The Book of Diamonds

– ULTRA-DRAFT, PAPERS & FRAGMENTS –

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The Book of Diamonds, *Intro*

Pour Lorna Duffy Blue, qui ma poussé, à tout hasard,
dans une quadrille burlésque indécidable.
Printemps 2007, Glasgow

A book I didn't write

This is not the book I wanted to write. Nor did I want to read the book I didn't write. What you are reading now is the book which has written me into the book of diamonds I never owned. I never wanted to write you such a book. Nor that you are reading the book I didn't write.

It happened in a situation where I lost connection to what I have just written and what I had written before, again and again. While I was writing what I wanted to write I was writing what I never thought to write. A book of Diamonds. Or even *The Book of Diamonds*.

I haven't written this book. After I have written some parts I started to read it. I think what happened is the most radical departure from Occidental thinking and writing I ever have read before.

I remember vaguely what I was writing all those years before. I tried to read it and had the feeling to discover a way of thinking which has become a dark continent of what I always wanted to think but never succeeded. This is because this darkness wasn't illuminated enough to let discover this tiny but most fundamental difference in the way we are thinking and doing mathematics.

What jumped into my eyes, or was writing itself automatically into my formula editor, was the *resistance* of a difference to be levelled by the common approach of thinking.

The brightness of the new (in)sight is still troubling me.

It isn't my aim to write this book. I never wanted to write a book.

Nevertheless, I don't see a chance not to write this text as *The Book of Diamonds* wether or not I'm in the possession of diamonds. Nor do I want to be the author of a book I didn't write myself.

What troubles me, is that, as a matter of course, I don't understand what I have written in this book yet to be written.

The most self-evident situation, which is leading our thinking in whatever had been thought before, has become obsolete in its ridiculous restrictiveness.

Before I was overtaken by this tetralemmatic *trance sans dance*, I tried to overcome and surpass this boring narrowness of our common thinking by wild constructions of disseminated, i.e., distributed and mediated, formal systems. Like symbolic logic, formal arithmetic, programming languages and even category theory. This was a big step beyond the established way of thinking. And it still is.

But that isn't the real thing to write.

The striking news is the discovery of a new way of writing. Writing, until now, was the composition of letters, words and sentences to a composite, called text or book. The composition operation is no different from the composition of journeys. Let's have a look at how journeys are composed together to form a nice trip. We will be confronted with some surprising experiences in the middle of safe commodities.

Different times?

What is well known in time-related arts, that the temporality of a piece can be an intertwined movement of different futures and different pasts, is a thing of absolute impossibility in science and mathematics.

Time in science is uni-directional. It may be linear, branched or even cyclical, it remains oriented in one and only one direction. It is the direction of the next step into the future. But what we also know quite well is the fact that this is not the time of life, it is the time of chronology. Chronology is connecting time with numbers, forgetting the liveliness of lived time. Watchmakers know it the best.

Can you imagine a Swiss watch running forwards and backwards at once? Or our natural numbers, being disseminated and interwoven into counter-dynamic patterns? Utter nonsense!

Today, everything has to be linearized to be compatible with our scientific worldview and to be computed by our computerized technology and be measured by our chronology. No cash--point is working without the acceptance of global linearization.

We need this simple structure to compose our actions in a reasonable way. Reason is reduced to the ability to compose. To compose actions is the most elementary activity in life as well in science and maths. Hence, it is exactly the place to be analyzed and de-constructed in the search for a new way of composing complexity.

Well developed in time-based arts are patterns of poly-rhythms, poly-phony, multi-temporality of narratives, interwoven and fractal structures of stories, tempi developing in different directions, even the magic I'm interested in this book to be written, the simultaneous developments of tempi in contra-movements, at once forwards and backwards, and neither in the one nor in the other direction, and all that at once in a well balanced "harmony". This is not placed in the world of imagination and phantasy, only, but becoming a reality in our life, technology and science.

What's for?

As we know, time-related arts can be of intriguing temporal complexity. And the fact, that it happens in a limited and measurable time at a well-defined place for a calculable price is not interfering with its artistic and aesthetic complexity.

In terms of a theatre play we can imagine, and realizing it much more distinctively as it has been done before, a development of the drama at once forwards, future-oriented, and backwards, past-oriented. Both, simultaneously interplaying together.

This is not really new in drama, music or dance, nor in film, video and other time-related arts. But there is no theory, no instrumental support for it, thus based entirely on intuition, and therefore highly vulnerable and badly restricted in its possible complexity. At the same time, the paradigm of linearized and calculable time is intruding all parts of our life. It becomes more and more impossible for the arts to resist this way of thinking and organizing life.

The aim of the diamond approach is to reverse this historic situation. Complex temporal structures have to be implemented into the very basic notions and techniques of mathematics itself. With the diamond approach we will be able to design, calculate and program the complex qualities of interplaying time structures.

To achieve and realize this vision of a complex temporality, we have, paradoxically, to subvert the hegemony of time and time-related thinking. Different time movements can be interwoven only if there is some space offered for their interactions. Hence, a new kind of *spatiality,* obviously beyond space and time, has to be uncovered, able to open up an *arena* to localize the game of interacting time lines.

How to travel from Dublin to London via Glasgow?

Metaphorically, things are as trivial as possible. If you are travelling from Dublin to Glasgow you are doing a complementarity of two moves: you are leaving Dublin, mile by mile, and at the same time you are approaching Glasgow, mile by mile. What we learned to do, until now, is to travel from Dublin to Glasgow and to arrive more or less at the time we calculated to arrive.

To practice the complementarity of the movement is not as simple as it sounds. You have to have one eye in the driving mirror and the other eye directed to the front window and, surely, you have to mediate, i.e., to understand together, what you are perceiving: leaving and approaching at once. And the place you are thinking these two counter-movements which happens at once is neither the forward nor the backward direction of your journey. It's your awareness of both. Both together at once and, at the same time, neither the one nor the other. It is your *arena* where you are playing the play of leaving and arriving.

This complementarity of movements is just one part of the metaphor.

Because life is complex, it has to be composed by parts. Or it has to be de-composed into parts. We may drive from Dublin to Glasgow and then from Glasgow to London to realize our trip from Dublin to London. This, of course, is again something extremely simple to think and even to realize.

But again, there is a difference to discover which may change the way we are thinking for ever.

To arrive and to depart are two activities, i.e., two functions, two operations. Dublin, Glasgow and London as cities have nothing to do with arrivals and departures *per se*. They are three distinct cities. We can arrive and we can depart from these cities. But cities are not activities but entities, at least in this metaphor of traveling.

