [separate education](#) (**1910**).

The rock-class at the Drawing School has called a *cuckoo*—it would soon grow out of proportion with the rest of the school before flying its way. However, it is from the painter Johannes Flintoe that young K. had learned to draw. And they continued to collaborate on reproductions of K.’s drawings for some years. K. is mentioned once in Parman’s book, relating to Flintoe’s departure.

The majority of Norwegian artists and architects at this time had a *military* background. The distinction between art and engineering was blurred. What, in the vernacular, was called *craft*, was more like what in English is called a *trade*. It was difficult to locate in the school, and has remained so till at present. The principal child of the school until 1910 was rather *industrial art*.

[In this translated version of the original manuscript in Norway, I would like to add—at the attention of the foreign reader—that the Drawing school lacked a clear objective and definition

beyond its foundation in drawing. The romantic era of the 19th century created the precedence for a school ground with educations that provisionally would not be fitted elsewhere. A *wildcard*.]

This gives some background. In K.'s career the receding geognostic horizon runs between the Drawing school and the University where he was the 1st professor in Geology: i.e., an *edgeland* between drawing and science, and other edges *within* drawing that I will comment on. I will proceed towards the end to pick up on movements in geological discipline through K.s work.

## THE IMAGE-ROUTE

4 We will now work with the image-route, in two different ways: the drawings from the manuscript collection board work 1247 from a mountain trip, and the images in the window of a computer at a webinar: certainly a different route than the one undertaken in **1820**. Here I start with a comparison of Carpelan's painting from a snow shelf by Mugna Mountain and Dürer's print *Melencolia I*.

According to Rune Slagstad—in the book [The educated mountaineering](#)—it has been asserted that K. Was interested in Albrecht Dürer (referring to P.A. Munch). Dürer was prominent in making technical aspects of artistic production an *artistic topic*. That is, an artistic reflection on technology in the artistic vocation, and thus develop a view of the artist's higher calling ([Panofsky](#)).

The images in the slide-view have something in common with the *vanishing points* and *horizons*: what one could call the wasteland of drawing. In both images the drawers have their backs turned to precision instruments, and are lost in a reflective drawing within the constructed drawing. A receding horizon (RH): *what is added by the view which is not in the construction?*

5 The task of drawing is *ambivalent* in its relation to the construction. Also people who have been standing with both feet in construction drawing have posed the question. This was obviously Albrecht Dürer's case. Conceptual artists as Marcel Duchamp have been interested in Dürer's perspective machines in researching painters as Titian and Böcklin, preparing [The large glass](#).

We do not have time to enter the details here, but they are included to underline some problems linked to the relation between *drawing* and *view*, wherever construction is a premise for the artistic view. The time-line here goes from renaissance to modernism. But it is unproblematic to pursue the reflections on this problem into our time; which is the legitimacy of raising it here.

6 Not only extending from art-history, but with perspective as separate professional domain. Here featured by former Colonel Eyolf Glent who recommended reducing drawing equipment to a bare minimum. The drawing on the cover—also showed inside the book—is the volume's *one* example of 3-point perspectives, used by Prof. Gunnar Aune in drawing the oil-rig [Statfjord B](#).

7 The view (*Anschauung*) here lies in seeing the object photographically *before* it exists, the approach is scientific and the drawing approaches a certificate. In the next slide we see two versions of K.'s drawings Carpelan used in the image I juxtaposed with Dürer's. The West view from Mount Mugna's 6750 feet up. The top one is *from the trip*, the other *after*: the record is dated.

Let us ask a question: can we consider the terms *optagelse* (record) and *opdagelse* (discovery) as *completely* separate in the language of the time? May we consider that in the twilight between descriptive drawing and aesthetic view we find concealed the steps that led to the appropriation of [Jotunheimen's](#) discovery? Drawings as records on the trip, drawings as public views.

K. and Boeck (B.) were not practised in this terrain as the reindeer-hunters were—here Ole Urden and later Jo Gjende. But what is the sum of their knowledges if we consider this troupe in one? Today some of us are practised in terrain, we shoot photos with interesting *information*, and make discoveries as we replay the images triggering *views* we did not have while walking.

A difference is that we evidently do not think we are historically *first*. But rather in that alternating between walking, recording and replaying we develop a kind of knowledge that we cannot speculate our way to. We are in the expanded field of scientific investigation and are engaging with activities akin to what geologists and anthropologists call *fieldwork*. K. was a fieldworker.