Things come into the swing if applied to the quadrille.

```
departure(Dublin)
arrival(Glasgow)/departure(Glasgow)
arrival(London)
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Obviously, Glasgow, in this case, is involved in the double activity of arrival and departure. It also seems to be clear, that the city Glasgow as the arrival city and Glasgow as the departure city are the same or even identical. It wouldn't make sense for our exercise if the arrival city would be Glasgow in Scotland and the departure city Glasgow would be Glasgow in the USA. But what does that mean exactly? If we stay for a while in Glasgow before we move on to London, Glasgow could have changed. Is it then still the same Glasgow we arrived in? And the same from which we want to depart? It could even happen that the city is changing its name in between!

On the other hand, it doesn't matter how much Glasgow is changing, the *activity* of arrival and the activity of departure are independent of a possible change of Glasgow.

It seems also quite clear, that the activity of arrival and the activity of departure are not only different but building an opposition. They are opposite activities.

It is also not of special interest for our consideration if the *way* of arriving and the way of departing is changing. Instead of taking a bus to leave Glasgow we could take a train or an airplane. Nothing would change the functionality of *departing* and *arriving* as such.

Thus, we can distinguish two notions in the movement or even two separated movements playing together the movement of the journey:

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1. Dublin--> Glasgow --> London, and
2. departure --> arrival/departure --> arrival.
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The classic analysis of the situation would naturally suppose that there is a kind of an equivalence or coincidence between Glasgow as arrival city and Glasgow as departure city, hence not making a big deal about the two distinctions just separated. Thus:

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arrival(Glasgow)=departure(Glasgow)
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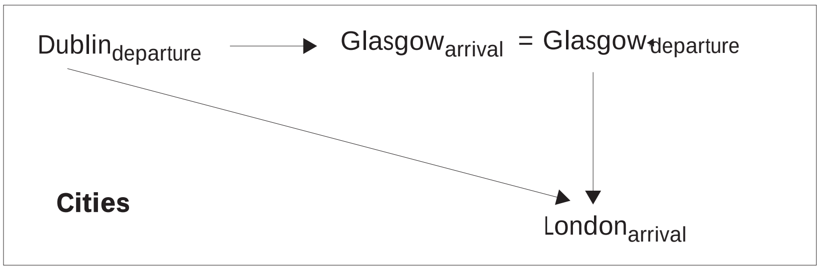
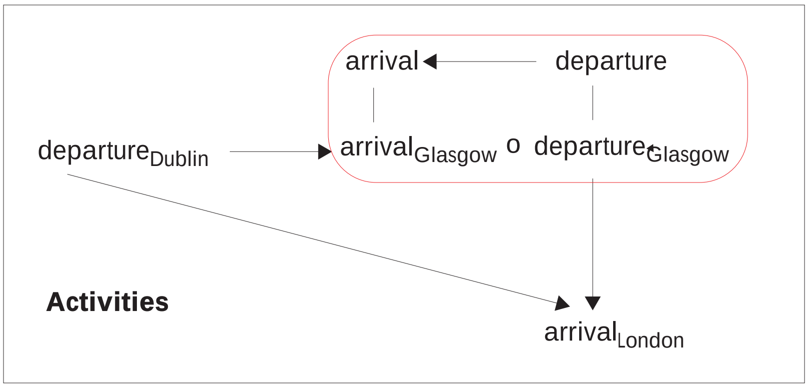
City-oriented travel diagram



A closer look at the place where the connection of both parts of the travel happens shows a more intricate structure than we are used to knowing. If we zoom into the connection of both journeys we discover an interesting interplay between the function of arrivals and the function of departures.

Activity-oriented diagram



The activity-oriented diagram is thematizing what really happens at the place of *"arrival(Glasgow)=departure(Glasgow)"*. That is, the internal logical structure of the simple or simplifying equality, *"arrival(Glasgow)"* and *"departure(Glasgow)"*, is analyzed and has to be studied in its 2-leveled structure and its complementary dynamics.

Obviously, the travel from Dublin to Glasgow, and from Glasgow to London is a *composition* of two sub-travels. Thus, the composition "o" in the first diagram is working only if the *coincidence* of both, *Glasgow(arrival)* and *Glasgow(departure)* is established. If this coincidence is not given, the composition of the journeys cannot happen.

Maybe something else will happen but not the connection of both journeys we wanted to happen. If we wanted to model what happened if it didn't happen we would have to draw a new diagram with its own arrows and it wouldn't be bad to find a connection from the old diagram to the new one.

What is the zoom telling us?

First, we observe the composition of the part-travels "o" aiming forwards to the aim.

Second, we discover a counter-movement in this activity of connecting parts, aiming into the opposite direction of the composition operation.

It may not be easy to understand why we have to deal with complicating such simple things. But we remember, even a single journey, without any connections, is a double movement. It is always simultaneously a dynamic of *away* and *anear*, to and fro, an intriguing *mêlée* of both. Not a toggle between one and the other, no flip-flop at all, but happening simultaneously both at once, coming and going.

Hence, it comes without surprise, that this *mêlée* happens for compositions too. In fact, it becomes inevitable in light of compositions. We simply have to zoom into it. We could forget about this complications if we would be on one and only one travel for ever. Then the backsight or retrospect would become obsolete. And only the foresight or prospect would count. Or in a further turn, only the journey *per se* without origin nor aim could become the leading metaphor.

Funnily enough, that is the way life is organized in *Occidental* cultures, modern and post-modern.

More profane, everything in the modern world-view is conceived as a problem to be solved, i.e. life appears as problem solving. Soon, happily enough, machines will overtake this *destin sinistre*.

Diamonds are not involved into the paradigm of problem solving and its time structure but are opening up playful games of the *joie de vivre,* spacing possibilities where problems can find their re-solution.

Lets go on! Keep it real!

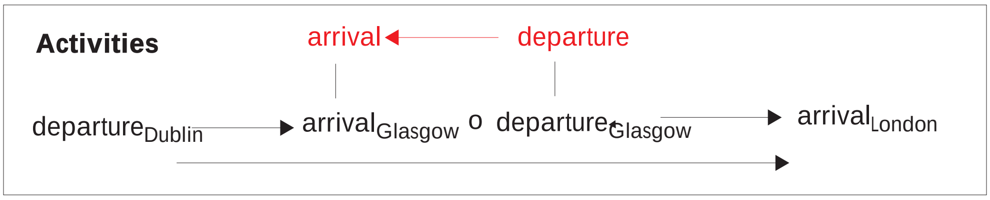
This intriguing situation we are discovering with our zoom, happens for all stations of our travel. We started at Dublin and ended in London. And these two stations are looking simple and harmless. But this is only the case because we have taken a *snapshot* out of the dynamics of traveling. That is, in some way we arrived before in Dublin and at some time we will leave London. Hence, Dublin and London have to be seen in the same light of dynamics between the categories of *arrival* and *departure* as it is the case for Glasgow as the connecting *interstation* to London.

Coming to terms

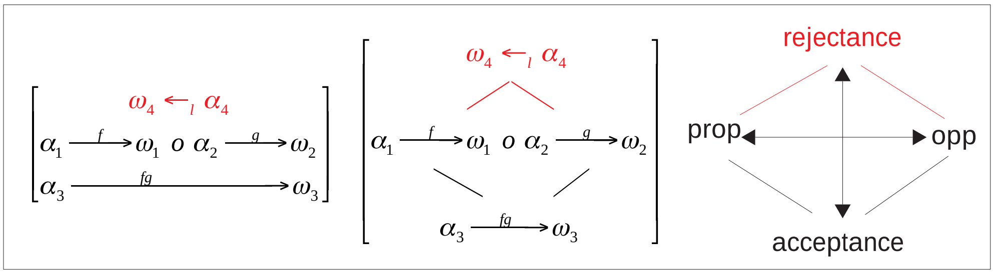
In mathematics, the study of such composed arrows is called category theory. *Category theory* is studying arrows (morphisms), *diamond theory* is studying composition of morphisms as the primary topic. The activity is not in the arrows but in the composition of the arrows. Hence, the complementary movement of the *rejectional* arrows (morphisms). At the cross-point of compositions the magic complementarity of encounters happens. There is nothing similar happening with morphisms alone and their objects. Category theory, without doubt, is dealing with compositions, too. But the focus is not on the intrinsic structure and dynamics of the composition itself but on the construction of new arrows based on the composition of arrows (morphisms).

Without such a magic of complementarity there is no realm for *rendez-vous*.

Departure is always the opposite of arrival. But this simple fact is also always doubled. The departure is the *double opposite* of arrival, the past arrival and the arrival in the future. Thus, the duplicity has to be realized at once. Let's read the diagram!



We can change terms now to introduce a more general approach to our intellectual journey. We replace for *departure* "alpha" and for *arrival* "omega" and omit the names of the cities. We get the first diagram. Then we stretch it to a nicer form. This is the diamond diagram of the arrows. Connected with a known terminology we get into the diamond of (proposition, opposition, acceptance, rejectance).



Further wordings

The class of departures can be taken as the position of *proposition*.

The class of arrivals can be taken as the position of the *opposition*.

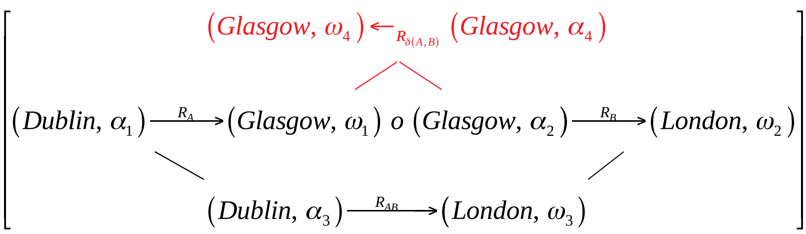
The class of compositions can be taken as the position of the *acceptance*.

The class of complements can be taken as the position of the *rejectance*.

Acceptance means: both at once, proposition and opposition.

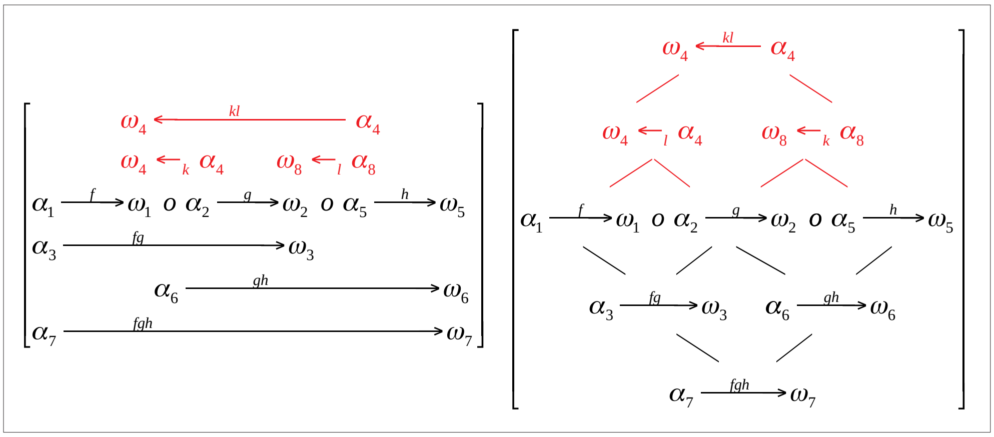
Rejectance means: neither-nor, neither proposition nor opposition.

Putting things together again, cities and activities, we get a final diagram



We learned to deal with identities, Glasgow *is* Glasgow. But our diagram is teaching us a difference. Glasgow *as* arrival city and Glasgow *as* departure city are not the same. As the *location* of arrival and departure of our journey, they are different.

More insights into the game are accessible if we go one step further with our journey



Category theory as the study of arrows is studying the rules of the *connectedness* of arrows. The diagram above, with its 3 arrows f, g, h and its compositions (fg), (gh) and (fgh), shows clearly one of the main rules for arrows: *associativity*.

In a formula, for all arrows f, g and h: (f o g) o h = f o (g o h).

Applying associativity to our journey analogy we have to add one more destination.

Hence, if we travel from *(Dublin to Glasgow and from Glasgow to London*) and then from *(London to Brighton)*, we are realizing the same trip as if we travel first from *(Dublin to Glasgow)* and then from *(Glasgow to London and from London to Brighton)*.

In contrast, within Diamond theory, for the very first time, additional to the category theory and in an interplay with it, the *gaps and jumps* involved are complementary to the connectedness of compositions. The counter-movements of compositions are generating jumps. In our diagram: between the red arrows *l* and *k* there is no connectedness but a gap which needs a jump. We can bridge the separated arrows by the red arrow *(kl)*, which is a balancing act over the gap, called *spagat*. If we want to compromise, we can build a *risky bridge*: *(lgk)*, which is involving acceptional and the rejectional arrows. Both together, *connectedness* and *jumps*, are forming the diamond structure of any journey.

Positioning Diamonds

The part of the book I have written myself is the part of localizing or positioning diamonds into the kenomic grid of polycontexturality without knowing exactly their internal structure. Diamonds are not falling from the *blue sky*, they have to be positioned. This happens on different levels in the tectonics of the graphematic system. The logical structure of distributed diamonds, especially, is enlightening this brand new experience and is producing further insights into the diamond paradigm of writing.

Diamonds in Ancient thinking

Furthermore, a connection is risked between diamond thinking and ancient Greek, Pythagorean, and the ancient Chinese way of thinking. Diamonds are not necessarily connected with any phono-logocentric notions. That is, diamonds are inscribed beyond the conception of names, notions, sentences, propositions, numbers and advice. Diamonds are not about eternal logical truth but are opening up worlds to discover.

Diamonds had been surviving in Western thinking as neglected creatures, reduced to logical entities, like Aristotle's *Square of Oppositions*. To do the diamond, i.e., to *diamondize* is still the challenge we have to enjoy to risk.

We are proud to live our life in an open world, not restricted to any limitations, allowing all kind of infinities, endless progresses, and feeling open to unlimited futures.

This enthusiasm for an open, infinite and dynamic world-view can be summarized in the very concept of natural numbers. Their counting structure is open and limitless.

With such an achievement in thinking and technology we are proud to distinguish our culture from Ancient cultures which had been closed, limited and static, and often involved with cyclic time-structures and their endless repetition of the same.

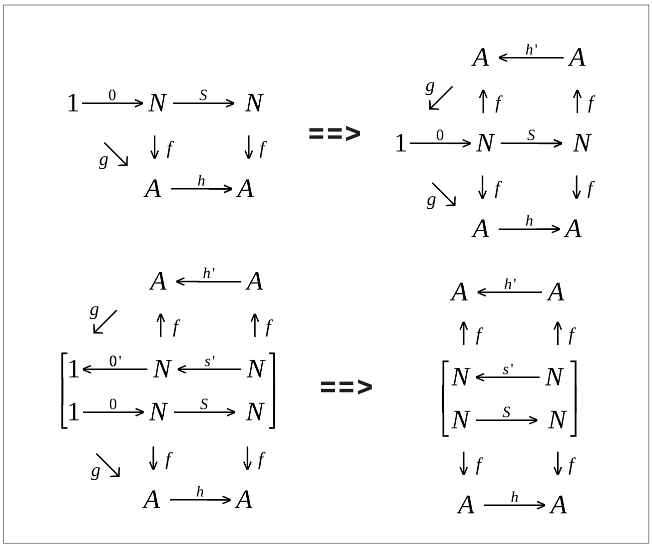
At a time where this proudness has achieved its aims, we are wakening up from this dream of liberty. The whole hallucination of the openness turns round into the nightmare of a sinister narrowness of endless iterativity and the shocking discovery of the endlessness of its resources.

It is time to acknowledge that the Ancient world-view wasn't as closed as its critics propagated. In fact since Aristotle we simply have lost any understanding of a world-view which is neither open nor closed, neither finite nor infinite, and neither static nor dynamic, simply because these distinctions are not thought in the sense of the Ancient world-view but in the modern way of thinking. Its simple bi-valuedness is automatically forcing this attitude of thinking to evaluate the binaries involved, i.e. open is good, closed is bad, dynamic is good, static is bad, infinite is good, finite is bad.

closed, static, temporal vs. open, dynamic, eternal worlds

In a closed world, which consists of many worlds, there is no narrowness. In such a world, which is open and closed at once, there is profoundness of reflection and broadness of interaction. In such a world, it is reasonable to conceive any movement as coupled with its counter-movement.

In an open world it wouldn't make much sense to run numbers forwards and backwards at once. But in a closed world, which is open to a multitude of other worlds, numbers are situated and distributed over many places and running together in all directions possible. Each step in a open / closed world goes together with its counter-step. There is no move without its counter-move.



If we respect the situation for closed / open worlds, then we can omit the special status of an *initial* object. That is, there is no zero as the ultimate beginning or origin of natural numbers in a diamond world. Everything begins everywhere. Thus, parallax structures of number series, where numbers are *ambivalent* and *antidromic*, are natural. It has to be shown, how such ambivalent and antidromic number systems are well founded in diamonds.

What's new?

So, after all these journeys about journeys, what is new and interesting about at all?

To cite, what I might have written, I can answer this question with an interrogative first trial. But first, I have to write, what's new is the fact that I'm writing without knowing what I'm writing. Until now, I was quite aware and in control of my writings.

> "If everything is in itself in a contractional struggle, involved into the dynamics of its opposites, hence, what does it mean for the most fundamental mathematical action, the *composition* of objects (relations, functions, morphisms, etc.)? The main opposites of thinking are *sameness* and *differentness* (difference, distinctness, diversity). They have to be inscribed in their chiastic interplay. How can their struggle at the place of the most elementary mathematical operation be inscribed?"

The discovery of the *realm of rejectionality,* the *"royaume sans roy et capital",* which is inscribing the writer into his writing, is the new theme of writing to be risked and explored.

All this together could become a book I would like (you) to read. What is written now could be called a sketch, or a proposal of a book I would like to write. But such a book would remain, necessarily, an endless sketch. What I have done until now was to disseminate formal systems (logics, arithmetic, category theory, etc.) based on triadic structures, i.e., I diamondized triangles (triads).

Classical thinking is dealing with dyads, like (yes / no), (true / false), (good / bad).

Modern thinking tries to be involved into triads: (true / false / context) or (operator / operand / operation).

The brand new exciting event to enjoy is: *Diamondization of diamonds!*

How to play the game of tetrads of tetrads, diamonds of diamonds?

How to do it?

Let's do it!

Read the book to be written: *"The Book of Diamonds".*

The Diamond Book, *Another Intro*

The White Queen says to Alice:
"It's a poor sort of memory that only works backwards".

1 Diamond Strategies and Ancient Chinese mathematical thinking

"expanding categories", "mutual relations", "changing world"

To diamondize is to invent/discover new contextures.

"A good mathematician is one who is good at expanding categories or kinds (tong lei)."

"Chinese mathematical art aims to clarify practical problems by examining their relations; it puts problems and answers in a system of mutual relation—a yin-yang structure for all the things in a changing world. The mutual relations are determined by the lei (kind), which represents a group of associations, and the lei (kind) is determined by certain kinds of mutual relations."

"Chinese logicians in ancient times presupposed no fixed order in the world. Things are changing all the time. If this is true, then universal rules that aim to represent fixed order in the world for all time are not possible." (Jinmei Yuan)

http://ccbs.ntu.edu.tw/FULLTEXT/JR-JOCP/jc106031.pdf

Given those insights into the character of Ancient Chinese mathematical practice the question arises:

How can it be applied to the modern Western way of doing maths?

If we agree, that the most fundamental operation in math and logic is to *compose* parts to a composed composition, then we have to ask:

How can the Chinese way of thinking being applied to this most fundamental operation of composition?

1.1 Tabular structure of the time "now"

"Chinese logical reasoning instead foregrounds the element of time as now. *Time, then, plays a crucial role in the structure of Chinese logic."*

Because of the "mutual relations" and "bi-directional" structure of Chinese strategies I think the time mode of "now" is not the Western "now" appearing in the linear chain of "past–present–future". To understand "now" in a non-positivist sense of "here and now" it could be reasonable to engage into the adventure of reading Heidegger's and Derrida's contemplation about time. This seems to be confirmed by the term "happenstance" (Ereignis) which is crucial to understand the "now"-time structure.

http://www.thinkartlab.com/CCR/2006_09_01_rudys-chinese-challenge_archive.html

Hence, the temporality of "now" is at least a complementarity of "past"- and "future"-oriented aspects. In other words, "now" as happenstance (Ereignis) is neither past nor future but also not present, but the interplay of these modi of temporality together.

"Deductive steps are not importand for Chinese mathematicians; the important thing is to find harmonious relationships in a bidirectional order." (Jinmei Yuan)

There is no need to proclaim any kind of proof that the diamond strategies are the ultimate explication and formalization of Ancient Chinese mathematical thinking. What I intent is to elucidate both approaches; and specially to motivate the diamond way of thinking. Borrowing Ancient insights as *metaphors* and *guidelines* to understand the immanent formal stringency of the diamond approach.

Time-structure of mathematical operations

I'm in the mood to belief that I just discovered a possibility to answer this crucial questen, i.e., the possibility to answer this question just discovered me to inscribe an answer, *where* and *how* to intervene into the fundamental concept of composition in mathematics and logic.

In a closed / open world things are purely functional (operational) and objectional, at once. Western math is separating objects from morphisms. This happens even in the "object-free" interpretation of category theory.

My aim is not to regress to a state of mind, where we are not able to make such a difference like between objects and morphisms, but to go beyond of its fundamental restrictiveness.

1.2 Towards a diamond category theory

A morphism or arrow between two objects, morph(A, B), is always supposing, that A is first and B is second. That is, (A, B), is an ordered relation, called a tuple. It is also assumed that A and B are disjunct.

To mention such a triviality sounds tautological and unnecessarily. It would even be clumsy to write (A;first, B; second). Because we could iterate this game one step further: ((A;first;first, B; second;second) and so on.

The reason is simple. It is presumed that the order relation, written by the tuple, is established in advance. And where is it established? Somewhere in the *axioms* of whatever axiomatic theory, say set theory.

In a diamond world such pre-definitions cannot be accepted. They can be dommesticated after some use, but not as a pre-established necessity.

Hence, we have to reunite at each place the operational and the objectional character of our inscriptions.

$$morph(A;\alpha,\ B;\omega),\ or\ as\ a\ graph,$$
$$morph: (A,\ \alpha) \longrightarrow (B,\ \omega)$$

As we know from mathematics, especially from category theory, a morphism at its own is not doing the job. We have to *compose* morphisms to composed morphisms. At this point, the clumsy notation starts to make some sense:

$$(A^1,\ \alpha_1) \xrightarrow{R_A} (B^1,\ \omega_1)\ o\ (A^2,\ \alpha_2) \xrightarrow{R_B} (B^2,\ \omega_2)$$
$$composition\ defined\ with\ \begin{bmatrix} \omega_1 \simeq \alpha_2 \\ A^2 \triangleq B^1 \end{bmatrix}$$

When we met, it wasn't that you and me met each other, it was our togetherness which brought us together without our knowledge of what is happening with us together.

The conditions of compositions are expressed, even in classic theories, as a *coinci-*

dence of the codomain of the first morphism with the domain of the second morphism. Hence, the composition takes the form:

$$\begin{array}{c}(A^1,\alpha_1)\xrightarrow{R_A}(B^1,\omega_1)\ o\ (A^2,\alpha_2)\xrightarrow{R_B}(B^2,\omega_2)\\ \diagdown \qquad\qquad\qquad\qquad \diagup \\ (A^1,\alpha_3)\xrightarrow{R_{AB}}(B^2,\omega_3)\end{array} \qquad \begin{bmatrix}\omega_1 \simeq \alpha_2\\ A^2 \triangleq B^1\\ (A^1,\alpha_1)=(A^1,\alpha_3)\\ (B^2,\omega_2)=(B^2,\omega_3)\end{bmatrix}$$

And now, a full complementation towards a Diamond category.

$$\begin{array}{c}(B^1,\omega_4)\leftarrow(A^2,\alpha_4)\\ \diagup\diagdown\ \delta \\ (A^1,\alpha_1)\xrightarrow{morph}(B^1,\omega_1)\ o\ (A^2,\alpha_2)\xrightarrow{morph}(B^2,\omega_2)\\ \diagdown \qquad\qquad\qquad\qquad \diagup\ \varphi \\ (A^1,\alpha_3)\xrightarrow{morph}(B^2,\omega_3)\end{array}$$

Your brightness didn't blend me to see this *minutious* difference in the composition of actions. What confused me, and still is shaking me, is this coincidence and synchronicity of our encounter and what I started to write without understanding what I was writing and how I could write you to understand our togetherness.

Which could be the words left which could be chosen to write you my wordlessness?

We are together in our differentness. Our differentness is what brought us together. We will never come together without the differentness of our togetherness.

Our togetherness is our differentness; and our differentness is our togetherness.

$$\begin{bmatrix} o=\begin{cases}\lambda(\omega_1)\simeq\lambda(\alpha_2)\\ \lambda(A^2)\triangleq\lambda(B^1)\end{cases}\\ \varphi(A^1,\alpha_1)=\varphi(A^1,\alpha_3)\\ \varphi(B^2,\omega_2)=\varphi(B^2,\omega_3)\\ \delta((B^1,\omega_1)\ o\ (A^2,\alpha_2))=\\ (\delta(B^1),\omega_4)\leftarrow(\delta(A^2),\alpha_4)\end{bmatrix}$$

You have given me the warmth I needed to open my eyes.

Together we are different; in our differentness we are close.

Our closeness is disclosing us futures which aren't enclosing our past.

Was it coincidence, parallelism and synchronicity or simply the diamond way of life which brought us together, not only you and me, but us together into our togetherness and with the work which has overtaken me?

What I couldn't see before, that always was in front of me, was eluminated by your brightness.

diamond composition of morphisms

$$\forall i,\ morph^i \in MORPH : \frac{morph^1\ o\ morph^2}{morph^3 \mid \overline{morph^4}}$$

$$thus,\ \ morph^{(4)} = \begin{bmatrix} \overline{morph^4} \\ morph^1,\ morph^2 \\ morph^3 \end{bmatrix}$$

I was walking on the pavement, thinking about all this beautiful coincidences and the scientific problems of the temporal structure of synchronicity. And just at this moment I heard a voice calling my name. It was you on your bike. I had been stuck in my thoughts, you in a hurry and the dangers of the traffic. But down to earth and the street, doing what made me happy. A différence minutieuse. Giving me a hug and a kiss.

"Bump, is a meeting of coincidence!", you text me

Then I started to write this text as another approach to an Intro for the *Book of Diamonds,* to be writen.

What are our diagrams telling us?

First of all, the way the arrows are connected is not straight forwards. There is additionally, a mutual counter-direction of the morphisms involved. Because of this split, the diagram is mediating two procedures, called the *acceptional* and the *rejectional*. Thus, an interaction between these two parts of the diagram happens. Such an interaction is not future-oriented but happens in the *now*, the happenstance, of its interactivity.

All the goodies of the classical orientation, the unrestricted iterativity of composition, is included in the diamond diagram. Nothing is lost.

Morphisms in categories are not only composed, but have to realize the conditions of associativity for compositions.

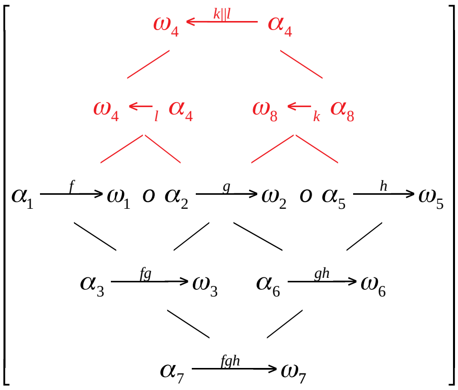
2 Complementarity of composition and hetero-morphism

The composition is legitimate if its hetero-morphism is established. If the hetero-morphism is establishe the composition is legitimate. The hetero-morphism is legitimating the composition of morphisms.

Only if the hetero-morphism of the composition is established, the composition is legitimate.

Only if the composition of the morphism is realized, the hetero-morphism is legitimate.

connectivity vs. jumps



I didn’t look for you; you didn’t look for me. We didn’t look for each other. Neither was there anything to look.

It happened in the happenstance of our togetherness.

We jumped together; we bridged the abyss.
You bridged the abyss; I bridged the abyss.

In a balancing act we bridged the abyss together.
The abyss bridged me and you.
The bridge abyssed us together into our differentness, again.

Une quadrille burlesque indécidable.

Now I can see, I always was looking for you.

But I couldn't see in the darkness of my thoughts that you had been there for all the time.

We learned to live with the deepness of our differentness. Discovered guiding rules to compose our journeys.

The time structure of synchronicity is antidromic, parallel, both at once forwards and backwards. Not in chronological time but in lived time of encounters and togetherness.

You have given me the warmth I needed to open my eyes.

Associativity of saltatories

With the *associativity* of categories new insights in to the functionality of diamonds are shown.

Diamonds may be thematized as 2-categories where two mutual *antidromic* categories are in an interplay. Hence possibiliy, not ecaxtly in the classic sense of 2-category theory neither in the sense of the *polycontexturality* of mediated categories.

complementarity of accept, reject

$$reject(gf) = k \;\; iff \;\; accept(k) = (gf)$$
$$reject(hg) = l \;\; iff \;\; accept(l) = (hg)$$
$$reject(hgf) = m \;\; iff \;\; accept(m) = (hgf)$$

Another notation is separating the acceptional from the rejectional morphisms of the diamond. A diamond consists on a simultaneity of a category and a jumpoid, also called a *saltatory*). If the category is involving m arrows, its antidromic saltatory is involving m-1 inverse arrows. Some simplification in the notation of saltatories is achieved if we adopt the category method of connecting arrows. This can be considered as a kind of a double strategies of thematization, one for compositions and one for saltos.

With such a separation of different types of morphisms, *diagram chasing* might be supported.

$$\begin{array}{ccc|c} A & \xrightarrow{f} & B & \\ & h \searrow & \downarrow g & b_1 \xleftarrow{k} b_2 \\ & C & & \end{array}$$

What went together, too, is the fact that I changed to a PPC, hence, this text written here, is written on the fly. In fact this machine simply should have served as my mobile for you. Not speaking much, but texting to communicate.

Diamond

$$\begin{array}{ccc|ccc} & & & & \underline{saltatory} & \\ A & \xrightarrow{f} & B & & & \\ \downarrow h & & \downarrow g & a & \xleftarrow{l} & b \\ C & \xrightarrow{k} & D & & n \nwarrow & \uparrow m \\ & & & & & c \\ \overline{category} & & & & & \end{array}$$

In our togetherness we are separated.

In our separateness we are associated.

Together, *nous some un ensemble très fort.*

Diamond rules

$$\frac{\begin{pmatrix} A \xrightarrow{f} B \xrightarrow{g} C \xrightarrow{h} D \\ b_1 \xleftarrow{k} b_2 \parallel c_1 \xleftarrow{l} c_2 \end{pmatrix}}{A \xrightarrow{m} D \mid b_1 \xleftarrow{n} c_2}$$

On the other side, I was aware that something special will happen this year. I told this my son. It is an odd year. I love odd numbers. But as we know there are about the same amount of even numbers. And there is something more.

Our society told me all the time, that, in my age, it will be time for the very end of the game.

$$\frac{\begin{pmatrix} id_A \ o \ f \\ diff_A \ o \ f \end{pmatrix}}{f \mid b}$$

Hence, I had to make a difference and to start a new round in this interplay of neither-nor. And that's what's going on, now.

Diamond Composition

$$(g \ \Diamond \ f) = \chi \left\langle \begin{array}{l} g \ o \ f : sameness \\ \overleftarrow{k} : differentness \end{array} \right\rangle$$

of relatedness.

$$(h \ \Diamond \ g \ \Diamond \ f) := \chi \left\langle \begin{array}{c} h \ o \ g \ o \ f \\ \overleftarrow{k} \parallel \overleftarrow{l} \end{array} \right\rangle$$

It is this difference you made , I was blind before.

After the difference made myself, I can see, how to meet you, again.

To play this game of sameness and differentness as the interplay of our relatedness.

I remember, you said: "Later!".

3 What's new?

Hence, what is new with the diamond approach to mathematical thinking is the fact, that, after 30 years of distributing and mediating formal systems over the kenomic grid with the mechanism of proemiality and tetradic chiasms, which goes far beyond "translations, embeddings, fibring, combining logics", I discovered finally the hetero-morphisms, and thus, the diamond structure, inside, i.e. immanently and intrinsically, of the very notion of category itself.

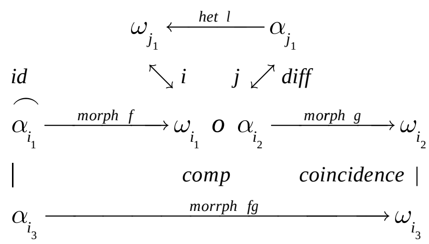
4 First steps, where to go

Following the arrows of our diagram some primary steps towards a formalization of the structure of our cognitive journeys may be proposed.

Descriptive Definition of diamond

$$
\begin{aligned}
&If\ \ coinc\left(\omega_1,\ \alpha_2\right),\ and\\
&\left(\begin{array}{l} coinc\left(\alpha_1,\ \alpha_3\right),\\ coinc\left(\omega_2,\ \omega_3\right)\end{array}\right),\\
&then\\
&morph\left(\alpha_1,\ \omega_1\right)\ o\ \ morph\left(\alpha_2,\ \omega_2\right) = morph\left(\alpha_3,\ \omega_3\right),\\
&and\ \ if\\
&\left(\begin{array}{l} diff\left(\alpha_2\right) = \alpha_4,\\ diff\left(\omega_1\right) = \omega_4\end{array}\right),\\
&then\\
&compl\left(morph\left(\alpha_3,\ \omega_3\right)\right) = het\left(\alpha_4,\ \omega_4\right)
\end{aligned}
$$

$$
\begin{aligned}
&Diamond\left(morph\right) = \chi\left\langle accept,\ reject\right\rangle\\
&accept\ \left(morph_1,\ morph_2\right) = morph_3\\
&reject\ \left(morph_1,\ morph_2\right) = morph_4
\end{aligned}
$$



Terms

morph / het

coinc / diff

id / div

o / ||

dual / compl

accept / reject

As written above, diamonds don't fall from the blue sky, we have to bring them together, for a first trial, to borrow methods, with the well known formalizations of arrows in category theory.

$$\mathbf{Diamond}^{(\mathbf{m})}_{\mathbf{Category}} = \left(\mathbf{Cat}^{(\mathbf{m})}_{\mathbf{coinc}} \mid \mathbf{Cat}^{(\mathbf{m-1})}_{\mathbf{jump}}\right)$$
$$\mathbb{C} = \left(M, o, \|\right)$$

1. Matching Conditions

$a.\ g\ o\ f,\ h\ o\ g,\ k\ o\ g\ and$

$$b_1 \xleftarrow{\ l\ } b_2$$
$$c_1 \xleftarrow{\ m\ } c_2$$
$$d_1 \xleftarrow{\ n\ } d_2$$
$$l \parallel m \parallel n\ are\ defined,$$

$b.\ h\ o\ \left(\left(g\ o\ f\right) o\ k\right)\ and$

$$b_1 \xleftarrow{\ l\ } b_2 \parallel c_1 \xleftarrow{\ m\ } c_2 \parallel d_1 \xleftarrow{\ n\ } d_2$$
$$l \parallel \left(m \parallel n\right)\ are\ defined$$

$c.\ \left(\left(h\ o\ g\right)\ o\ f\right) o\ k\ and$

$$\left(l \parallel m\right) \parallel n\ \ are\ defined,$$

$d.\ mixed : f, l, m$

$$l \parallel m, \bar{l}\ o\ f\ o\ \overline{m}$$
$$\left(\bar{l}\ o\ f\right)\ o\ \overline{m},$$
$$\bar{l}\ o\ \left(f\ o\ \overline{m}\right)\ are\ defined.$$

After the entry steps, the nice properties of associativity for morphisms and heteromorphisms are notified.

2. Associativity Condition

$a.\ If\ \ f, g, h \in MC,\ then\ h\ o\ \left(\left(g\ o\ f\right)\ o\ k\right) = \left(\left(h\ o\ g\right)\ o\ f\right)\ o\ k\ and$

$l, m, n \in MC \qquad\qquad l \parallel \left(m \parallel n\right) = \left(l \parallel m\right) \parallel n$

$b.\ If\ \ \bar{l}, f, \overline{m} \in MC,\ then\ \left(\bar{l}\ o\ f\right)\ o\ \overline{m} = \bar{l}\ o\ \left(f\ o\ \overline{m}\right)$

The definition of units has to interplay with identity and difference.

3. **Unit Existence Condition**

$$a.\ \forall f\ \exists(u_C,\ u_D) \in (M,\ o,\ \|):\ \begin{cases} u_C\ o\ f,\ u_D\ o\ f, \\ u_C\ \|\ f,\ u_D\ \|\ f \end{cases} are\ defined.$$

To not to lose ground, a smallness definition is accepted, at first.

4. Smallness Condition

$$\forall(u_1,\ u_2) \in (M,\ o,\ \|):\ hom(u_1,\ u_2) \wedge het(u_1,\ u_2) =$$
$$\begin{Bmatrix} f \in M \mid f\ o\ u_1\ \wedge\ u_2\ o\ f, \\ f \in M \mid f\ \|\ u_1\ \wedge\ u_2\ \|\ f\ are\ defined \end{Bmatrix} \in SET$$

As in category theory, many other approaches are accessible to formalize categories. The same will happen with diamonds; *later*.

5 Further comments on diamonds

5.1 Three kinds of Propositions

– Each proposition of category theory is valid for the category of a diamond.

– Each categorical proposition of a category has an antidromic equivalent in the saltatory of the diamond.

– Each saltatorical proposition of a saltatory has a categorical equivalent in the category of the diamond.

– Each diamond has an interplay of categorical and saltatorical propositions in the diamond.

- Hence, there are first, purely categorical and second, purely saltatorical propositions and third, mixed propositions of categorical and saltatorical situations in a diamond.

5.2 Is-abstraction vs. as-abstraction

It seems to be quite clear that the objects A, B and C or in other words the domains and codomains of the morphisms f and g are thought as identities. They are what they are in the is-mode of existence.

In contrast, counter-morphisms are thematizing the objects involved by their as-mode. The codomain of morphism f is thematized *as* the codomain of morphism k and the domain of morphism g is inscribed *as* the domain of morphism k, hence, building a morphism of opposite direction to the morphisms f and g.

The coincidence condition for composition is demanding a coincidence of the identities cod(f) and dom(g). If the new morphism k would take these identities in the is-mode it wouldn't be able to establish a new reasonable morphism. This can be realized only if these identities are taken in their as-mode. That is, the as-abstraction of cod(f) and dom(g) are enabling a new kind of morphism. Only with such a new functionality, offered by the as-abstraction, of the objects, a new kind of morphism can be established.

In the introductory example of a composed journey with,

```
departure(Dublin)
arrival(Glasgow)/departure(Glasgow)
arrival(London)
```

the as-abstraction comes into the play with *Glasgow as arrival* and *Glasgow as departure* city. The ontological status of the as-abstractions is different from the ontological status of the cities Dublin and London in their simple function of departure and arrival. The difference in the modi of existence is realized by the difference of is-abstraction versus as-abstraction.

The intrinsic structure of the coincidence, as the condition of composition of morphisms, is in itself doubled: it is the *equivalence* of the objects and the *differentness* of their functionality.

The new condition for composition in diamonds is the condition of mediation *of equivalence (coincidence) and differentness.*

5.3 Is this approach more than simply higher nonsense?

It is well known that category theory as a theory of morphisms or arrows is called by some people *"abstract nonsense"*. Hence, we have to ask if diamond theory is not only abstract nonsense but abstract higher nonsense.

How is category theory defending itself against this compliment?

Unifying theory

Category theory is helping to translate between different formal and notional approaches in nearly all disciplines from math, logical systems, computer science to linguistics, psychology, etc. In this sense, translation is supporting unifying interests.

This defence may give some hints how to defend diamond theory.

Plurifying theory

Antagonistic or antidromic polarities.

5.4 Tectonics of diamonds

Category theory has a hierarchical build up of its concepts. Classically, it start with objects, morphisms between objects, then functors between morphisms, and further natural transformations between functors.

Hence, the new insights into the diamond structure of composition has to be handed over to the higher order constructions in analogy to category theory.

5.5 Duality for diamonds

Duality for categories

Duality for saltatories

Complementarity of categories and saltatories

5.6 Foundational, anti- and trans-foundational strategies

As I have written before, situations in a open/closed diamond world are highly different from what we know until now.

> "In a closed world, which consists of many worlds, there is no narrowness. In such a world, which is open and closed at once, there is profoundness of reflection and broadness of interaction. In such a world, it is reasonable to conceive any movement as coupled with its counter-movement. "

Foundational studies in mathematics and logic are founding a construction after it has been constructed. There are always two different level in play: the object- and the meta-level. The temporal structure of foundations is mainly backwards oriented. Also, it is proposed that there is one and only one real foundation for a mathematical construction.

Anti-fundamentalism in mathematics and logic is mostly defined by negation and rejection or refutation of the former fundamentalism. The interest is more future-oriented in favor of new conceptions and constructions, which have to be negated to be accepted in general. Nevertheless, the distinction of construction and foundation, legitimation, negotiation remains.

Diamond strategies are offering a fundamentally different approach.

Each step in a diamond world has simultaneously its counter-step. Hence, each operation has an environment in which a legitimation of it can be stated. The legitimation is not happening before or after the step is realized but immediately in parallel to it.

This togetherness of construction and legitimation is the most radical departure from Western conceptualization and doing mathematics.

This principally new possibility opened up by the diamond strategies has to be recognized and developed.

At first, diamondization has to be connected with the other fundamental concept of trans-classic thinking: *the tabularity of positional systems.*

Obviously, morphisms and hetero-morphisms, or compositions and complementations, have to be positioned. But, additional to the known mechanism of positioning formal systems, the diamond introduces the antidromic movement of its objects to be positioned.

5.7 From goose-steps to saltos and balancing acts

In terms of steps we distinguish the goose-step of category theory from the jump, salto, spagat and the bridging-mix of steps and jumps of diamond theory. Both, step and saltos, are simultaneously involved in this play together. I developed this dialectic interplay as a chiasm between *Schritt (step) und Sprung (jump)* of trans-classic number theory.

> "Sprünge heissen bei Günther *„transkontexturale Überschreitungen"*. Solche Übergänge sind nicht einfach Transitionen einer Übergangsfunktion, sondern geregelte Sprünge von einer intra-kontexturalen Situation einer gegebenen Kontextur in eine andere Nachbar-Kontextur innerhalb einer Verbund-Kontextur. Sie sind somit immer doppelt definiert als Schritt intra-kontextural und als Sprung transkontextural. Auf die Kenogrammatik der Proto-Struktur mit ihrer Iteration und Akkretion bezogen betont Günther:
>
> *"Eine trans-kontexturale Überscheitung hat aber immer nur dann stattgefunden, wenn der Übergang von einem kontexturalen Zusammenhang zum nächsten sowohl iterativ wie akkretiv erfolgt."* Günther, Bd. II, S. 275
>
> Der Schritt vollzieht sich in der Unizität des Systems. Der Sprung erspringt eine Plurizität von Kontexturen. Jede dieser Kontexturen ist in sich durch ihre je eigene Unizität geregelt und ermöglicht damit den Spielraum ihres Schrittes. Damit werden die Metaphern des Schrittes und des Sprunges miteinander verwoben.
>
> Der neue Spruch lautet: *Kein Sprung ohne Schritt; kein Schritt ohne Sprung.* Beide zusammen bilden, wie könnte es anders sein, einen Chiasmus.
>
> *Schritt vs. Sprung*
> *vs.*
> *mono- vs. polykontextural*
>
> Der Begriff der Sukzession, des schrittweisen Vorgehens, der Schrittzahl, des Schrittes überhaupt, ist dahingehend zu dekonstruieren, dass der Schritt als chiastischer Gegensatz des *Sprunges* verstanden wird.
>
> Erinnert sei an Heidegger: *„Der Satz des Grundes ist der Grund des Satzes."*
>
> Der Schritt hat als logischen Gegensatz den Nicht-Schritt, den Stillstand. Der lineare Schritt, wie der rekurrente Schritt schliessen den Sprung aus. Schritte leisten keinen Sprung aus dem Regelsatz des Schrittsystems. Vom Standpunkt der Idee des Sprunges ist der Schritt ein spezieller Sprung, nämlich der Sprung in sich selbst, d.h. der Sprung innerhalb seines eigenen Bereichs.
>
> Wenn Zahlen Nachbarn haben, werden diese Nachbarn nicht durch einen Schritt, sondern einzig durch einen *Sprung* errechnet bzw. besucht.
>
> Die Redeweise *„in endlich vielen Schritten"* etwa zur Charakterisierung von Algorithmen muss nicht nur auf die Konzeption der Endlichkeit, sondern auch auf die Schritt-Metapher hin dekonstruiert werden." Kaehr, Skizze-0.9.5

The Book of Diamonds

– DRAFT –

Rudolf Kaehr

ThinkArt Lab Glasgow 2007

http://www.thinkartlab.com

How to compose?

How to compose?

How to compose?

6 Category, Proemiality, Chiasm and Diamonds

From a pattern of cosmic law to a figure of speech to the structure of cosmos as the pattern of the script beyond speech.

To put the different terminologies together I'm resuming the analysis of composition, again.

Chiasm is for Chiasm, too

"Emileigh Rohn is a solo artist who produces the dark industrial electronic music project *Chiasm* sold by COP International records."

"At the age of five, Emileigh Rohn began taking piano lessons from her church organist, Mildred Benson, and eventually began singing solos in church. By the age of 13 she received a Casiotone keyboard and began experimenting with electronic music."
http://www.last.fm/music/Chiasm/+wiki

Chiasm, which *"began in 1998 when Rohn began to entirely produce her own music"*, named *"Embryonic"* is composing in its dark *"experimental/industrial"* sound structures Emileigh Rohn, the artist of Chiasm, which began *"At the age of five"*, when *"Emileigh Rohn began taking piano lessons …and eventually began singing solos in church."*, Emileigh began to be involved into the chiastic co-creation of Rohn and Chiasm, together. Her beginning hasn't ended to create and re-create Chiasm and Emileigh Rohn, again. Tomorrow, July the 7th 2007 at The Labyrinth/Detroit/USA.
http://www.chiasm.org/

As a guideline to this *summary* of the modi of beginnings and endings, and their compositions, the diagram of chiasm as developed in the texts to polycontextural logics, might be of help to lead the understanding of polycontextural logics and their chiasms.

On page 55 of *Chuang-tzu: The Inner Chapters* it is said,

"There is 'beginning', there is 'not yet having begun having a beginning'. There is 'there not yet having begun to be that "not yet having begun having a beginning"'. There is 'something', there is 'nothing'. There is 'not yet having begun being without something'. There is 'there not yet having begun to be that "not yet having begun being without something'."

Zhuangzi quips, "While we dream we do not know that we are dreaming, and in the middle of a dream interpret a dream within it; not until we wake do we know that we were dreaming. Only at the ultimate awakening shall we know that this is the ultimate dream".

"Last night Chuang Chou dreamed he was a butterfly, spirits soaring he was a butterfly (is it that in showing what he was he suited his own fancy?), and did not know about Chou. When all of a sudden he awoke, he was Chou with all his wits about him. He does not know whether he is Chou who dreams he is a butterfly or a butterfly who dreams he is Chou. Between Chou and the butterfly there was necessarily a dividing; just this is what is meant by the transformation of things".

Chiastic structures

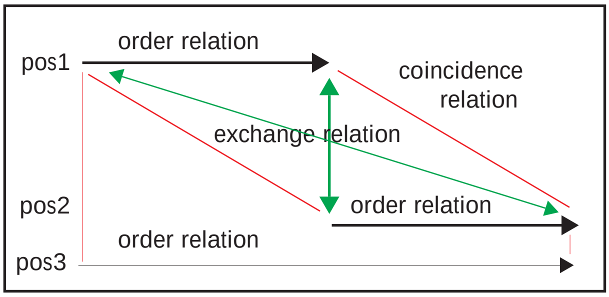
"The Intertwining the Chiasm:
If it is true that as soon as philosophy declares itself to be reflection or coincidence it prejudges what it will find, then once again it must recommence everything, reject the instruments reflection and intuition had provided themselves, and install itself in a locus where they have not yet been distinguished, in experiences that have not yet been "worked over," that offer us all at once, pell-mell, both "subject" and "object," both existence and essence, and hence give philosophy resources to redefine them." (Merleau-Ponty 130).

"The second quotation is a selection from the Zhuangzi.
It states, "Cook Ding was cutting up an ox for Lord Wen-Hui. At every touch of his hand, every heave of his shoulder, every move of his feet, every thrust of his knee-zip! Zoop! He slithered the knife along with a zing, and all was in perfect rhythm, as though he were performing the dance of the Mulberry Grove or keeping time to the Ching-shou music. 'Ah, this is marvelous!' said Lord Wen-Hui. 'Imagine skill reaching such heights!' Cook Ting laid down his knife and replied, 'What I care about is the [way], which goes beyond skill. When I first began cutting up oxen, all I could see was the ox itself. After three years I no longer saw the whole ox. And now-now I go at it by spirit and don't look with my eyes. Perception and understanding have come to a stop and spirit moves where it wants. I go along with the natural makeup, strike in the big hollows, guide the knife through the big openings, and follow things as they are'."
http://www.uwlax.edu/urc/JUR-online/PDF/2004/durski.pdf

"Chiastic structures are sometimes called *palistrophes*, *chiasms*, *symmetric* structures, *ring* structures, or *concentric* structures."
http://en.wikipedia.org/wiki/Chiastic_structure

The *optic chiasm* (Greek χιασμα, "crossing", from the Greek χλαζειν 'to mark with an X', after the Greek letter "χ'', chi)

Preliminary travel guide to chiasm



The green arrows are symbolizing the over-cross position of terms, *exchange* relation, involved in the polycontextural approach to chiasm.

To enable the chiasm to function, the *coincidence* relations, which are securing categorial sameness, have to be matched. In the rhetoric form "winter becomes summer and summer becomes winter" the terms "winter" ("summer") in the first and "winter" ("summer") in the second part of the sentence are the same, that is they have to match their categorial sameness. Hence the figure of its crossed terms is "ABBA". The *order* relations are representing the difference and order between "winter" and "summer". Both order relations are distributed over 2 positions (pos1, pos2). A summary is given at position pos3 with the 3. order relation, representing the seasonal *change* of winter and summer as such.

Chiastic Rhetoric

"In rhetoric, chiasmus is the figure of speech in which two clauses are related to each other through a reversal of structures in order to make a larger point; that is, the two clauses display inverted parallelism. Chiasmus was particularly popular in Latin literature, where it was used to articulate balance or order within a text."

http://en.wikipedia.org/wiki/Chiasmus

Depending on the interpretation of the coincidence relations between the crossed terms, A, A' and B, B', different rhetoric figures can be realized.

Antanaclasis

"We must all hang together, or assuredly we shall all hang separately." —Benjamin Franklin

Hence, in Bejamin Franklin's figure of *antanaclasis* the terms are changing the meaning of its crossed terms, but not its phonetics. That is, in "hang together" vs. "hang seperatedly", the terms "hang" are phonetically in a coincidence, but different in meaning. The different meanings are even in some sense in an opposition.

Antimetabole

Marx wrote:
"It is not the consciousness of men that determines their being, but, on the contrary, their social being that determines their consciousness".

"We didn't land on Plymouth Rock, the rock was landed on us."
Malcolm X, The Ballot or the Bullet, Washington Heights, NY, March 29, 1964.

Zeugma

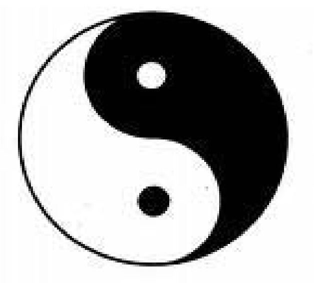
Zeugma (from the Greek word "ζευγμα", meaning "yoke") is a figure of speech describing the joining of two or more parts of a sentence with a common verb or noun. A zeugma employs both ellipsis, the omission of words which are easily understood, and parallelism, the balance of several words or phrases.

Syllepsis

Syllepsis is a particular type of zeugma in which the clauses are not parallel either in meaning or grammar. The governing word may change meaning with respect to the other words it modifies.

"You held your breath and the door for me." Alanis Morissette, Head over Feet

Yin-Yang symbol of change, Yijing



Taijitu, the traditional symbol representing the forces of yin and yang.

Obviously, from the point of view developed in this paper, the *taijitu* is not simply a binary polarity, dichotomy, duality or cyclic complementarity, nor a part-whole merological figure, but a *chiasm* with its 4 elements (black=yin, white=yang, big, small) and its 6 relations between the 4 elements.

http://www.kolahstudio.com/Underground/?p=153
http://them.polylog.org/3/amb-en.htm
http://www.sjsu.edu/faculty/bmou/Default.htm
http://www.chiasmus.com/whatischiasmus.shtml

Chiastic Music

Patterns of Musical Chiasms at the Grove Music Online

Thomas Braatz wrote (April 5, 2006):
Rovescio (2 meanings), retrograde, palindrome, etc.

"In the meantime, here are some explanations I have extracted from the Grove Music Online which might help in *'coming to terms with these terms'*:

Al rovescio

(It.: 'upside down', 'back to front').

A term that can refer either to Inversion or to Retrograde motion. Haydn called the minuet of the Piano Sonata in A h XVI:26 Minuetto al rovescio: after the trio the minuet is directed to be played backwards (retrograde motion). In the Serenade for Wind in C minor K388/384a, Mozart called the trio of the minuet Trio in canone al rovescio, referring to the fact that the two oboes and the two bassoons are in canon by inversion.

Retrograde

(Ger. 'Krebsgang', from Lat. 'cancrizans': 'crab-like').

A succession of notes played backwards, either retaining or abandoning the rhythm of the original. It has always been regarded as among the more esoteric ways of extending musical structures, one that does not necessarily invite the listener's appreciation. In the Middle Ages and Renaissance it was applied to cantus firmi, sometimes with elaborate indications of rhythmic organization given in cryptic Latin inscriptions in the musical manuscripts; rarely was it intended to be detected from performance.

Cancrizans

(Lat.: 'crab-like').

By tradition 'cancrizans' signifies that a part is to be heard backwards (see Retrograde); crabs in fact move sideways, a mode of perambulation that greatly facilitates reversal of direction.

Palindrome.

A piece or passage in which a Retrograde follows the original (or 'model') from which it is derived (see Mirror forms). The retrograde normally follows the original directly. The term 'palindrome' may be applied exclusively to the retrograde itself, provided that the original preceded it. In the simplest kind of palindrome a melodic line is followed by its 'cancrizans', while the harmony (if present) is freely treated. The finale of Beethoven's Hammerklavier Sonata op.106 provides an example. Unlike the 'crab canon', known also as 'canon cancrizans' or 'canon al rovescio', in which the original is present with the retrograde, a palindrome does not present both directional forms simultaneously. Much rarer than any of these phenomena is the true palindrome, where the entire fabric of the model is reversed, so that the harmonic progressions emerge backwards too.

http://www.bach-cantatas.com/Topics/Chiasm.htm

"ABA is a palindrome: you can read it both ways, but it is not a chiasm. AB:BA is a chiasm, and so is of course AB:C:BA. Both are palindromes too, because they are dreadfully abstract. But Recitative-Aria-Chorus-Aria-Recitative will be a palindrome only if both your recitatives and both your recitatives are similar, which I would definitely advise against. The chiasm is fun only because you realize that you have two pairs facing each other that decided to dance a little step instead of mirroring each other blandly."

7 Categorical composition of morphisms

A action from A to B can be considered as a mapping or morphism, symbolized by an arrow from A to B. In this sense, morphisms are universal, they occur everywhere. But morphisms (mappings) don't occur in isolation, they are composed together to interesting complexions. This highly general notion of morphism and composition of morphisms is studied in *Category Theory*.

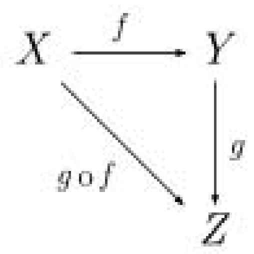
"... category theory is based upon one primitive notion – that of composition *of morphisms." D. E. Rydeheard*

What is a morphism? And how are morphisms composed?

$$morph(A;\alpha,\ B;\omega),\ or\ as\ a\ graph,$$
$$morph : (A,\ \alpha) \longrightarrow (B,\ \omega)$$

"In mathematics, a *morphism* is an abstraction of a structure-preserving mapping between two mathematical structures.
The most common example occurs when the process is a function or map which preserves the structure in some sense.

There are two operations defined on every morphism, the *domain* (or source) and the *codomain* (or target). Morphisms are often depicted as arrows from their domain to their codomain, e.g. if a morphism f has domain X and codomain Y, it is denoted f : X –> Y. The set of all morphisms from X to Y is denoted hom_C(X,Y) or simply hom(X, Y) and called the *hom-set* between X and Y.



For every three objects X, Y, and Z, there exists a binary operation hom(X, Y) x hom(Y, Z) –> hom(X, Z) called *composition*.
The composite of f : X –> Y and g : Y –> Z is written gof or gf (Some authors write it as fg.) Composition of morphisms is often denoted by means of a *commutative* diagram."

Hence, commutativity means, to operate from X to Y and from Y to Z, is the same as to operate from X to Z.

"Morphisms must satisfy two *axioms*:
1. IDENTITY:
for every object X, there exists a morphism idX : X –> X called the identity morphism on X, such that for every morphism f : A –> B we have id_B o f = f o Id_A.

2. ASSOCIATIVITY:
h o (g o f) = (g o h) o f whenever the operations are defined."

http://en.wikipedia.org/wiki/Morphism

The composition of morphisms (arrows) is defined by the *coincidence* of codomain (cod) and domain (dom) of the morphism to compose. That is, cod(f) = dom(g). Or more abstract, the *matching rules* of the morphisms f and g have to be fulfilled to compose the morphisms f and g as the composite g o f.

Obviously, morphisms (arrows) are modelled in the chiastic approach as order relations. Hence, the focus of this categorial approach of composition are the matching (coincidence) rules. And not any exchange relations between codomain and domain of composed morphisms, like in the chiastic model. Instead of an exchange relation, a partial coincidence relation (matching) is used to compose morphisms.

$$\left[\begin{array}{l} \alpha_1 \xrightarrow{f} \omega_1 \ o \ \alpha_2 \xrightarrow{g} \omega_2 \\ \alpha_3 \xrightarrow{\quad fg \quad} \omega_3 \end{array}\right]$$

$$is\ COMP\ iff\ \omega_1 \triangleq \alpha_2$$