I have used the letters  $T_0$ ,  $T_1$  and  $T_2$  inspired by Arne Næss' *ecosophy T* (T refers to Tvergastein: the place, cabin and life there). That is, a *personal philosophy* as a starting-point for a discussion and analysis of broader interest. The logic is the following: becoming practised in a terrain makes it *specific* ( $T_0$ ), constructing something there (a drawing/a cabin) yields a [precision](#) ( $T_1$ ).

8 Inhabiting the terrain (a drawing or in a cabin) yield *yet one precision* ( $T_2$ ). The is my point here. As I return to the renaissance—a preparatory work to a painting by Domenico Ghirlandaio—it is not to go back in time, but because the drawing provides an overview of different drawing-techniques: contour drawings, value drawings, perspective and sketch. Let us view the *collection*.

9 Here I have numbered and gathered in a single view all the 30 boards 1247, of the National Library's manuscript collection, with the exception of element 31; the map. I have used a [red circle](#) to round up the drawings that relate directly to the trip, and a [blue circle](#) to indicate a larger group of prints and drawings—sketches and —we can call the expanded field of the journey.

10 The top drawings are *reproductions* made *after* the trip: in the lower right corner of *each one of these* reference is made to the drawing made during the walk (on the slide's lower row). Then I  
11 have extracted some samples of drawings and prints not directly linked to the trip, some of which have been done by others than K. and B. Such collectives still prevail among print-makers today.

12 Then the question: what are we going to do with this image, added to the collection by K. as an *appendix*? The question has been raised by others in the seminar series. It is the Mugna mountain seen from South near Olberg in Valdres. In the background there is a *print* of the same w/both K. Flintoe and Carpelan mentioned as artists. Notice the drawing is framed with annotations inside.

13 This is untypical for the way K. otherwise has treated the image-information. As you see here all the drawings that have been done in the field have some systematic traits: the ones drawn *without* a frame and annotations *inside* the drawings. The ones reproduced in the aftermath, with a dated record, all have a *frame* and annotations included *outside* it. A receding horizon (RH).

In *all* the drawings *except* one. That is the view from Olberg in Valdres, to the Mugna Mountain, up the valley. It is included as an appendix—added alongside the sketches and the views—while featuring the same basic traits as the principal group: the image as a *frame* and *annotations*. But contrary to the main group it has a frame, while the annotations are inside the image. Strange!

14 A truly striking cuckoo of an *exception* we have here! Hence the question: if the image connects the principal group ([red circle](#)) with a larger circle ([blue circle](#)), what are the properties of the image making this possible, besides systematically mixing up the categories in the principal group, and being added later as an appendix, on par with the number of successive ulterior additions?

15 Well, in the map we are relating to a much larger area, after all, than the trip's itinerary: the Jotun mountains, or what was to become Jotunheimen. So, as we in K., Flintoe and Carpelan's print are looking from above Olberg in Valdres and over to Mount Mugna, we must ask: *but weren't we just there?* Or, wasn't there we saw the group of 3 drawn on a snow-shelf on the edge of a precipice?

*What strange things the altitude can do to perspective!* *Not* the horizontal perspective inwards, but the *vertical* perspective: with *valleys sinking* and *mountains rising*—the ascent and descent of the walk—one can even get the impression that they are *wholly different* places. We are not only changing viewpoints. Altitude, thus, presents itself in *leaps* (in more than one way).

A leap into an abyss—that would tend to avoid—but it can also be a leap between *one reality* and *another*: some of us never tire of this. Maybe it can make us wise! *High up conditions can be such that we barely manage*. How does one draw in thin air, with snow under one's feet and razor sharp view... very unfamiliar. How is it further down (where we commonly visit, live or work)?

16 I.e., it is also the *contents* of the image from Olberg that makes it special: it *presents* the journey. For as we do the leap from Valdres over Tyin to Falkteting, with the famous view to Hurrungane, this ways—as has been pointed out earlier in the seminar series—a desolate and barren place. It doubtlessly was the peak of the journey, but is it a scenery as depicted in Flinto's romantic piece?