Also not in focus is the distinction of the domain of the first and the codomain of the second morphism as *opposite* properties.

That is, neither exchange nor coincidence relations are considered as such in the categorial approach to the composition of morphisms. This may be called a *local* approach to composition.

An explicit definition of the composition of morphisms is given by the following diagram and its matching conditions. Here, the distinction between objects, A, B, and the domain, codomain properties, alpha (α), omega (ω), are included.

$$\begin{array}{ccc} (A^1, \alpha_1) \xrightarrow{R_A} (B^1, \omega_1) \ o \ (A^2, \alpha_2) \xrightarrow{R_B} (B^2, \omega_2) \\ \diagdown \qquad\qquad\qquad \diagup \\ (A^1, \alpha_3) \xrightarrow{R_{AB}} (B^2, \omega_3) \end{array}$$

$$\left[\begin{array}{l} \omega_1 \simeq \alpha_2 \\ A^2 \triangleq B^1 \\ (A^1, \alpha_1) = (A^1, \alpha_3) \\ (B^2, \omega_2) = (B^2, \omega_3) \end{array}\right]$$

Hence, not only the codomain B1 and the domain A2 as objects have to coincide, but also the domain "alpha2" (α2) and the codomain "omega1" (ω2) as functions have to match. The distinction of objects and functions (aspects) of morphisms is not strictly used in category theory. Obviously, the commutativity of the diagram has to fulfil, additionally, the matching conditions for (A1, α1) with (A1, α3) and (B2, ω2) with (B2, ω3).

Associativity

The associativity rules for compositions are easily pictured by the following diagram, which is reducing the notation to its essentials.

In a formula, for all arrows f, g and h: (f o g) o h = f o (g o h).

$$\left[\begin{array}{l} \alpha_1 \xrightarrow{f} \omega_1 \ o \ \alpha_2 \xrightarrow{g} \omega_2 \ o \ \alpha_4 \xrightarrow{h} \omega_4 \\ \alpha_3 \xrightarrow{\qquad fg \qquad} \omega_3 \\ \qquad\qquad\quad \alpha_5 \xrightarrow{\qquad gh \qquad} \omega_5 \\ \alpha_6 \xrightarrow{\qquad\qquad fgh \qquad\qquad} \omega_6 \end{array}\right]$$

To suggest a picture of the diamond way of thinking, to be introduced, the graph may take this form:

$$\left[\begin{array}{c} \alpha_1 \xrightarrow{f} \omega_1 \ o \ \alpha_2 \xrightarrow{g} \omega_2 \ o \ \alpha_4 \xrightarrow{h} \omega_4 \\ \diagdown \quad \diagup \qquad \diagdown \quad \diagup \\ \alpha_3 \xrightarrow{fg} \omega_3 \qquad \alpha_5 \xrightarrow{gh} \omega_5 \\ \diagdown \quad \diagup \\ \alpha_6 \xrightarrow{fgh} \omega_6 \end{array}\right]$$

This is the beginning only. All further steps from *morphisms*, to *functors*, to *natural transformations*, etc. are following "naturally" the laws of composition.

8 Proemiality of composition

Proemiality of composition in the sense of Gotthard Gunther is focusing on the *exchange* relationship between morphisms as *order* relations over different levels. Hence the inverse exchange relation between the levels was not specially thematized. Also not in focus at all are the coincidence relations responsible for categorial matching of morphisms beyond commutativity.

„However, if we let the relator assume the place of a relatum the exchange is not mutual. The relator may become a relatum, not in the relation for which it formerly established the relationship, but only relative to a relationship of higher order.

And vice versa the relatum may become a relator, not within the relation in which it has figured as a relational member or relatum but only relative to relata of lower order.

If:

R_{i+1}(xi, yi) *is given and the relatum (x or y) becomes a relator, we obtain*
R_i *(xi-1, yi-1) where Ri =* x_i *or* y_i. *But if the relator becomes a relatum, we obtain*
R_{i+2}*(xi+1, yi+1) where* $R_{i+1} = x_{i+1}$ or y_{i+1}. *The subscript i signifies higher or lower logical orders.*

We shall call this connection between relator and relatum the 'proemial' relationship*, for it 'pre-faces' the symmetrical exchange relation and the ordered relation and forms, as we shall see, their common basis.“*

"But the exchange is not a direct one. If we switch in the summer from our snow skis to water skis and in the next winter back to snow skis, this is a direct exchange. But the switch in the proemial relationship always involves not two relata but four!" (Gunther)

On focusing on the *activity* of the proemial relationship, a connection to kenogrammatics is established.

"This author has, in former publications, introduced the distinction between value structures and the kenogrammatic structure of empty places which may or may not have changing value occupancies.

The proemial relation belongs to the level of the *kenogrammatic* structure because it is a mere potential which will become an actual relation only as either symmetrical exchange relation or non-symmetrical ordered relation. It has one thing in common with the classic symmetrical exchange relation, namely, what is a relator may become a relatum and what was a relatum may become a relation." (Gunther)

Gunther's Proemiality

What wasn't yet considered in this approach Gunther's to the proemial relationship are the "acceptional" relations, also called the mediation systems, between the different levels of proemiality. A morphism based on a kind of coincidence relation was allowed only for the mediation of his polycontextural logics but didn't have a representation in the introduction of his proemial relationship.

Graph formalization of Proemiality as a cascadic chiasm

The graph of Gunther's description was given in my *Materialien* as a cascade.

"The exchange which the proemial relation (R^{pr}) effects is one between higher and lower relational order." (Gunther)

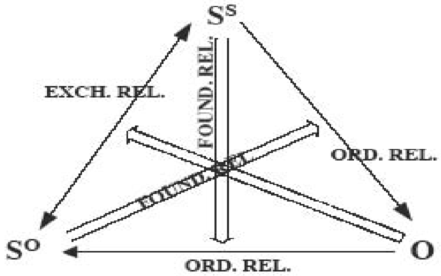
$$\mathbf{PR}\left(\mathbf{R}_{i+1}, \mathbf{R}_i, \mathbf{x}_{i+1}, \mathbf{x}_i\right)::$$

$$\begin{array}{llll}
m-1: & & & R_i \longrightarrow x_{i-1} \\
 & & & \Updownarrow \\
m: & & R_{i+1} \longrightarrow x_i & \\
 & & \Updownarrow & \\
m+1: & R_{i+2} \longrightarrow x_{i+1} & &
\end{array}$$

The proemial relation is not considering the categorial coincidence relations as such, nor the inverse exchange relation. The movements, up and down, in the cascade are ruled by the indexes of the levels (m) and not by an additional inverse exchange relation.

> "We stated that the proemial relationship presents itself as an interlocking mechanism of exchange and order. This gave us the opportunity to look at it in a double way. We can either say that proemiality is an exchange founded on order; but since the order is only constituted by the fact that the exchange either transports a relator (as relatum) to a context of higher logical complexities or demotes a relatum to a lower level, we can also define proemiality as an ordered relation on the base of an exchange." (Gunther)

This reading of the proemial relationship is thematization the upwards and downward movement of proemiality. What is missing is the insight into the simultaneity of both movements of upwards as construction and downwards as deconstruction at once. Because Gunther introduced one and only one exchange relation per transition (transport/remote) of reflection such a simultaneity is systematically excluded. By another, earlier 1966, approach to the phenomen of proemiality, Gunther is introducing an additional *"founding relation"*, which seems to close the pattern of reflection to some degree by including the objects of the relations into the interplay. The schemes has the following structure:



"an *exchange* relation between logical positions
an *ordered* relation between logical positions
a *founding* relation which holds between the member of a relation and a relation itself."

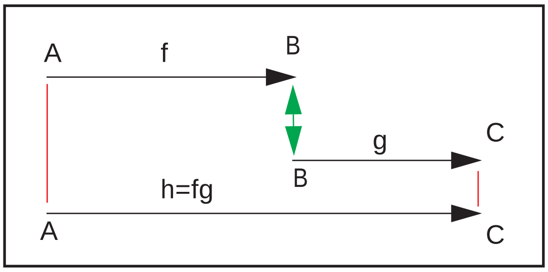
O=object
So= objective subject (Thou)
Ss= subjective subject (I).

Hence, the interlocking mechanism of order and exchange relations are founded by the founding relation, which is omitted in the later introduction of proemiality.

> "We are now able to establish the fundamental law that governs the connections between exchange-, ordered- and founding-relation. We discover first in classic two-valued logic that affirmation and negation form an ordered relation. The positive value implies itself and only itself. The negative value implies itself and the positive. In other words: affirmation is never anything but implicate and negation is always implication. This is why we speak here of an ordered relation between the implicate and the implicand. The name of this relation in classic two-valued logic is - inference."
>
> "Thus we may say: the founding-relation is an exchange-relation based on an ordered-relation. But since the exchange-relations can establish themselves only between ordered relations we might also say: the founding-relation is an ordered relation based on the succession of exchange-relations. When we stated that the founding-relation establishes subjectivity we referred to the fact that a self-reflecting system must always be: self-reflection of (self- and hetero-reflection)."
> Gunther, Formal Logic, Totality and The Super-additive Principle, 1966

Gunther's Proemiality and Super-additivity of composition

That an m-valued logic is producing s(m)-valued subsystems is emphazised and based on the coincidence relations in the sense of commutativity.



This topic is constant in Gunther's studies to polycontextural logics. But it is not included in the definition of his proemial relationship.

Open and closed proemiality

In my paper *Materialien 1973-75*, I introduced the distinction between open and closed proemial relationships.

$$Open-PR: \quad PR\left(PR^{(m)}\right) = PR^{(m+1)}$$
$$Closed-PR: PR\left(PR^{(m)}\right) = PR^{(m)}$$

It seems that the concept of a *closed proemiality* is including the inverse exchange relation to guaranty the circularity of the chiasm. Hence, this thematization of proemiality is involving two exchange relations in the transition from one level of reflection to the next; and backwards at once.

The open proemial relationship is a cascade from step to step of the iteration. It can be involved in one or in two exchange relations at each transition.

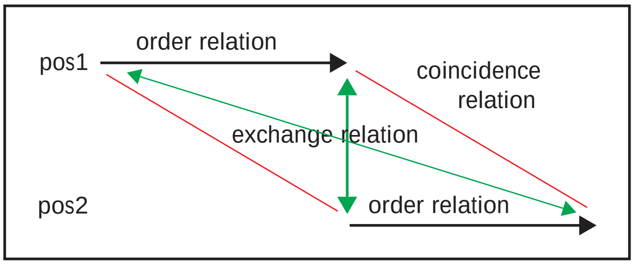
9 Chiasm of composition

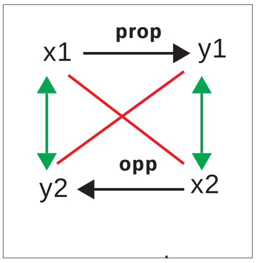
The chiasm of composition is reflecting all parts involved into the composition.

In this sense, finiteness and closeness of the operation of composition are established by the interplay of two exchange and two coincidence relations over two morphisms as order relations, distributed over two positions.

9.1 Proemiality pure

This kind of chiasm is not a simple cascade but a circular structure involving two exchange relations.





coinc (x y)	***exch (x y)***	***ord (x y)***
x1 coinc x2 *y1 coinc y2*	*x1 exch y2* *y1 exch x2*	*x1 ord y1* *x2 ord y2*

This table is resuming the relations of the chiasm using the variables x and y for the objects, that is, the domain and codomain of the morphisms, defined by the order relations.

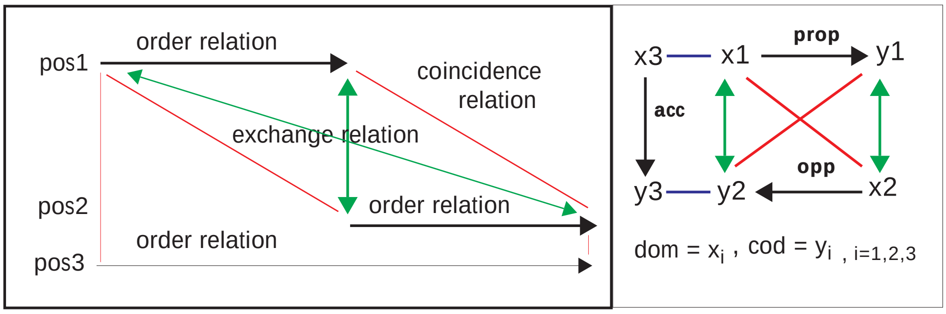
A metaphor: From chiasm to diamond

"I wish from you that you wish from me
what I wish from you that you wish from me.
Do you?"

"Ich wünsche mir von dir, dass du dir wünschst von mir,
was ich mir wünsche von dir.
Und du?"

This formula of you and me is celebrating the suspension of the *pure* chiasm. It is not making a decision about to what the wish is aimed. With such a decision, a new order relation, mediating the dynamics of the pure chiasm, has to be installed. This is producing the *acceptional* chiasm. The dynamics of suspension is not interrupted by the introduction of an acceptional order relation, but it gets a place where the hidden content of the dynamics can be realized. Nevertheless, this acceptional chiasm, which is incorporating the pure chiasm, is still blind for the necessity of a possible surprise by the unpredictable otherness. Such a otherness is complementary to the you/me-chiasms and the our-acceptionality. Thus, it has, formally, to be an order relation in inverse direction, additional to the acceptional order relation. Hence, it is called *rejectional* order relation. With this together, the *diamond* chiasm, i.e., the diamond is created.

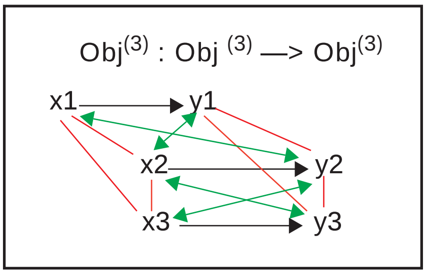
9.2 Proemiality with acceptional systems



Compositions as chiasm are strongly global or holistic, like the categorical and proemial concept of composition, but the chiastic concept is still excluding the hetero-morphisms of rejectionality.

coinc (x y)	***exch (x y)***	***ord (x y)***
x1 coinc x2	*x1 exch y2*	*x1 ord y1*
y1 coinc y2	*y1 exch x2*	*x2 ord y2*
x1 coinc x3		*x3 ord y3*
y2 coinc y3		

More detailed analysis of the chiastic proemial relationship is given additionally to order, exchange and coincidence by the distinction of *similarity*.

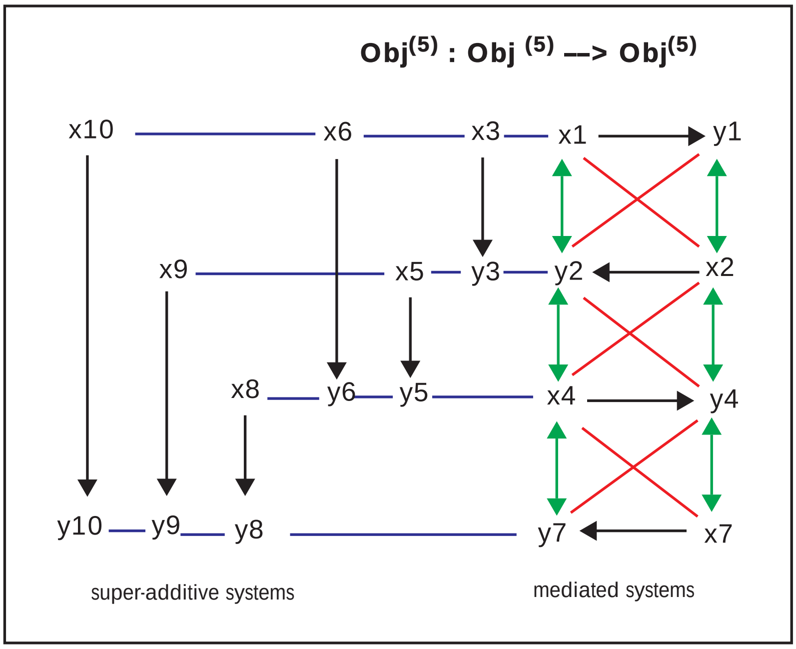


This diagram shows explicitly all possible relations of the chiasm.

coinc (x y)	***exch (x y)***	***siml (x y)***	***ord (x y)***	***opp (x y)***
x1 coinc x2	*x1 exch y2*	*x1 siml x3*	*x1 ord y1*	*x2 opp y3*
y1 coinc y2	*y1 exch x2*	*y2 siml y3*	*x2 ord y2*	*x3 opp y2*
y1 coinc y3	*x1 exch y3*		*x3 ord y3*	*x3 opp y1*
x2 coinc x3				

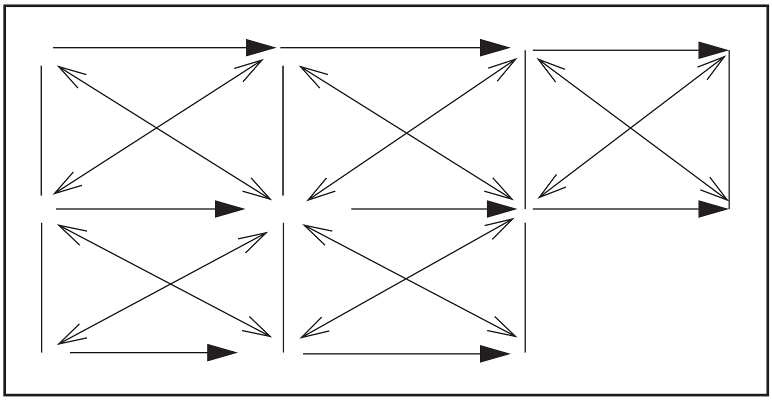
This is the table of a highly detailed description of the chiastic proemial relationship. In the following, I will omit this additional information about the distinction of similarity and coincidence.

Iterative composition of chiasms



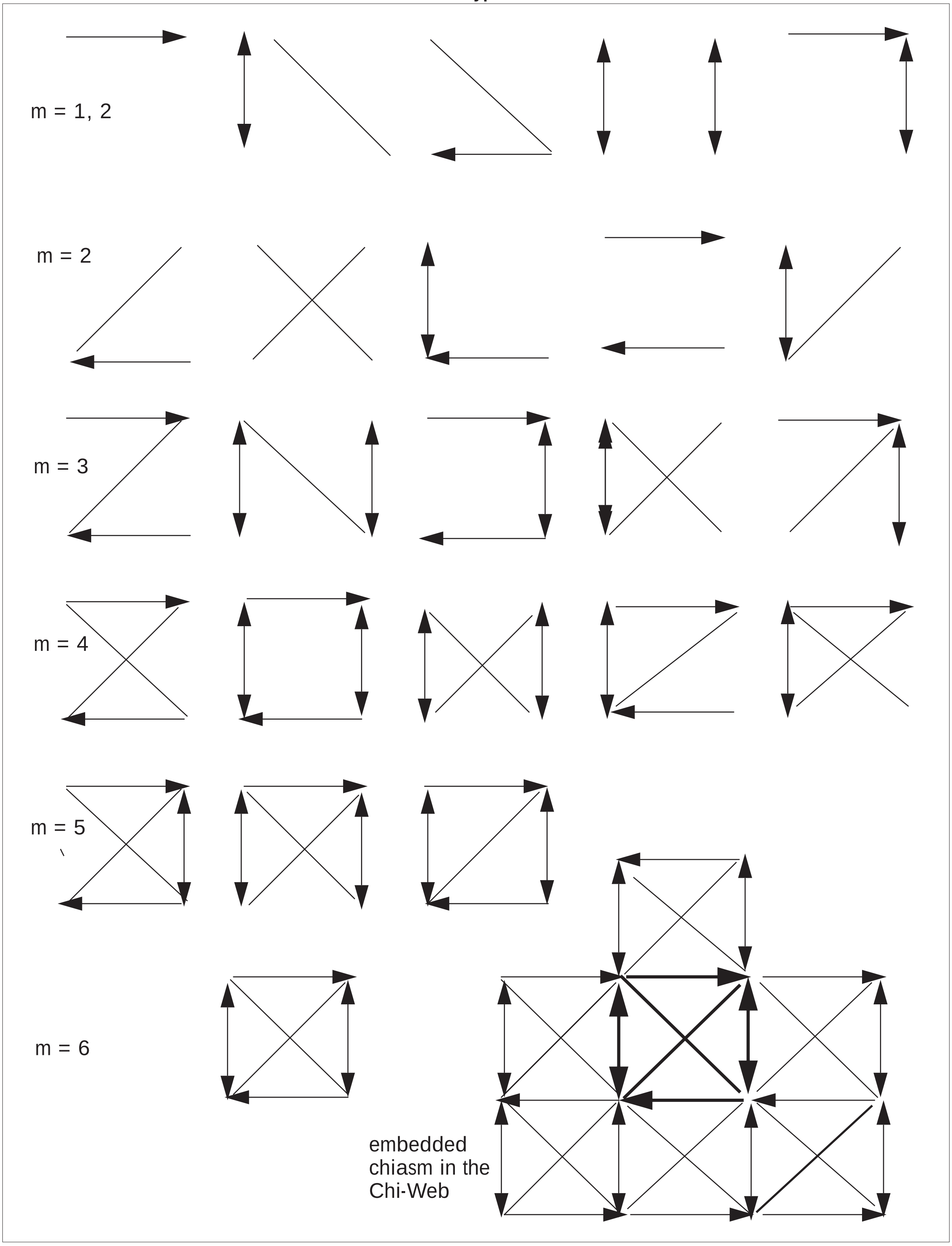
Not only morphisms can be composed but chiasms, too. This can happen in a mix of accretive and iterative compositions of diamonds.

Accretive and iterative compositions of chiasms



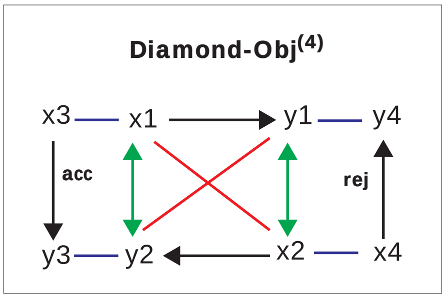
This diagram of iterative and accretive compositions of diamonds is omitting the super-additive systems of acceptionality and the rejectional sub-systems of rejectionality, too.

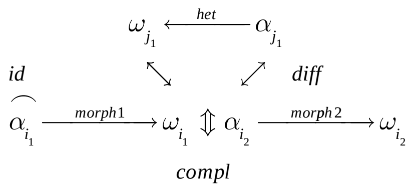
Table of different types of chiasms



10 Diamond of composition

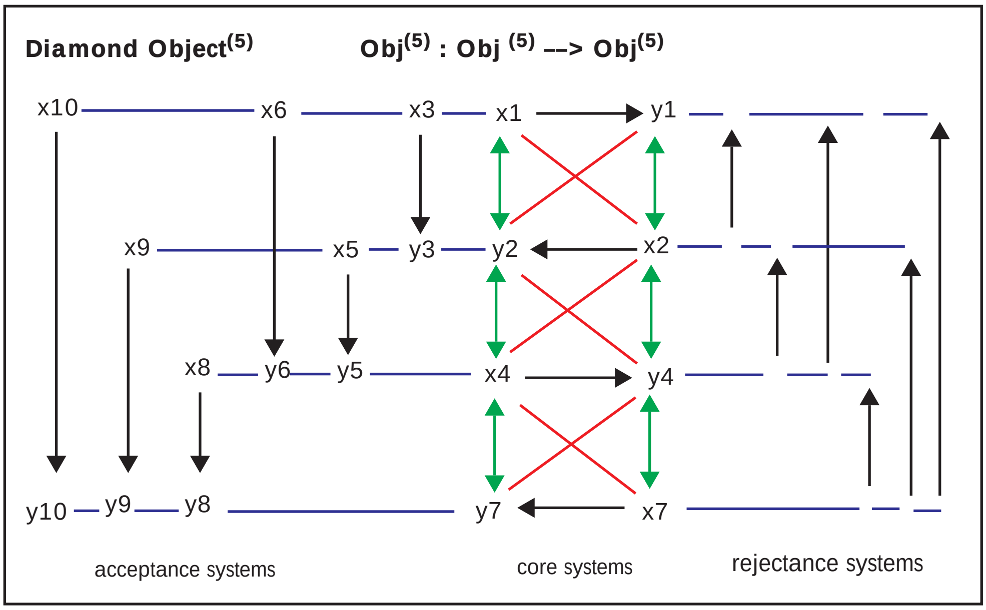
Finally, after 30 years of proemializing and chiastifying formal languages, the *diamond* of composition is introduced, which is accepting the *rejectional* aspect of chiastic compositions, too. It seems, that the diamond concept of composition is building a complete holistic unit. With its radical closeness it is opening up unlimited, linear and tabular, repeatability and deployment.





coinc (x y)	*exch (x y)*	*ord (x y)*	*$\overline{\text{ord}}$ (x y)*
x1 coinc x2	*x1 exch y2*	*x1 ord y1*	*x4 $\overline{\text{ord}}$ y4*
y1 coinc y2	*y1 exch x2*	*x2 ord y2*	
x1 coinc x3		*x3 ord y3*	
y2 coinc y3			
y1 coinc y4			
x2 coinc x4			

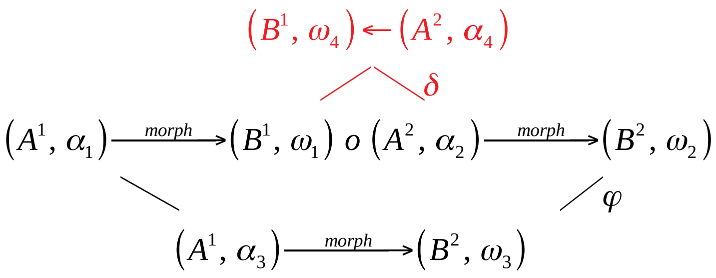
Not only the coincidence relations are realized, and the inverse exchange relation, but also, additionally to the acceptional mediation relation, the rejectional mediation relation, defining all together the diamond structure of composition of morphisms.



To each composition there is a simultaneous complementary decomposition.

Hetero-morphisms are not concerned with morphisms but the composition rules of morphisms. The processuality of compositions, i.e., the activity to compose, is modeled in their hetero-morphisms.

Category theoretical interpretations of diamonds



Comments:
"o" is the composition operation between morphisms, *phi* is the coincidence relation, and *delta* the difference relation producing the complement of the composition "o".

Conditions for the diamond composition

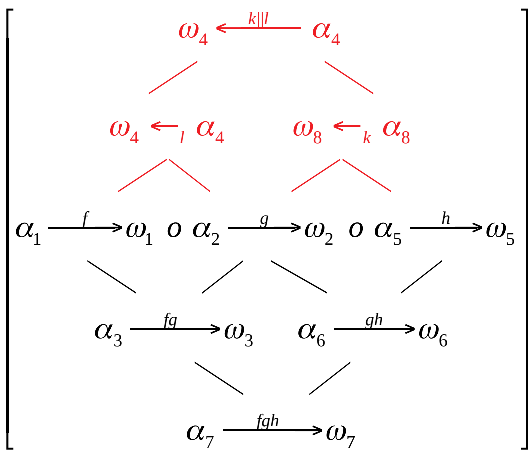
$$\left[\begin{array}{l} o = \begin{cases} \lambda(\omega_1) \simeq \lambda(\alpha_2) \\ \lambda(A^2) \triangleq \lambda(B^1) \end{cases} \\ \varphi(A^1, \alpha_1) = \varphi(A^1, \alpha_3) \\ \varphi(B^2, \omega_2) = \varphi(B^2, \omega_3) \\ \delta((B^1, \omega_1)\ o\ (A^2, \alpha_2)) = \\ (\delta(B^1), \omega_4) \leftarrow (\delta(A^2), \alpha_4) \end{array}\right]$$

Additional to the wording for the categorical composition, the wording of the rejectional part has to follow: the difference of the acceptional compositions of morphisms is producing the rejectional hetero-morphism. That is, the difference of (A2, α2) is coinciding with (A2, α4) and the difference of (B1, omega1) is coinciding with (B1, omega4). Hence, the complement of the acceptional composition is represented by a rejectional hetero-morphism.

The full wording is accessible with the associativity for morphisms and hetero-morphisms.

Composition of morphisms and hetero-morphisms in a diamond

The full wording is accessible with the associativity for morphisms and hetero-morphisms.



The acceptance of f*g, acc(f,g), is the *composition* of f and g, (fg).

The rejectance of f*g, rej(f,g) is the *hetero-morphism* of f and g, (g°,f°)=l.

The acceptance of f*g*h, acc(f,g,h), is the *composition* of f, g and h, (fgh).

The rejectance of f*g*h, rej(f,g,h) is the *jump* morphism of fª and h°, (h°,f°)=k| | l.

The acceptance fª and h°, acc(h°,f°) is the *spagat* of f° and h°, (f°h°).

The acceptance fª, g and h°, acc(h°,g, f°) is the *bridge* g of f° and h°, (f°gh°).

Thus, the operation *reject(gf)* of the acceptance morphisms f and g is producing the rejectance morphism k. And the operation *accept(k)* of the rejectance morphism k is producing the acceptance of the morphisms g and f.

Sketch of a formalization of diamonds

Cat - Gumm

$Objects : Co = \{A,\ B,\ \ldots\},\ Morphisms : Cm = \{f,\ g,\ \ldots\}$

$dom : Cm \longrightarrow Co,$

$cod :\ Cm \longrightarrow Co,$

$id :\ \ Co \longrightarrow Cm$

$dom(g\ o\ f) = dom(f)\ and\ cod(g\ o\ f) = dom(g)$

$(h\ o\ g)\ o\ f = h\ o\ (g\ o\ f)$

$idA\ o\ f\ = f\ \ and\ \ g = g\ o\ idA$

Diamond

Cat +

$Hetero - Objects \qquad C_o^h = \{A^h, B^h, \ldots\},$

$Hetero - Morphisms\ \ C_m^h = \{k,\ l,\ \ldots\},$

$Hetero - Differences\ \ D_m^h = \{i, j, \ldots\},$

$dom^h :\ C_m^h \longrightarrow C_o^h,$

$cod^h\ :\ C_m^h \longrightarrow C_o^h,$

$id^h\ \ :\ C_o^h \longrightarrow C_m^h,$

$diff^h :\ C_o \longrightarrow C_o^h.$

$dom^h(k \parallel l) = dom^h(k)\ and\ cod^h(k \parallel l) = dom^h(k)$

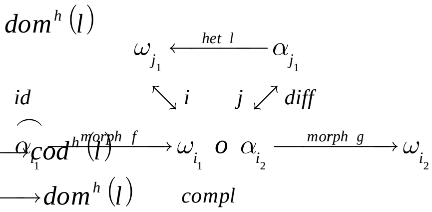
$(m \parallel l) \parallel k = m\ o\ (l \parallel k)$

$idA^h\ o\ l\ = l\ and\ m = m\ o\ idA^h$

$diff(cod(g\ o\ f)) = cod^h(l)$

$diff(dom(g\ o\ f)) = dom^h(l)$

$diff(g\ o\ f) = l$



$i : (cod(g\ o\ f)) \longrightarrow cod^h(l)$

$j : (dom(g\ o\ f)) \longrightarrow dom^h(l)$

$(g\ o\ f)\ o\ i\ and\ (g\ o\ f)\ o\ j = l$

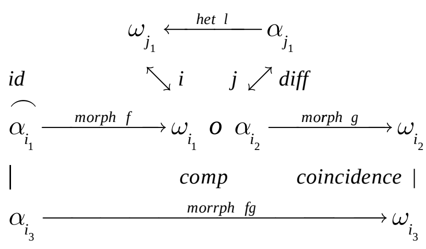
$(g\ o\ f)\ o\ (j \parallel i) = l$

$reject(gf) = k$

$reject(hg) = l$

$reject(hgf) = m$

$accept = reject^{-1}$



$$\mathbf{Diamond}^{(m)}_{\mathbf{Category}} = \left(\mathbf{Cat}^{(m)}_{\mathbf{coinc}} \mid \mathbf{Cat}^{(m-1)}_{\mathbf{jump}}\right)$$

$$\mathbb{C} = (M, o, \|)$$

1. Matching Conditions

$a.\ g\ o\ f,\ h\ o\ g,\ k\ o\ g\ and$

$$b_1 \xleftarrow{l} b_2$$
$$c_1 \xleftarrow{m} c_2$$
$$d_1 \xleftarrow{n} d_2$$

$l \parallel m \parallel n\ are\ defined,$

$b.\ h\ o\ ((g\ o\ f) o\ k)\ and$

$$b_1 \xleftarrow{l} b_2 \parallel c_1 \xleftarrow{m} c_2 \parallel d_1 \xleftarrow{n} d_2$$

$l \parallel (m \parallel n)\ are\ defined$

$c.\ ((h\ o\ g)\ o\ f) o\ k\ and$

$(l \parallel m) \parallel n\ \ are\ defined,$

$d.\ mixed: f, l, m$

$l \parallel m, \bar{l}\ o\ f\ o\ \overline{m}$

$(\bar{l}\ o\ f)\ o\ \overline{m},$

$\bar{l}\ o\ (f\ o\ \overline{m})\ are\ defined.$

2. Associativity Condition

$a.\ If\ \ f, g, h \in MC,\ then\ h\ o\ ((g\ o\ f)\ o\ k) = ((h\ o\ g)\ o\ f)\ o\ k\ and$

$l, m, n\ \in MC \qquad\qquad l \parallel (m \parallel n) = (l \parallel m) \parallel n$

$b.\ If\ \ \bar{l}, f, \overline{m} \in MC,\ then\ (\bar{l}\ o\ f)\ o\ \overline{m} = \bar{l}\ o\ (f\ o\ \overline{m})$

3. **Unit Existence Condition**

$$a.\ \forall f\ \exists(u_C, u_D) \in (M, o, \|): \begin{cases} u_C\ o\ f, u_D\ o\ f, \\ u_C \parallel f, u_D \parallel f \end{cases} are\ defined.$$

4. Smallness Condition

$$\forall(u_1, u_2) \in (M, o, \|): hom(u_1, u_2) \wedge het(u_1, u_2) =$$
$$\left\{\begin{matrix} f \in M \mid f\ o\ u_1\ \wedge u_2\ o\ f, \\ f \in M \mid f \parallel u_1\ \wedge u_2 \parallel f\ are\ defined \end{matrix}\right\} \in SET$$

Diamond rules for morphisms

$$\frac{f \in Morph,\ g \in Morph}{gf \in Morph}$$

$$\frac{g \in Morph,\ h \in Morph}{hg \in Morph}$$

$$\frac{fg \in Morph,\ gh \in Morph}{ghf \in Morph}$$

$$\frac{fg \in Morph}{k \in \overline{Morph}} \qquad \frac{gh \in Morph}{l \in \overline{Morph}}$$

$$\frac{fg \in Morph,\ gh \in Morph}{m \in \overline{Morph}}$$

$$\frac{k \in \overline{Morph},\ l \in \overline{Morph}}{m \in \overline{Morph},\ m = k \,||\, l}$$

$$\frac{k \in \overline{Morph},\ g \in Morph,\ l \in \overline{Morph}}{kgl \in \overline{Morph}}$$

$$\frac{k \in \overline{Morph}}{fg \in Morph} \quad \frac{l \in \overline{Morph}}{gh \in Morph}$$

– Matching conditions for morphisms f, g, h are realized in the usual way, i.e., codomain of f is coinciding with domain of g, thus guarantying the composition (fg).

The same happens for the composites (fg) and (gh) guaranteeing the composition (fgh).

– Complementary, the categorial difference between hetero-morphism k and l have to "coincide" to guarantee the jump-composition (kl).

– The spagat-composition (kgl) is realized as a mix of category and jumpoid compositions.

```
Diamond= [ Morph, M̅o̅r̅p̅h̅, o, ||]

o = composition-operator
||= jump-operator
Morph = morphisms
M̅o̅r̅p̅h̅ = hetero-morphisms
```

Different aspects of the same

Diagram — **Chiasm** — **Diamond**

$$\begin{bmatrix} & \omega_4 \xleftarrow{l} \alpha_4 & \\ \alpha_1 \xrightarrow{f} \omega_1 & \Updownarrow & \alpha_2 \xrightarrow{g} \omega_2 \\ \alpha_3 & \xrightarrow{fg} & \omega_3 \end{bmatrix} \equiv \begin{bmatrix} \alpha_3 - \alpha_1 \xrightarrow{f} \omega_1 - \omega_4 \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3 - \omega_2 \xleftarrow{g} \alpha_2 - \alpha_4 \end{bmatrix} \equiv \begin{bmatrix} & \omega_4 \xleftarrow{l} \alpha_4 & \\ & / \quad \backslash & \\ \alpha_1 \xrightarrow{f} \omega_1 & o & \alpha_2 \xrightarrow{g} \omega_2 \\ & \backslash \quad / & \\ & \alpha_3 \xrightarrow{fg} \omega_3 & \end{bmatrix}$$

11 Compositions of Diamonds

Diamonds can be composed in an iterative and an accretive way, both together composing a tabular pattern of diamonds. This approach is focused on the composition of diamonds as such and not on the composition of morphisms in diamonds.

Accretive and mixed iterative+accretive iterability

$$\left[\begin{array}{ccccccc}
\alpha_3 - \alpha_1 \xrightarrow{f} \omega_1 - \omega_4 & - & \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\
\downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow & & \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\
\omega_3 - \omega_2 \xleftarrow{g} \alpha_2 - \alpha_4 & - & \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \\
\downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow & & \\
\alpha_3 - \alpha_1 \xrightarrow{f} \omega_1 - \omega_4 & & \\
\downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow & & \\
\omega_3 - \omega_2 \xleftarrow{g} \alpha_2 - \alpha_4 & & \\
\downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow & & \\
\alpha_3 - \alpha_1 \xrightarrow{f} \omega_1 - \omega_4 & & \\
\downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow & & \\
\omega_3 - \omega_2 \xleftarrow{g} \alpha_2 - \alpha_4 & &
\end{array}\right]$$

Notational abbreviation

The notation of the chiastic composition structure can be omitted by the *block* representation of the composition of the basic chiasms. Hence, the bracket are symbolizing chiastic composition at all of their 4 sides, left/right and top /bottom.

That is, the top and bottom aspects are representing chiastic compositions in the sense of accretion of complexity. The right/left-aspects are connections in the sense of iterative complication. Iteration per se is not chiastic but compositional in the usual sense.

Iterative composition is coincidental, accretive composition is chiastic. Coincidental composition is based on the coincidence of domains and codomains of morphisms, chiastic composition is based on the exchange relation between alpha and omega properties of morphisms. Both together, are defining the free composition of diamonds.

In a diamond grid, all kind of different paths, not accessible in category theory, are naturally constructed.

Free iterative and accretive chiasm-block compositions

$$\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}$$

$$\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}$$

$$\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}$$

$$\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix} \qquad\qquad\qquad \begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}$$

$$\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}$$

$$\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}$$

$$\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix} \qquad\qquad\qquad \begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}$$

$$\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix} \qquad\qquad\qquad\qquad\qquad\qquad \begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}$$

$$\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}$$

$$\begin{bmatrix} \alpha_3' - \alpha_1' \xrightarrow{f} \omega_1' - \omega_4' \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3' - \omega_2' \xleftarrow{g} \alpha_2' - \alpha_4' \end{bmatrix}$$

12 Diamondization of diamonds

Like the possibility of categorization of categories there is a similar strategy for diamonds: *the diamondization of diamonds*. As a self-application of the diamond questions, the diamond of the diamond can be questioned. Diamond are introduced as the quintuple of proposition, opposition, acceptionality, rejectionality and positionality,