Then I am thinking of his painting from **1837** (16 years after). Here, I will return to a detail we briefly discussed in the previous seminar: how should we understand that the record from Falketind—

the view over the Kolde valley—is dated the *14<sup>th</sup> July, 1820*. That is, the date of the storming of the Bastille, today the French national day? The two men were to leave for a Grand Tour in **1823**.

17 They left with another member of the Physiographic society—namely, mathematician Niels Henrik Abel. Can we imagine that they had started to think about this already in 1820, or the year after when K. handed over the collection to his friend B.? Maybe. If so it puts the collection in perspective. I am here thinking about the continental connections with for instance Leopold von Buch.

18 As the custom was in that day, peers were often fiends: von Buch was a friend of K.'s for many years. Von Buch was tied by intellectual friendship with Alexander von Humboldt. The year **1844** was likely the summit of K.'s career. He had then developed another collection—the geological exhibit that was awarded in Paris—of which von Buch spoke non-empty words of *praise*.

19 He stated that the minerals K. had collected and the geological exhibition he had developed, *not only* showed the world a collection of rocks, but the Norwegian mountains. The knowledge of the mountains is *in* the mountain. He declared that the exhibit would stand as long as the mountains. An attitude we may see reflected in how Carpelan included the *map* into the view from Falketind.

*The knowledge of the mountain nearly falls out from the painting.* An there is little doubt of the location. These are the Norwegian mountains. Even an urban viewer would see it. I Norway as abroad. Rocks were not only about chemistry, but also about processes one has to do geological fieldwork to understand. K. writes of this. There is but little metaphysics in this account.

20 I have spent some time reading through an article that K. got published in **1844**. It is even written in English. The contents are quite removed from the impression one gets from accounts placing K. within the romantic *Zeitgeist*. The descriptions in the article are quite sober about the migration hypothesis and actually argue against *any form* of speculation. Where was he going with this?

21 The oil-findings that were made about 100 years after his death were here scarcely en route. Neither was K. a prophet in his own eyes. But he vouched for a management model for primary resources in Norway with distinct similarities to the policy up to our time. This he relates in a passage of his “biography” when he succeeded Rock-counsellor Collett at the Ministry of Finance.

Whether he should be counted amongst the professor-politicians discussed by Rune Slagstad in his book on the national strategists, I do not know. But placing him as trend-setting flâneur in a generation of natural historians who made the mountains cultivated, leaves me baffled. I mainly think that he actually died a bit early, and that his successor also was a personal enemy.

If ‘discourse’ is a modern conception, it might quite jerky in its application on the romantic era. I will not enter this in detail here, but limit myself to ask the question: how do we understand *conversation* marking loyalty to a generation and the time, a rather mundane matter, in contrast to the research questions one was actually concerned with? Were conversations like browsing?

A hardworking researcher, an unlucky strategist perhaps... What we can conclude from our query is that there are 3 variables of height perspective: **1)** the sinking valley; **2)** the rising mountains; **3)** the viewpoint. Not two, but 3 variables. The viewpoint varies with high/low situations while hiking and in hindsight and determines what we can know: contact-metaphors of viewing and framing.

22 *When the environmental conditions change so will the conditions for what we can know.* Currently, nature sets other conditions than those prevailing at K. & B's time. *The question is whether the technological development can compensate this, or much is simply lost. Maybe exercises as the present, in developing a view (Anschauung) of a mountain journey i 1820, will be helpful.*

In this aspect a possible contribution to environmental humanities, though with the premise of some *mathematical* principles reflected in a *literary exposé*; inspired by the ideas of the Physiographic Society. I.e., a mathematical *Anschauung*, in a literary exposé, on the basis of what we can not based on drawing, and look at *altitude* and *environmental change* as two site-variables.

Does this indicate that in order to live up to the Constitution's paragraph 112 we must widen our scope from the STEM subjects (science, technology, engineering and mathematics) to the STEAM subjects where we must include an A (Art, Architecture, Anthropology, Architecture, [Tim Ingold](#) written about)? In anthropocene would seem imperative to link geology and anthropology.

## POSTFACE

Some comments on the mathematics and the connection to *disordered systems* based on the transition from abstract set-theory to an empirically founded *experimental mereology*: mereology determines the *study* of the *relation* between *part* and *whole*. In the appendix to the slides (26-30) some examples are given of the type of problem encompassed by the mereological topic.

The main point with the *mereological* approach to the study—i.e., between part and whole—is not abstract, but *empirically connected to the site and material analysis*. It is experimental in the sense that all knowledge obtained *beyond* straight observation, is obtained through experiments and tests. The drawings we have looked at thereby are considered as experiments, attempts, essays.

Some years back, I was on a walk on the Nigard glacier, along with a troupe of MA students from KHiO, where the blue-ice course we were to pass was an excuse for having young artists work on the glacier with the tools that are used there. Essentially, an investigation of the glacier as a place and material. There were no ice/snow sculptures made. But the *views* prompted by the encounter.

That was the main question. The 3-day course was organised by glacier-/mountain guide Steinar Laumann who studied at the MA program at Art & Craft at the time. During our stay I got to talk to his father—Trond Laumann (TL), a glaciologist—about *disordered systems*: as a professional his relation to the concept was quite casual (it is shared by glaciologist and geology alike).

This was new to me, since as an anthropologist my experience with the concept is that it tended to be considered slightly esoteric—difficult to access—by my colleagues. TL gave the following explanation: when the weight of enormous masses of ice meet the counter-pressure from the rock of the valley a heterostructural pattern emerges at the bottom of the otherwise chaotic glacier.

Here, regular *hexagonal columns* are shaped, working as a bed under the glacier toward the rock-floor and walls. This sort of cross-pressure characterises disordered systems generally. The important feature is not that it is regular—as the bed of hex-columns—but that it is *atypical*, or heterostructural. It is in this sense disordered: it contrasts with what is going on around it.

This is how I learned about the concept—and its associated approaches—by Fredrick Barth. He was, as is known, an anthropologist. His father, Tom Barth, as a structural geologist. It was from his dad Fredrick took over the idea as an approach to *modelling processes with system-like properties*: such that are not planned by humans, but hatched by *spontaneous* processes.

Even though I had written my doctoral dissertation based on this model—in the study of ritual custom in a humanitarian aid organisation during the war on Sarajevo in 92-95—I felt that it was at Bretun, talking to Laumann, that I got in touch with my own work. This has to do with the concepts *provenance*: that is, such one cannot derive from reading, but has to *work* out.

Regarding the connection to mathematics there are two *factors*, both connected to the mathematician Felix Klein's work—e.g. the *Erlangen programme* which is math given in literary prose: in this lecture there is not a single instance of a mathematical formula. In his reflections on transformational groups there are two topics I have taken with me onwards.

The one is is precision on *special entities* that can be adjoined a principal group—defined by certain limits in a space—such that the properties of this group can be transferred/expanded to a larger/expanded group. Such a *special entity* is exemplified by an element in my seminar-contribution: that picture of Mount Mugna from an elevation by Olberg in Valdres, an *exception*.

This application of the first of Klein's points in the Erlangen programme is inspired in a systematic approach used by Claude Lévi-Strauss in the magnum opus *Mythologiques* (1964-71). Here *reference myths* are used as bridgeheads between smaller and larger *groups* of myths, retrieved from a very extant literature of Amerindian ethnography.

The critique addressed to this work, in British and American anthropology, has been concerned with the absence of an emphasis on fieldwork—investigations carried out by the anthropologist

herself—so the question of what happens when bringing as an experimental approach to the field, developing models close the the findings—interacting with them—is never really asked/posed.

Essentially, the use of mathematical structures to develop models from what may be called the [contact zone](#) (Pratt). For instance, Lévi-Strauss' application of Klein's groups—which he refers to may places—can have a different impact when used to develop field-understandings of developments in modern sculpture, as Rosalind Krauss did in the essay *Sculpture in the Expanded Field*.

She refers to Klein's groups based on Marc Barbut's article (1966) on *mathematical structures for humanities*, that was published in *Les Temps Modernes*. The definition of Klein's groups (based on Felix Klein's mathematics) is as follows: **1)** a term; **2)** its opposite; **3)** their inversions [that is, the inversions of **1)** and **2)**]. One might understand it as a deconstruction of sorts.

As a model-development tool the Klein's group opens for the possibility of working with *opposites* as *complements*. One can define an opposition between the drawings from the mountain-trip that are done while in the mountains, and those made in the city. If it were an opposition it wouldn't be symmetric, since what is made in the city (replay) is based on those from the mountain (record).