```
D=[prop, opp, acc, rej; pos].
```

The complementarity of *acceptional* and *rejectional* properties of a diamond can themselves be part of a new diamondization.

What is both together, acceptional and rejectional systems? As an answer, *core* systems can be considered as belonging at once to acceptional as well to rejectional systems.

What is neither acceptional nor rejectional? An answer may be the *positionality* of the diamond. Positionality of a diamond is neither acceptional nor rejectional but still belongs to the definition of a diamond.

Hence, diamond of diamonds or second-order diamonds:

```
DD=[Acc, Rej, Core, Pos].
```

Thus,

[Acc, Rej]-*opposition* can be studied on a second-level as a complementarity per se,

[Acc, Rej]-*both-and* can be studied as the core systems per se (Core),

[Acc, Rej]-*neither-nor* can be studied as the mechanisms of positioning (Pos), esp. by the *place-designator*.

What are the specific formal laws of the diamond of diamonds?

Between the first-order opposition of acceptional and rejectional systems of diamonds there is a complementarity, which can be studied as such on a second-level of diamondization. What are the specific features of this complementarity? Like category theory has its *duality* as a meta-theorem, second-order diamond theory has its *complementarity* theorem.

Hence, it is reasonable to study core systems per se, without their involvement into the complementarity of acceptional and rejectional systems. What could it be? Composition without commutativity and associativity? The axioms of identity and associativity are specific for categories. But, on a second-order level, they may be changed, weakened or augmented in their strength.

The study of the positionality per se of diamonds might be covered by the study of the functioning of the place-designator as an answer to the question of the positionality of the position of a diamond. Without doubt, positionality and its operators, like the "place-designator" and others, in connection to the kenomic grid, can be studied as a topic per se.

The first-order positionality of diamonds has become itself a topic of second-order diamonds, the neither-nor of acceptance and rejectance. Hence, because also second-order diamonds are positioned, a new kind of localization enters the game: the localization of second-order diamonds into the tectonics of kenomic systems, with their proto-, deutero- and trito-kenomic levels.

All together is defining a second-order diamond theory.

13 Composing the answers of *"How to compose?"*

This is a systematic summary of the paper "How to Compose?" It may be used as an introduction into the topics of a general theory of composition.

13.1 Categorical composition

Category theory is defining the rules of composition. It answers the question: How does composition work? What to do to compose morphisms?

Answer: Category Theory. It is focused on the surface-structures of the process of composing morphism, realized by the triple DPS of Data (source, target), Structure (composition, identity) and Properties (unity, associativity) by fulfilling the matching conditions for morphisms.

The properties (axioms) of categories are the global conditions for the final realization of the local rules of composition, i.e., the matching conditions for morphisms to be composed.

1.1.1 Categories I: graphs with structure

Definition 1 *A* category *is given by*

i) DATA*: a diagram* $C_1 \overset{s}{\underset{t}{\rightrightarrows}} C_0$ *in* Set

ii) STRUCTURE*: composition and identities*

iii) PROPERTIES*: unit and associativity axioms.*

The data $C_1 \overset{s}{\underset{t}{\rightrightarrows}} C_0$ is also known by the (over-used) term "". We can interpret it as a set C_1 of arrows with source and target in C_0 given by s, t.

Categories are based on their global Properties of "unit" and "associativity", understood as the axioms of categorical composition of morphisms.

13.2 Proemial composition

Proemiality answers the question: What enables categorical composition? What is the deep-structure of categorical composition?

Answer: proemial relationship.

Proemial relationship is understood as a cascade of order- and exchange-relations, as such it is conceived as a pre-face (pro-oimion) of any composition.

Parts of the categorial Structure are moved into the proemial Data domain. Or inverse: Parts of the Data (source, target) are moved into the Structure as exchange relation.

Thus,

Data (order relation=morphism),

Structure (exchange relation, position; identity, composition).

Properties (diversity; unit, associativity)

That is, categorical Structure is distributed over different levels of the proemial relationship.

Proemiality is based on order- and exchange relations. That is, order relations are based on a cascade of exchange relations and exchange relations are founded in cascade of order relations.

But this interlocking mechanism is not inscribed into the definition of proemiality, it occurs as an interpretation, only. Hence, proemiality as a pre-face may face the essentials of composition but not its true picture.

13.3 Chiastic composition

Chiastic approach to proemial composition answers the question: How is proemiality working? What enables proemiality to work?

Answer: Chiasm of the proemial constituents, i.e., order- and exchange relation.

The chiasm of composition is the inscription of the reading of the proemial relationship. It is mediating the upwards and downwards reading of proemiality, which in the proemial approach is separated. Proemiality is still depending on logo-centric thematizations even if its result are surpassing it by it polycontexturality.

Hence, it is realizing the Janus-faced movements of double exchange relations.

To avoid empty phantasms and eternal dizziness of the Janus-faced double movements of exchange relations, iterative and accretive, up- and downwards, the coincidence relations of chiasms have to enter the stage.

That is, the matching conditions have to be applied to the exchange relations as well as to the coincidence relations to perform properly the game of chiasms on trusted arenas.

Thus, proemiality, with its single exchange relation and lack of coincidence, is still depending on logo-centric thematizations, mental mappings, even if its result are surpassing radically its limits by the introduction of polycontexturality.

Hence, proemiality is depending on a specific reading, i.e., a mental mapping of chiasms. This proemial reading has to imagine the double movements of the way up and the way down. And the coherence of the different levels, formalized in chiasms by the coincidence relations.

The DSP-transfer is:
Data (morphisms),
Structure (exchange, coincidence, position; identity, composition),
Properties (diversity; unity, associativity)

13.4 Diamond of composition

The diamond approach answers the question: What is the deep-structure of composition per se, i.e., independent from the definition or view-point of morphisms and its chiasms?

Answer: the interplay of acceptional and rejectional process / structures as complementary movements of diamonds. Without such an interplay there is no chiasm, and hence, no proemiality nor categorial composition.

The DSP-transfer is:

Data (morphisms, hetero-morphism),

Structure (double-exchange, coincidence, position; identity, difference, composition, de-composition),

Properties (unity, diversity, associativity, complementarity).

In fact, diamonds don't have Data and Structure, everything is in the Properties as an interplay of global and local parts. Hence, diamonds are playing the Properties (global / local, surface / deep-structure).

Hence, diamonds are playing the

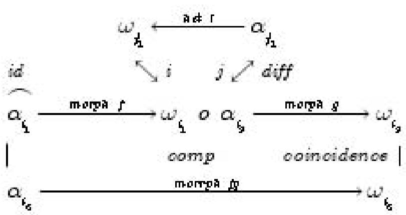
Properties (global / local, surface / deep-structure),

which is realized by the interplay of categories and saltatories, hence, again,

.A descriptive definition of diamonds

$$\begin{pmatrix} coinc(\alpha_1, \alpha_3), \\ coinc(\omega_2, \omega_3) \end{pmatrix},$$
$$then$$
$$morph(\alpha_1, \omega_1) \ o \ morph(\alpha_2, \omega_2) = morph(\alpha_3, \omega_3),$$
$$and \ if$$
$$\begin{pmatrix} diff(\alpha_2) = \alpha_4, \\ diff(\omega_1) = \omega_4 \end{pmatrix},$$
$$then$$
$$compl(morph(\alpha_3, \omega_3)) = het(\alpha_4, \omega_4)$$

$$Diamond(morph) = \chi \langle accept, reject \rangle$$
$$accept \ (morph_1, morph_2) = morph_3$$
$$reject \ (morph_1, morph_2) = morph_4$$



Terms

morph / het

coinc / diff

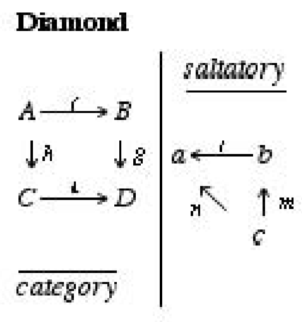
id / div

o / ‖

dual / compl

accept / reject

Properties (categories, saltatories



Saltatories are founded in categories and categories are founded in saltatories; both together in their interplay are realizing the diamond structure of composition.

13.5 Interplay of the 4 approaches

How are the 4 approaches related? What's their interplay? What is the deep-structure of "interplay"?

Answer: Diamonds as the interplay of interplays, i.e., the play of global/local and surface-/deep-structures are realizing the autonomous process/structure "diamond".

13.6 Kenogrammatics of Diamonds

Diamonds are taking place, they are positioned, hence their positionality is their deep-structure. The positionality of diamonds, marked by their place-designator, is the kenomic grid with its tectonics of proto-, deutero- and trito-structure of kenogrammatics.

Because diamonds are placed and situated they can be repeated in an iterative and a accretive way. Iteration is application inside the framework of a diamond system, hence iteration remains mono-contextural. Polycontexturality of diamonds is an accretive repetition, i.e., a dissemination of frameworks of diamonds.

Kenogrammatics answers the question: How to get rid of diamonds (without loosing them)?

In other words, kenogrammatics is inscribing diamonds without the necessity to relate them to the drama of composition.

Hence, the kenogrammatics of diamonds is opening up a *composition-free calculus of "composition"*.

13.7 Polycontexturality of Diamonds

Because of the iterability of diamonds based in the fact that diamonds are placed and situated in a kenomic grid they can be repeated in an iterative and a accretive way.

Iteration is application inside the framework of a diamond system, hence iteration remains mono-contextural.

Polycontexturality of diamonds is an accretive repetition, i.e., a dissemination of frameworks of diamonds.

14 Applications

14.1 Foundational Questions

The 2-level definition of the diamond composition as a composition and a complement, opens up the possibility to control the fulfilment of the conditions of coincidence of the categorial composition from the point of view of the complementary level.

If the morphism *I* is verified, then the composition *(f o g)* is realized. The verification is checking at the level *I* if the coincidence of cod(f) and dom(g), i.e., *cod(f)=dom(g)*, for the composition "o", is realized.

Thus, simultaneously with the realization of the composition, the complementary morphism *I* is controlling the (logical, categorical) adequacy of the composition (fg).

Diamonds are involved with bi-objects. Objects of the category and counter-objects of the *jumpoid* (saltatory) of the diamond. Both are belonging to different contextures, thus being involved with 2 different logical systems. The interplay between categories and jumpoids (saltatories) is ruled by a third, mediating logic for both, representing the core systems of the diamond. Saltatories are founded in categories and categories are founded in saltatories; both together in their interplay are realizing the diamond structure of composition.

14.2 Diamond class structure

$$\overbrace{\text{OthersClass}}$$

$$\underbrace{\overbrace{\text{MyClass} - \text{YourClass}}}$$

$$\underbrace{\text{OurClass}}$$

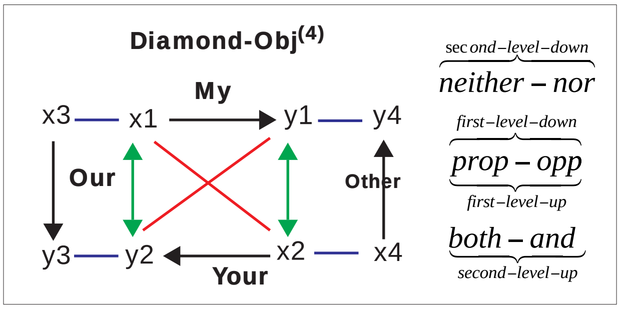
The harmonic My-Your-Our-Class conceptualization has to be augmented by a class which is incorporating the place for the other, the unknown, the difference to the harmonic system. That is, the NotOurClass is thematized positively as such as the class for others, called the *OthersClass*. Hence, the OthersClass can serve as the place where intruders, attacks, disturbance, etc. can be observed and defended. But also, it is the place where the new, inspiration, surprise and challenge can be localized and welcomed.

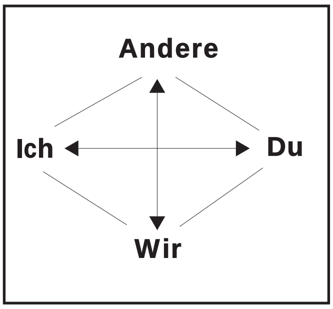
Again, this is a logical or conceptual place, depending in its structure entirely from the constellation in which it is placed as a whole. The OthersClass is representing the otherness to its own system. It is the otherness in respect of the structure of the system to which it is different. This difference is not abstract but related to the constellation in which it occurs. It has, thus, nothing to do with information processing, sending unfriendly or too friendly messages. Before any de-coding of a message can happen the logical correctness of the message in respect to the addressed system has to be realized.

In more metaphoric terms, it is the place where security actions are placed. While the OurClass place is responsible for the togetherness of the MyClass / YourClass interactions, i.e., mediation, the OthersClass is responsible for its segregation. Both, OurClass and OthersClass are second-order conceptualizations, hence, observing the complex core system "MyClass–YourClass". Internally, OurClass is focussed on what MyClass and YourClass have in common, OthersClass is focusing on the difference of both and its correct realization. In contrast to mediation it could be called *segregation*.

In other words, each polycontextural system has not only its internal complexity but also an instance which is representing its external environment according to its own complexity. In this sense, the system *has* its own environment and is not simply inside or embedded into an environment.

14.3 Communicational application





Coming to terms?

Often, love between two people is perceived as a My / Your-relationship realizing together a kind of a Our-domain. The other part of the diamond, the Others, is mostly excluded or at least reduced to known constellations. From a diamond approach to an understanding of love, all 4 positions have to be involved into the diamond game.

According to the chiasm between acceptional and rejectional domains, there is no fixed order, which couldn't be changed into its complementary opposite. What can be anticipated has a model in an acceptional domain and has lost, therefore, its unpredictable otherness. The otherness is what cannot be predicted. What we can know is that we always have to count with it as the surprise of unpredictable events.

Communicationally accessible are the Your / My-parts and the common Our-part of the scheme. These communicational relationships, i.e., interactions, can be made as transparent as possible. An application of the Diamond Strategies may be guiding to augment transparency, which is supported by the reflectional properties of the diamond. Further questioning of what could be the Others-part would clear some expectations. But everything which can be anticipated is losing its unpredictability. After new experiences happened, it can be asked about the unpredictable aspects, which happened despite the anticipative explorations.

These unpredictable experiences can be considered as belonging to the rejectional part of the system, only if its matching conditions, defined by the difference-relations, are realized. That is, if something totally different to the system happens, say an earthquake, then this experience is not a rejectional part of the communicational system of You-and-Me in question, but at least at first, something else.

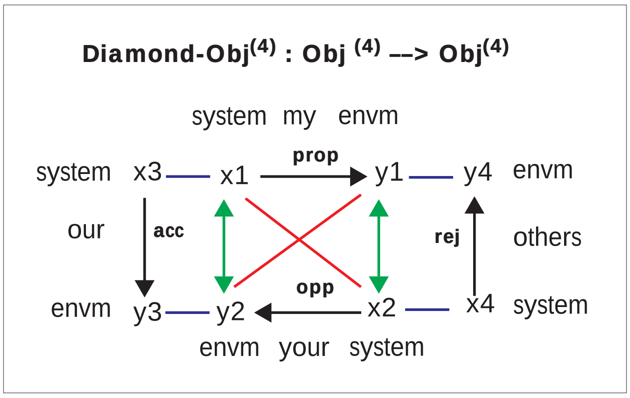
After the unpredictible happened, it can be domesticated, which means, it can be modelled in a new acceptional part of the system. Hence the complexity of the system as a whole is augmented by the domestication of the new experience. It also has to be questioned what made the experience such different that it couldn't be appreciated. Hence, the rejectional part of the diamond can be questioned in advance and in retrospect by a new aspect of the general *diamond format* to be constructed.

By this example of a communicational application the rejectional part can be consciously experienced and described only after it happened. Nevertheless, structurally, i.e., independent of its content, its possibility was part of the diamond from the very beginning. All 3 aspects of the systems are playing together: 1.The *core* system, realizing the pure chiasms, 2. *acceptional* systems as the super-additive components based on the chiasms, and 3. the *rejectional* systems as the complementary system to the acceptional systems, realizing the inscription of the operativity of the composition of the morphisms, i.e., the interactivity between proposition (Me) and opposition (You).

14.4 Diamond of system/environment structure

Some wordings to the diamond system/environment relationship.

What's my environment is your system,
What's your environment is my system,
What's both at once, my-system and your-system, is our-system,
What's both at once, my-environment and your-environment, is our-environment,
What are our environments and our systems is the environment of our-system.
What's our-system is the environment of others-system.
What's neither my-system nor your-system is others-system.
What's neither my-environment nor your-environment is others-environment.



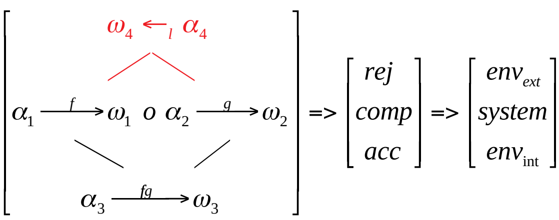
The diamond modeling of the otherness of the others is incorporating the otherness into its own system. An external modeling of the others would have to put them into a different additional contexture. With that, the otherness would be secondary to the system/environment complexion under consideration. The diamond modeling is accepting the otherness of others as a "first class object", and as belonging genuinely to the complexion as such.

Again, it seems, that the diamond modeling is a more radical departure from the usual modal logic and second-order cybernetic conceptualizations of interaction and reflection. The diamond is reflecting onto the same (our) and the different (others) of the reflectional system.

Internal vs. external environment

In another setting, without the "antropomorphic" metaphors, we are distinguishing between the system, its internal and its external environment. The external environment corresponds the rejectional part, the internal to the acceptional part of the diamond. Applied to the diamond scheme of diamondized morphisms we are getting directly the *diamond system scheme* out of the diamond-object model.

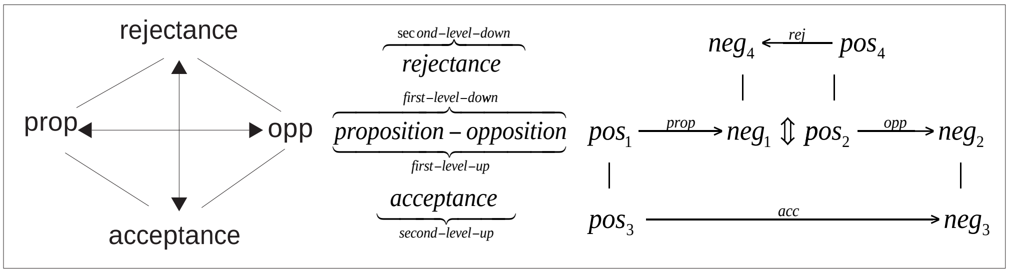
Diamond System Scheme



Thus, a diamond system is defined from its very beginning as being constituted by an internal and an external environment.

Further interpretations could involve the reflectional/interactional terminology of logics. The acceptional part fits together with the *interactional* and the rejectional part with the *reflectional* function of a system. Obviously, a composition is an interaction between the composed morphisms. The interactionality of the composition is represented by the acceptional system, the rejectionality is representing its reflectionality.

14.5 Logification of diamonds



General Logification Strategy

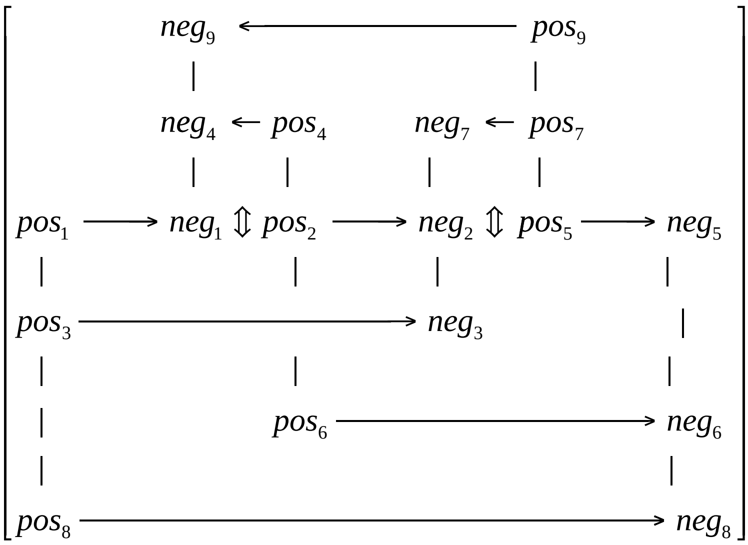
A logification of the diamond strategies, which is importing the architectonics of the diamond into the architectonics of polycontextural logical systems, has to consider 3 different types of logical systems:

The chiastic chain of core logics, i.e., the *core* logics.
The chains of mediating logics, i.e., the logics of *acceptance*.
The chains of separating logics, i.e., the logics of *rejectance*.

The chain of core logics corresponds to the chain of proposition and opposition systems.The basic chiastic structure or the proemiality of the core logics is mirrored by the mediating and the separating logics, representing the acceptance and the rejectance functions of logics in diamonds.

Logification of diamonds corresponds to the techniques used in polylogics.

Logification scheme for 4-diamonds



$$\begin{bmatrix} S_9 \\ S_4 S_7 \\ S_1 \mid S_2 \mid S_5 \\ S_3\, S_6 \\ S_8 \end{bmatrix}$$

Negations in a elementary 3-diamond

$$\begin{bmatrix} id_4 \\ \\ id_1 id_2 \\ \\ id_3 \end{bmatrix} : \begin{bmatrix} & & neg_4 \leftarrow pos_4 & & \\ & & | \qquad | & & \\ pos_1 & \longrightarrow & neg_1 \Updownarrow pos_2 & \longrightarrow & neg_2 \\ | & & & & | \\ pos_3 & & \longrightarrow & & neg_3 \end{bmatrix}$$

$$\begin{bmatrix} id_4 \\ non_1 id_2 \\ id_3 \end{bmatrix} : \xrightarrow{neg1} \begin{bmatrix} neg_4 - neg_1 & \longleftarrow & pos_1 \mid pos_3 & \longrightarrow & neg_3 \\ \uparrow \qquad \Updownarrow & & & & | \\ pos_4 - pos_2 & & \longrightarrow & & neg_2 \end{bmatrix}$$

$$\begin{bmatrix} id_4 \\ id_1 non_2 \\ id_3 \end{bmatrix} : \xrightarrow{neg2} \begin{bmatrix} pos_3 & \longrightarrow & neg_3 \mid neg_2 & \longleftarrow & pos_2 - pos_4 \\ | & & & & \Updownarrow \qquad \downarrow \\ pos_1 & & \longrightarrow & & neg_1 - neg_4 \end{bmatrix}$$

$$\begin{bmatrix} id_4 \\ \\ id_1 id_2 \\ \\ non_3 \end{bmatrix} : \xrightarrow{neg4} \begin{bmatrix} & & pos_4 \rightarrow neg_4 & & \\ & & | \qquad | & & \\ neg_2 & \longleftarrow & pos_2 \Updownarrow neg_1 & \longleftarrow & pos_1 \\ | & & & & | \\ neg_3 & & \longleftarrow & & pos_3 \end{bmatrix}$$

$$\begin{bmatrix} non_4 \\ \\ id_1 id_2 \\ \\ id_3 \end{bmatrix} : \xrightarrow{neg4} \begin{bmatrix} & & pos_4 \rightarrow neg_4 & & \\ & & | \qquad | & & \\ neg_2 & \longleftarrow & pos_2 \Updownarrow neg_1 & \longleftarrow & pos_1 \\ | & & & & | \\ neg_3 & & \longleftarrow & & pos_3 \end{bmatrix}$$

Formal rules of negation for a 3-diamond

$$\begin{bmatrix} id_4 \\ non_1 id_2 \\ id_3 \end{bmatrix} : \begin{bmatrix} S_4 \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix} \xrightarrow{neg1} \begin{bmatrix} \overline{S_4} \\ \overline{S}_1 \mid S_{3.} \\ S_2 \end{bmatrix}$$

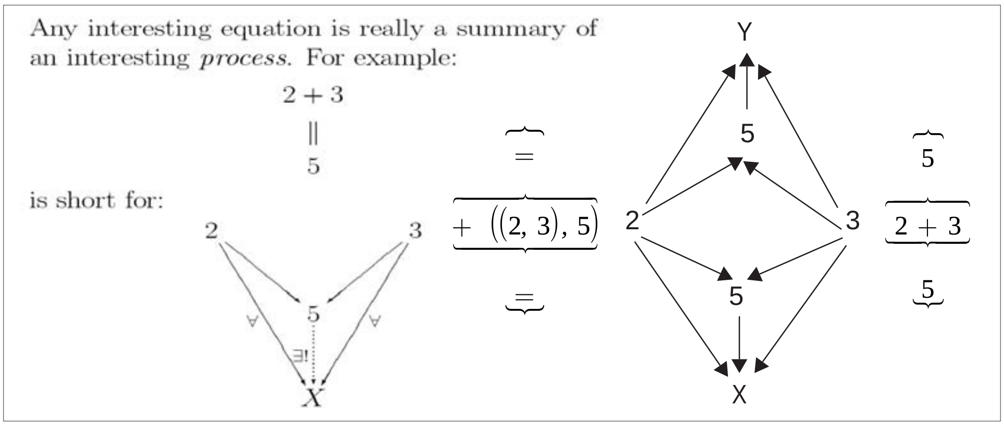
$$\begin{bmatrix} id_4 \\ id_1 non_2 \\ id_3 \end{bmatrix} : \begin{bmatrix} S_4 \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix} \xrightarrow{neg2} \begin{bmatrix} S_4 \\ S_3 \mid \overline{S_{2.}} \\ S_1 \end{bmatrix}$$

$$\begin{bmatrix} id_4 \\ id_1 id_2 \\ non_3 \end{bmatrix} : \begin{bmatrix} S_4 \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix} \xrightarrow{neg3} \begin{bmatrix} \overline{S_4} \\ \overline{S}_2 \mid \overline{S_{1.}} \\ \overline{S}_3 \end{bmatrix}$$

$$\begin{bmatrix} non_4 \\ id_1 id_2 \\ id_3 \end{bmatrix} : \begin{bmatrix} S_4 \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix} \xrightarrow{neg4} \begin{bmatrix} \overline{S_4} \\ \overline{S_2} \mid \overline{S}_1 \\ \overline{S_3} \end{bmatrix}$$

14.6 Arithmetification of diamonds

An arithmetification of diamonds is surely at once a diamondization of arithmetic.



How is the diamond operation, 2+2=5, to read? The first diagram gives an explanation of the processes involved into the addition. That is, for all numbers 2 of X and all numbers 3 of X there is exactly one number 5 of X representing the addition 2+3. This is the classic operational or categorial approach to addition (Baez).

The second diagram shows the diamond representation of the addition 2+3. The wordings are the same, one for X, and one for Y. The equation is *stable* in respect of the acceptional addition and the rejectional addition iff X=Y. That is, iff the numbers and the operations belong to isomorphic arithmetical systems, then they are equivalent. If X would be a totally different arithmetical system to Y then some disturbance of the harmony between both would happen. Nevertheless, because of their rejectional direction, numbers of Y might "run" in reverse order to X and coincide at the point of X=Y.

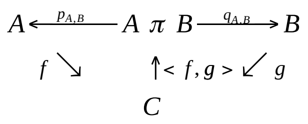
The meaning of a sign is defined by its use. Thus, the numeral "5" belonging to the system X, has not exactly the same meaning as the numeral "5" belonging to the system Y. They may be isomorphic, hetero-morphic, equivalent, but they are not equal. Equality is given intra-contextually for terms of X only, or for terms of Y only. But not for terms between X and Y. In other words, the equation is realized as an equivalence only if it has a model in the rejectional, i.e., in the environmental or context system. Otherwise, that is, without the environmental system, the arithmetical system of the acceptance system, here X, has to be accepted as unique, fundamental and pre-given.

This, obviously, is an extremely simple example, but it could explain, in a first step, the mechanism of diamond operations.

Things are getting easier to understand, if we assume that X belongs to an object-language and Y to a meta-language of the arithmetical system. Then the diamond is mediating at the very base of conceptualization between object- and meta-language constructions. From the point of view of the object language, the meta-language appears as an environment or a context taking place, positively, at the locus of rejection. Thus, a kind of an opposition between X and Y systems seems to be established. The other part of the diamond, the duality between proposition and opposition, necessarily to establish a diamond structure, is not yet very clear. We could re-write the constellation in Polish notation to get an easier result: =(+(2, 3), 5). Thus, the distinction between operator and operand is introduced and we simply have to redesign the diagram.

Some more topics

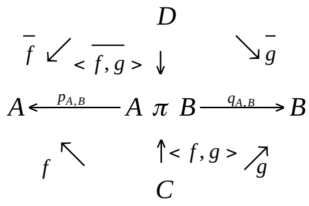
Categorical product



$$Logic^1 : \begin{bmatrix} \forall C \\ \forall f, g \end{bmatrix} \exists! \langle f, g \rangle$$

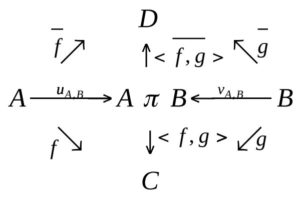
<f,g>: acceptance

Diamond product



$$Logic^2 : \begin{bmatrix} \forall C^o \\ \forall f^o, g^o \end{bmatrix} \exists! \langle f^o, g^o \rangle$$

<f°,g°>: rejectance



Diamond coproduct

Terminal and initial objects in diamonds

To each diamond, if there is a terminal object for its morphisms then there is a final object for its hetero-morphisms.

To each diamond, if there is a initial object for its morphisms then there is a final object for its hetero-morphisms.

In diamond terms, rejectance has its own terminal and initial objects, like acceptance is having its own initial and terminal objects.

But both properties are distinct, there can be a final (terminal) object in a category, and another construction in a saltatory.

Morphisms are ruled by equivalence; hetro-morphisms are ruled by bisimulation.

14.7 Graphematics of Chinese characters

This is an aperçu and not yet the fugue.