What do we take it from there? Well, we can discover and add an element that *neither* belongs to the core record *nor* to the core of reproductions. What distinguishes the opposites will, in such a special entity, exist in different *ratio*, as has been proposed in the seminar-contribution. Thus, the depiction of Mount Mugna from Olberg in Valdres, which is atypical to (both) the opposites.

Though it includes the *exact* same traits. Such that the special entity contributes to a mediation between the two main groups, which now are not in straight opposition to one another anymore. That is, they supplement each other that they can complement each other in the **1247-collection**, including *other* elements than we have presently taken into consideration. The two *inversions*.

The way the *proximate sketches* and the *remote views* can connect to the principal group 1) and 2) in an obvious way: that the *proximate sketches* are inversions of the drawings done in the field and the *remote views* are inversions of the reproductions made in the city. In this way we have established the elements that have been added in the aftermath to the *expanded field* of **1247**.

This exercise has some formal aspects to it, but mainly constitutes moves—as moves in a game—exceeding normal mental capacity, when the task is to observe. This works two ways: I became aware of the potential importance of the drawing from Olberg could have, *long before* I discovered its potential importance to the logic expounded here. So, what has been achieved?

The task is to make the discovery of the drawing readable in relation to a specific materials that was never formulated according to the present logic, but still contributes to understanding **1247** as a *collection*: that is, the relation between part and whole, or the *collection's mereology*. The realisation came gradually, working visually with a material, and then crystallised in text.

There are aspects of images that are similar to mathematics, by the fact of *inferences being laid out visually*—such that also include mathematics (symbolic language included)—having a *demonstration value*. The demonstration value belongs to a different repertoire than the *argumentation value*, as developed in text. It is these to *jointly* that are the vectors in a mereological query.

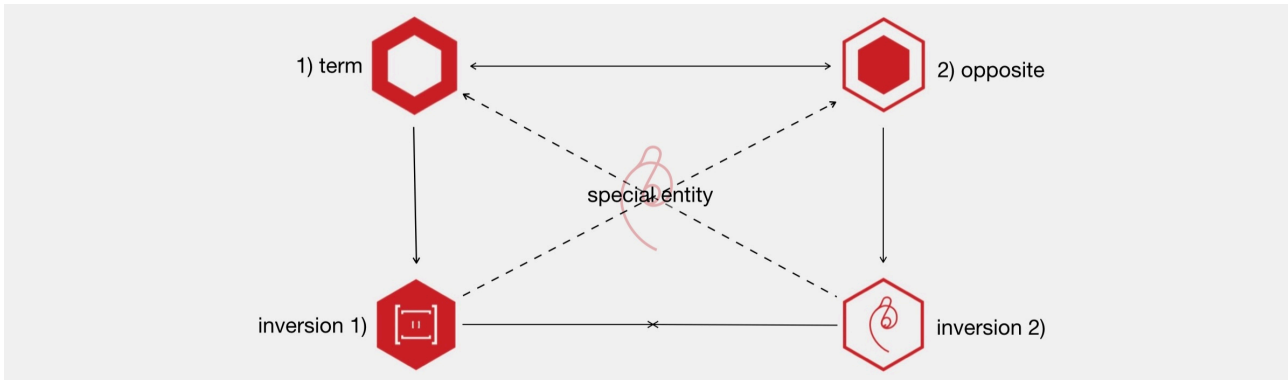
When two part partake of a whole through the *cross-pressure* between them, then what first appears as *background noise* from deep processes, next comes through as *weak signals* constituting the whole: as the ice-rods between rock and ice, as key to how the mountain and glacier form a whole, and not only juxtaposed (the one on top). Empirical traits of system.

That natural and cultural elements can enter contexts where they hold each other, is thereby a possibility. And it is this possibility that could be an entry and approach to *anthropocene*: where *geology* meet *anthropology*. The contemporary studies on disordered systems that I have gleaned, hinge on statistical calculations, but the approach can also be descriptive as here.