Gerundatives: chiasm (ming) of noun and verb in Chinese characters

"For instance, all or almost all Chinese characters are gerundative. This means that the nouns are in action. A good example of this in English is the word rain. Rain can be both an action and a thing, thus embodying a noun and verb state. Most Chinese nouns are of this form, which means a thing is what it is because of what it does.

French, on the other hand, is typically very abstract and essentialistic. This means that whenever one uses a noun, the noun is not seen as doing something, but rather, is seen as being something / having essential characteristics."

Matt Durski, Phenomenology: Cook Ding's Ming and Merleau-Ponty's Chiasm

Western sentences are propositions with semantic characteristics. The meaning of their nouns is embedded into the sentences conceived as propositions. Chinese characters as gerundives are pragmatic and thus are neither sentences nor nouns.

Diamonds are mediating acceptional and rejectional aspects of interactions. The logical place where operationality happens for propositions, is not a place inside a proposition, but the *composition* of proposition. Composition of proposition is realized by an operator which is itself not propositional. In propositional logic such operators are known as conjunction, implication, etc. Their operationality is well codified in syntactic, semantic or pragmatic rules. But the aim of logic is not to study the pragmatics of compositional operators but their truth-conditions in respect of their propositions.

The same happens with the composition for morphisms. In focus is the new morphisms constructed by the application of the composition operator, but not the operator in its operativity as such. In other words, the composition operator has no logical representation as such. Its own semantic is not inscribed in the composition of morphisms, only the construction of new morphisms as its products is considered.

If *"nouns are in action"*, as it is the case for Chinese characters, then their structure is not logical but chiastic. "*Noun in action"* means that the Chinese character is both at once, a noun with its *semantics* and an action, i.e., an *advice*, with its operativity. But nouns in Western grammar are not in actions (verbs), hence Chinese characters are not nouns in a grammatical sense. It is also said, that Chinese thinking is not sentence based, hence it has to be noun-based. But this seems to be obsolete.

A good candidate where to place a first attempt to formalize the chiasm (ming) of action / noun seems to be the chiasm of the compositional operator and its hetero-morphism in the *diamond* modeling of the categorical composition of morphisms. The operator of composition, the compositor, as such is not modeled in category theory. Only the conditions of composition, and the result to produce new morphisms is thematized. This is the *acceptional* part of the diamond, called category. This activity as such, reflected in its meaning, inscribed as a morphism, is realized by the *renvérsement* and *déplacement* of the compository activity as a hetero-morphism. This is the *rejectional* part of the diamond, called saltatory. Both together, the operationality of composition as the acceptional and its displacement as counter-meaning, represented as hetero-morphism, the rejectional part, are enacting a chiastic process / structure, opening up the arena for the inscription of a new kind of scripturality, which is implementing in itself the Chinese approach to writing with the Western approach to operative formal languages and operational paradigms of programming.

Graphematic metaphor for bi-objects

A graphematic metaphor for bi-objects may be the Chinese characters. They are, at once, inscribing, at least, two different grammatological systems, the *phonetic* and the *pictographic* aspects of the writing system, together in one complex inscription, i.e., character. The composition laws of phonology are different from the composition laws of pictography. Because in Chinese script, characters with their double aspects, are composed as wholes and not by their separated aspects, composition laws of Chinese script is involved into a complexion of two different structural systems.

It can be speculated that the phonological aspect is categorical, with its composition laws of identity, commutativity and associativity, while the composition laws of the pictographic aspect is different, and may be covered, not by categories but by saltatories. At least, there is no need to map the laws of composition for Chinese characters into a homogenous calculus of formal linguistics based, say on combinatory logic.

The Western writing system is based on its phonetic system.

> "*Pictophonetic compounds* (å`„fléö/å`êʃéö, Xíngsh?ngzì)
> Also called *semantic-phonetic* compounds, or phono-semantic compounds, this category represents the largest group of characters in modern Chinese.
> Characters of this sort are composed of two parts: a *pictograph*, which suggests the general meaning of the character, and a *phonetic* part, which is derived from a character pronounced in the same way as the word the new character represents."
> http://en.wikipedia.org/wiki/Chinese_character#Formation_of_characters

14.8 Heideggers crossing as a rejectional gesture

Druchkreuzung und Gegen den Strich.

Heidegger's *crossing* of words is inventing a poetic way of writing Chinese in German language.

The cross over the term Sein (being) is inscribing its chiastic interplay to be a noun and a verb at once, i.e., to be neiter a noun (notion) nor a verb (sentence).

The structural direction of crossing is inverse to the linear sequence of alphabetic writing.

14.9 Why harmony is not enough?

The aim of Chinese thinking and living is harmony as it is conceived by Confucius and further developed to toady to give an ethical foundation to the new China.

Harmony is a holistic concept; it is excluding the acceptance of the other in its unpredictable form and event structure of surprise.

The Chinese idea of harmony is not yet considering the complementary interplay between acceptional and rejectional aspects of a system, societal, legal, economic or aesthetic.

> "The central theme of the Confucian doctrines is 'the quest for equilibrium and harmony' (zhi zhong he). The whole tradition of Confucianism developed out of the deliberations about how to establish or reestablish harmony in conflicts and disorder. For Confucianism harmony is the essence of the universe and of human existence. Harmony was manifested in ancient time when virtues prevailed in the world."
> http://www.interfaith-centre.org/resources/lectures/_1996_1.htm
> http://uselesstree.typepad.com/useless_tree/2006/10/a_socialist_har.html

The Book of Diamonds

Diamonds of Togetherness –

Formalizing Diamond Strategies

Towards a harmony of diamonds

1 Beyond propositions, names, numbers and advice

"But what has still not been seriously investigated in modern linguistic analysis during the course of secularization of myth, religion, and metaphysics is *the increase of secularization on human language*. In its insect like persistence, in which it naively supposes that Man and not the universe as a whole is the proper subject of speech and thought, it has completely forgotten God and myth, which both await their metamorphosis." G. Gunther

„Die Zahlen 1, 2, 3, 4 ergeben nicht nur als Summe die Zehn (d.i. die Grundlage, gr. putmen, des Zählens), sondern das 'Operieren mit der Tetrade' *(tetraktys) – darunter die Bildung der 3 'symphonen' Intervalle Oktave, Quint, Quart als 1: 2, 2 : 3, 3 : 4 – ist für die Phythagoräer so wichtig, daß sie auf die Tetraktys den heiligen Eid schwören."*

„Als 'Tetraktys' ist die Vierzahl das zusammenfassende Symbol aller Strukturen des Universums… Die Tetraktys ist der Weltprozeß seiner Form *nach, zugleich mit seiner 'Re-produktion' im 'Denken' (noein) und so auch in der Gestalt der Reproduktion oder Produktion 'musikalischer' Strukturen."* Johannes Lohmann

2 Name-oriented languages

Modern linguistics as the study of sign and languages systems in general, has to be separated from the philosophical decisions to focus on certain language interpretations, like the noun-, proposition-, action-oriented understanding of language. The aim of this study is to make some steps toward a reasoning beyond such decisions for propositions and their hierarchy (diaeresis) in favor of a new way of orientation and computation guided understanding of thematization and symbolization by the decision for polycontexturality and kenogrammatics.

Chad Hanson writes about the linguistic analysis of Chinese language by Chinese thinkers.

"Chinese linguistic thought focused on names not sentences."

"This explains the anomaly of treating all terms as 'names,' but fails to explain the similar treatment of adjectives and verbs. Lack of function marking is again part of a possible explanation. Adjectives used in nominal position did not undergo abstract inflection so theorists treated 'red' and 'gold' as analogous. They could associate descriptive adjectives, like mass nouns, with a range or "extension" and view adjectival "names" as distinguishing one range from others. The ranges distinguished by different "names" can overlap. In those cases, they would use compound "names." Distinguishing between the ways adjectives and nouns worked in compounds produced puzzles for pre-Han theorists."

"Zilu said, 'The ruler of Wei awaits your taking on administration.
What would be master's priority?' The master replied,
'Certainly--rectifying names!' . . . .
If names are not rectified then language will not flow.
If language does not flow, then affairs cannot be completed.

> If affairs are not completed, ritual and music will not flourish.
> If ritual and music do not flourish, punishments and penalties will miss their mark.
> When punishments and penalties miss their mark, people lack the wherewithal to control hand and foot.
> Hence a gentleman's words must be acceptable to vocalize and his language must be acceptable as action.
> A gentleman's language lacks anything that misses--period.(13:3)"
> http://www.hku.hk/philodep/ch/lang.htm

A chain of terms is build: rectification/names –> language –> ritual/music –> punishment/penalties –> control
==> acceptance of vocalization/action.

This chain of terms, from rectifying names to the acceptance of vocalization and action, suggests a linear and hierarchic order of entailments. There are no chiastic elements or relations involved. But there is also no system mentioned in which the hierarchic development takes place. Thus, it is open to interpretations.

Cyclic and chiastic order

If, on the other side, it is said, that "*war becomes peace and peace becomes war"* (Confucius, Heraklit) a cyclic and chiastic (dialectic) order is established. What is basic in this approach are not the names and notions involved but the rules of the *interplay* between them. This *chiastic model*, even still archaic, is neither sentence- nor notion-based. The change, the differences of the play are primary to the notions involved. Because of its chiastic form, the whole statement is in itself also not strictly a sentence or proposition in the definitional sense. Because a sentence is based on the hierarchy of subject and predicate. Chiastic forms are circular, violating the hierarchy of propositions. Thus, the operator "and" is not simply a logical or linguitic conjunction but a term for mediation between the two order relations between *war* and *peace*. There is no reason to thematize chiastic formations as name-based. It is neither the name/notion nor the propositions involved which are primary but the chiastic interplay between them. This change as such is neither name- nor proposition-based. In the terminology of polycontextural logic, this situation is modeled by the *proemial relationship*. A system of chiastic order relations is establishing the order of the proto-structure of dynamic terms.

That’s the reason why Pythagorean thinking is not deductive but proportional. Things and human beings are understood as being in proportions, like A:B = C:D. The aim is to realize a *harmonic* proportion and not a true deduction.

Harmony: China's creation to promote human rights

> by:Wen Chihua 2006-11-25 11:09:47, Xinhuanet
>
> BEIJING, Nov. 24, 2006 -- "What's the new catchphrase for human rights development in China? Well, it's Harmony, or peace, security and a happy co-existence between different people, communities and nations.
> "With top leaders tirelessly calling for the building of a *"harmonious society"* in China, as well as a "harmonious Asia" and "harmonious world", Chinese officials and human rights experts now take pride in their creative adding of "harmony" as a key conception of human rights promotion and guarantee."
>
> "The idea of harmony being connected to human rights is significant and relevant to Asian cultures, which are largely rooted in Confucianism, he said."
> http://www.humanrights.cn/en/feature/seminar/news/t20061125_181347.htm

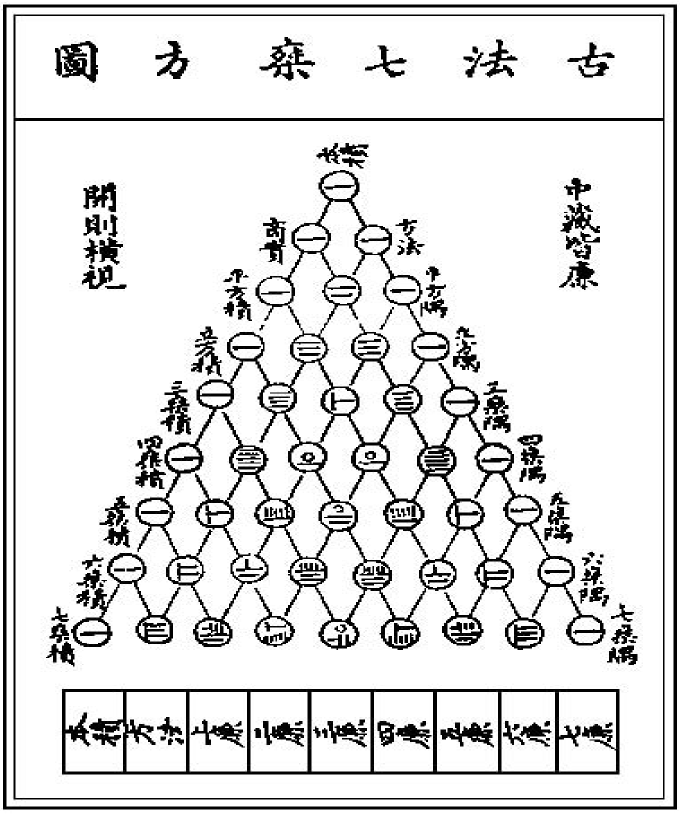
3 Yang Hui's Triangle and Gunther's Proto-Structure

If interpreted semantically, each point of the triangle is defined in a conflictive and ambiguous way, involving two complementary notional definitions. Thus, logically a contradiction. But the grid of the triangle is beyond logic, hence there are no contradictions involved.

A notional interpretation of the triangle (grid) can recur on the Pythagorean operation of the *tetraktys* (tetraktomai). Plato linked his ideas to numbers. But obviously not to the linear number system, like todays Peano numbers, but to the tabular Pythagorean number system (speculations) based on the *tetraktys* and also not to the dyadic progression of diaeresis.

The interpretation *Blaise Pascal* gives to the triangle is strictly *numeric*: for calculation in arithmetic and game theory. A further arithmetic abstraction is given by the row-presentation of the triangle as we know it today.

Yang Hui's interpretation of the triangle seems to be mixed: numeric and notional.



Diaeresis on Proto-Structures

Logic systems distributed over the proto-structure.

Linguistic and logical structure of diaeresis: genus proximum / differentia specifica.

Up and down; the same. (Diels)

But the *conceptual* use of the triangle is in strict conflict to the binary structure of diaeresis.

The way up and the way down have not to coincede.

Diaeresis is applicable to both approaches, the sentence- and the notion-based.

Yang Hui (ókãP, c. 1238 - c. 1298)
Khu Shijiei triangle, depth 8, 1303.

http://people.bath.ac.uk/ma3mja/patterns.html
http://www.csam.montclair.edu/~kazimir/construction.html
http://www.vordenker.de/ggphilosophy/gg_life_as_polycontexturality.pdf

http://www.vordenker.de/ggphilosophy/gg_identity-neg-language_biling.pdf
http://www.roma.unisa.edu.au/07305/pascal.htm

Different numeric interpretations of the proto-structure

The abstractness of the grid enables not only different notional or symbolic interpretations but is also serving for different numeric calculations. The closest numeric interpretation of the proto-structure is given by the fact of the number of the knots of the grid. This corresponds exactly to the Pythagorean numeric interpretation of the proto-structure. In contrast to the number of knots in the dyadic tree of the Platonic diaeresis, which corresponds the series of 1, 3, 6, 10, ... , the Pythagorean series of knots corresponds to 1, 3, 7, ... Thus differing at position 3 with $6 \neq 7$.

But triangles are not squares.

"To undermine the inevitable total control of information by our controllers we just have to make the very concept of information obsolete. The strategy of controlling the controllers is itself trapped in the stupidity of information controlling." Kaehr

"The big question, of course, is whether the idealism that first fired up Page and Brin can survive in a dirty corporate world where information is not just an intellectual ideal, but also a legal and political hot potato involving profound issues of privacy, intellectual property rights and freedom of speech. "You can make money without doing evil," runs one of their most celebrated mantras. Does that extend to signing a deal with China whereby its search functions will be subject to state censorship? The furore over that particular decision, made at the beginning of last year, still rages.

Google's activities thus touch on some of the *key philosophical questions of our digital age*. Because of its power and prominence, it will also be the benchmark by which we come to measure many of the answers." (Andrew Gumbel)

http://news.independent.co.uk/world/science_technology/article2578479.ece

3.1 Plato's Diaeresis onto Gunther's Proto-Structure

Strictly separated diaeresis systems, i.e., binary trees, localized at their common proto-structure, are offering communication as semiotic morphisms (Goguen) between them. Overlapping diaeresis systems are producing conflicts in communication because the may hide the lack of a common history. At the point where communication seems to be realized, mismatches are produced and their reasons are hidden as blind spots. That is, the semiotic isomorphisms between the different diaeretic systems can not be established because they are violating the condition of separation. Both diaeretic or semiotic systems have to be disjunct in respect of their elements to enable conversation between autonomous partners. Only if the overlapping can be reduced to an overlapping of the full trees, the conflict is resolved in coincidence. An overlapping of knots (terms) does not mean that the terms have the same meaning. Simply because they are defined by different notional backgrounds (histories).

Diaeresis, binary trees and proto-structure

From Plato's hierarchic pyramids, Porphyries notion-trees to the tree structure of XML and OOP. Trees, everywhere. Diaeresis is not an esoteric structure or an ancient and obsolete method of organizing knowledge. In its form as binary trees it has become a nearly universal method of thinking, computing and organizing knowledge and actions.

But with trees we are getting into trouble. It is also not enough to have forests of trees instead of a general tree. Even the trees in a forest may play some kind of a multitude, there are no mechanisms at all to realize interaction and reflection between trees. What's between trees is not itself a tree.

> *Graph transformation vs. trees*
>
> "Trees, however, do not allow sharing of common substructures, which is one of the main reasons for efficiency problems concerning functional and logical programs. This leads to consider graphs rather than trees as the fundamental structure of computing."

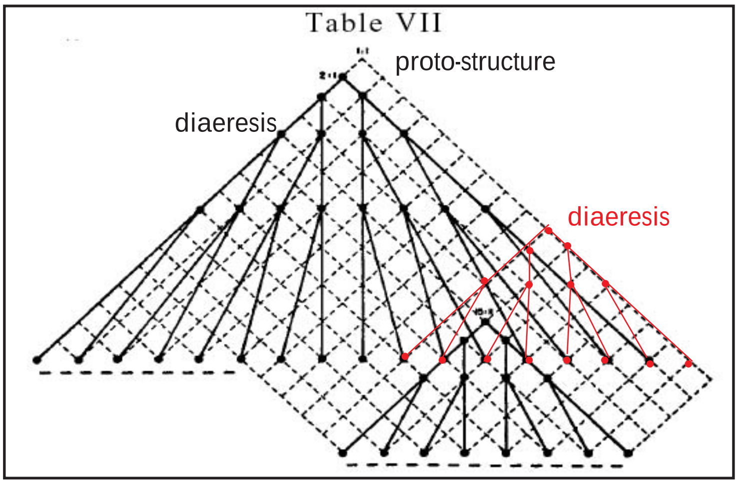
What are the costs for this (modelling) approach of computation? Obviously, *second order logics* are not a cheap solution. Systematically, they are based on *first order logics* which still are strictly tree-based.

> "The logical approach, [...], allows expressing graph transformation and graph properties in *monadic second order logic*."
>
> http://tfs.cs.tu-berlin.de/~uprange/paper/ep05.pdf

Different trees can be mapped onto the proto-structural grid. Gunther has given some examples of binary trees on proto-structures with different origins and common overlapping at proto-structural places. This can be freely extended to overlapping of binary trees, not only on common proto-structural places but at overlapping places of the trees themselves.

Gunther's table VII shows, in black, trees with different origins and proto-structural overlapping. The added red tree is overlapping with another tree, in black, additionally at common proto-structural places. The black tree is producing a differentiation of 3 decisions to meet the red tree which has at the common places realized a differentiation of only 2 decisions.

Obviously, diamond structures are the *"simplest and ugliest"* (Moressi), they are also the *poorest* of all, not containing anything developed by Western philosophy, logic, mathematics, science, economy and whatever. Simply because they are not even containing the basics of names, nouns, numbers and sentences. (*"Arbeit als absolute Armut"*, Karl Marx)



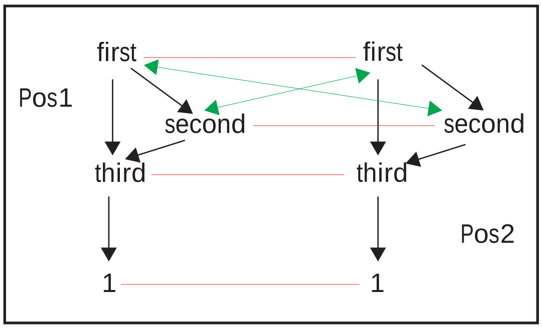
Such considerations are new and necessary, because they are dealing with relations between trees and not only with properties of a single tree. Deduction systems, like logic, can be modeled as a single, sometimes highly complex tree. Questions of proofability and truth are imminent. Between trees, new situations of *interactivity* which are surpassing questions of truth, like distance and closeness, have to be studied.

Mediation of binary trees in proto-structures

Diaeresis onto proto-structures are demonstrating the *distribution* of binary trees onto the proto-structural grid. They are not yet giving a mechanism of *mediation* between diaeretic trees. Both together, distribution and mediation, are defining the *dissemination* of binary objects, e.g., logics.

Binary objects are based on the structural number three. (If we would count with zero, an unary object would be of order 0 and the dyad of order two.) They are not reflecting triadizity but are based on it. Because the conceptual graph of binary objects is, additionally, based on unizity, its final structure is triadic. Hence, the mediation mechanism has to be established at the 3 places, only. The rest of the tree, the tree development, then is mediated in the same way as its principle structure. That is, the full tree is an iteration or application of the principle structure of binarity, i.e., the binarism based on unizity, that again, is a monad. Between monads, not much has to be mediated. They don't offer enough complexity to establish a chiastic interplay, i.e., a mediation mechanism. Between monads, the structure of mediation is reduced to *isomorphism*. Or in terms of the proemial relationship, their mediation is reduced to the coincidence relation.

If we consider, additionally to the *direct* mediation of triadic objects, the possibility of *metamorphic* interactions, then the full triad has to be involved. That is, e.g., the unizity of one triad at one position could become the "second" of the triad of the other position, etc.



As much as the full binary tree is an iteration of its basic principle, the iteration of those principles are fully determining the mediation, step by step, of the tree. As a result, each knot of a binary tree is mediated with the knots of its neighbor binary tree.

In being positioned into the proto-structure, the positions to be mediated, that is, proemialized, are qualified by their positions in the polycontexturality of the proto-structure. [It seems that this is an important step to a further concretization of the realization process of polycontexturality, which had not yet been emphasized clearly enough. 17.04.07]

Situated into the proto-structure vs. the positional matrix PM

The procedures of distribution, mediation, thus, dissemination, and their organization by the proemial relationship didn't include the *positioning* of the disseminated systems concrete enough. The proemiality between disseminated logics, e.g., is in some kind abstract to the concrete position of the logics involved. That is, the positioning or localization of the logics in the framework of the proto-structure, and therefore the deutero- and trito-structure, too, wasn't a topic of the introduction of poly-logics. This seems to be true even for the localization of logics into the positional matrix PM as developed in extenso since the paper ConTeXtures. There, positionality is not specified as it is designed in the proto-structure by the application of the diamondization or tetraktomai. Thus, the positional, i.e., the polycontextural matrix PM finds a foundation by the procedure of diamondization and the proto-structure of disseminated contextures.

The process of mapping logics onto the positional matrix PM has to be qualified by the proto-structural design of their contextures.

Hence, diamondization is producing the proto-structural grid of contextures. Their logification is producing distributed logics which have to be mediated. That is, the process of diamondization has to be mirrored on the level of logical systems. The positioning of the logics by their proto-structural places is not yet defining a dissemination of logics. It needs, additionally the proemial relationship between the logics, and this on all their tectonic levels.

Behind the positional / polycontextural matrix is not only the mechanism of mediation (dissemination) but also the proto-structural positioning of the contextures. This positioning is in fact the production of the complexity of the polycontextural systems.

The positional matrix starts with the design of the complexity and complication of the system involved. But it is not explaining or determining, producing it. This is done by the process of diamondization which is producing the structural "content" of the contextures and their positioning into the proto-structure.

In the theory of polycontexturality developed by Gunther there is nothing to find which is directly concerning this topic. Proto-structure, or generally, kenogrammatics and the proemial relationship, as well as the distributed / mediated logics are more or less separated topics.

Diamondization is a very fundamental operation. It is producing the proto-structural grid. It has to be studied how it can be developed to include deutero- and trito-structures too.

A connection from the proto-structure to the "valuedness" of polycontextural logics is given by the mechanism of *proemiality*.

Diamondization is the first step beyond Occidental diaeresis, two-valuedness, binarism, deduction, inference and objectification. For mathematical reasons, ternary or in general n-ary trees (structures) can be reduced without loss to binary trees (structures).

The basic structure of diamondization is limited by the number four. Questions of more complex basic systems have to be considered. Maybe Gunther's mention of Gauss numbers.

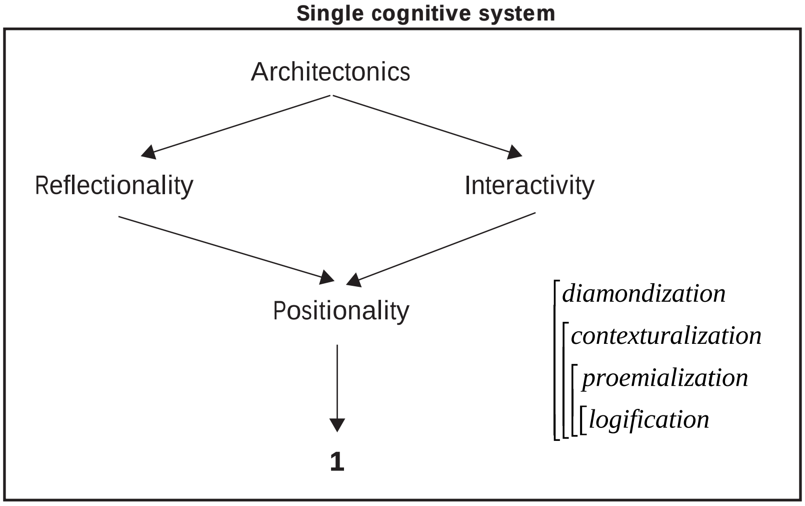
Proto-Procedure

Proto-structural conceptualization is a practise of inscribing orienting patterns.

Orienting patterns are designing the horizon of actions. They are the decisions which are designing the architectonics of formal systems.

In short, proto-structural conceptualizations are a further thematization and explication of the positioned uniqueness (1) of distributed systems.

Single cognitive system



Levels of Diamondization

concepts —> operators —> numerators