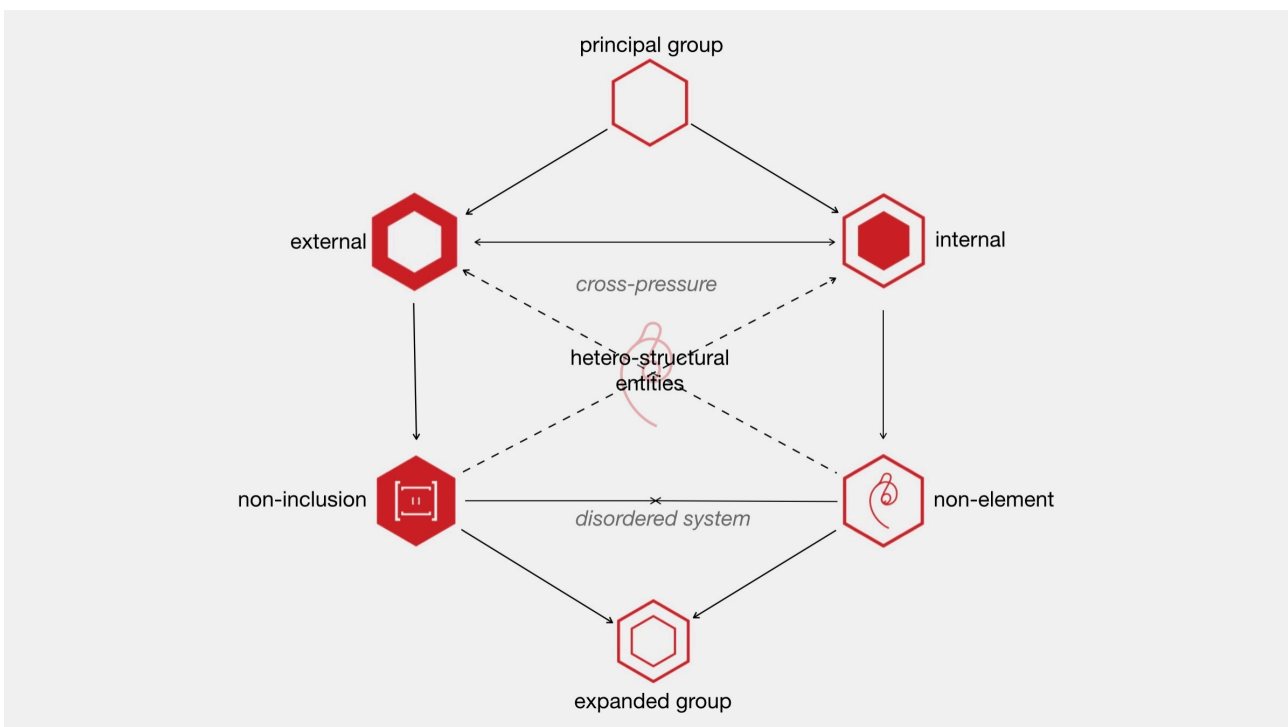
A chapter between the relation between what has been presented here as environmental humanities and STS (Science Technology Studies). This I see as an interesting question that one should

perhaps be cautious of determining *discursively*, through a literature-driven approach to research questions once they have a theoretical dimensions. We must also work *visually/orthogonally*.

That is, in the expanded field of observation and description with the prerequisite that theory needs not be developed behind a desk, but integrated into fieldwork (and thereby an expanded understanding of fieldwork, as attempted here). It is an approach with steps ahead hinged on contribution from creative disciplines. Working on the relation between *making* and *knowing*.



**Fig. 1**—Klein's group with HEX-signatures developed by the author.



**Fig. 2**—Disordered system w/HEX-signatures developed by the author. These are developed with functions visualised. Cf, also the appendix to the slide set with examples of application.

From the Erlangen programme: “If instead of the principal group one considers an expanded group, only a part of the geometrical properties will be preserved. The other properties do no longer appear as

SCI 1870-1871, pp. 187-190. 8/1801, no. 87-107.  
Si l'on remplace le groupe principal par un groupe plus étendu, une partie seulement des propriétés géométriques est conservée. Les autres propriétés n'apparaissent plus comme propriétés intrinsèques des êtres géométriques, mais comme propriétés du système obtenu en leur adjoignant un être spécial. Cet être spécial, en tant qu'il est, en général, déterminé (\*), est défini par cette condition que, en le supposant fixe, les seules transformations, parmi celles du groupe donné, qui soient encore à appliquer à l'espace, soient celles du groupe principal.

intrinsic properties of the geometrical elements, but as a property of the system obtained by adding a special entity. This special entity—as it is generally determined—is defined on the condition that, presupposing it fixed, the only transformations of the expanded group, that still apply on the field/space, are those of the principal group.” (My trnsl.).