```
diamondization --> contexturalization -->
proemialization --> logfication
```

1. diamondization: produces the proto-structure
2. contexturalization: produces the contexturality of the proto-structure
3. proemialization: produces the mediation of the positioned contextures
4. logfication: produces the logical systems of the positioned contextures

Other wordings

Diamonds applied, applications formalized.

First the Diamond questions are applied to a content. This is producing a contextural grid of contents. The other step is to take the questions as content. This is producing the formal skeleton of the Diamond of the basic terms. In a further step of formalization, the arithmetical notations of the positions is taken as the content. This is producing the arithmetic proto-structure of the grid.

Contextual foundations of the Diamond

Developing a Diamond is depending on strategies to enfold a given or taken starting point. If we start with a proposition or affirmation we can ask "What is the opposite of this proposition for you or the context involved?" A series of questions can be involved:

What is the opposite of a proposition?

What is the proposition of this opposite?

What is the proposition and the opposition of this acceptance?

What is the proposition and the opposition of this rejection?

What is the rejection of this acceptance?

What is the acceptance of this rejection?

Then, other topics can be asked:

What can we observe, logically, from the point of view of rejection (acceptance) about the position and opposition interaction? How is the constructed proposition / opposition mediation determinging logically the range of rejection / acceptance?

Then, we can combine or iterate some positions for new questions:

What is the opposite of the opposite of this proposition, etc.

What is the rejection of this opposite and acceptance in respect to its proposition?

Depending on the distance or rank of the distributed terms it can be asked how to bridge the gaps between them.

Tetraktys and Diamond

The Diamond is producing a proportionality between contextures. The proportionality is defined by the proportions of Prop / Opp, Acc / Rej, i.e., of the double proportions of A:B=C:D.

Proportionality is not involved with deduction or calculation, logic and arithmetic, but enabling both. A proportion is neither true nor false. Proportionality can be *harmonic (harmonious)* or *disharmonic (disharmonious)*. Harmonic situations are not logically deduced but played in accordance with the player and the played, the instrument and the cosmos. This situation was paradigmatic for both, the Ancient Greek and the Ancient Chinese world-view. Pythagorean thinking is not using the (Arabian) distinction of operator and operand, variables and constant, and its formal notational systems. It isn't solving problems but creating orientation in the world. The distinction of form and content, existence and representation is not yet established. Problem solving is a very limited form of creating orientational (orienting) advices.

> Der pythagoreische mathematische *logos* ist, von einem modernen Standpunkt aus betrachtet, eine *Formel ohne Symbolik*.
>
> Die Symbolik der heutigen Mathematik ist eine geborgte Anschauung. Am Anfange der griechischen Philosophie und der griechischen Mathematik aber steht eine *Anschaung der Sache selbt*. (Lohmann, p. 93)

Similar situations can be found for Ancient Chinese mathematical thinking.

3.2 The proto-structure as the grid of actions of diamondization

1. The proto-structure is created by the process of *diamondization* (tetraktomai). Diamondization starts somewhere with the setting (Setzung), i.e., the decision, of a proposition (affirmation) and the creation of its opposition (negation, dualization, reversion, subversion) in one dimension. The second dimension of the diamond is produced by the both-at-once (*acceptance*) and neither-nor (*rejection*) of the involved duality of proposition and opposition. Diamondization is not happening as an absolute and neutral abstract construction of a commutative grid but as a creation of distributed contextures understood as evoking meaning beyond the noun / sentence distinction. The design of the opposite position to the proposition is not reducible to a deduction, say a logical dualization. Depending on the understanding of the proposition, different kinds of oppositions are reasonably possible. A decision in favor to a specific opposition is the result of negotiation with the agent himself or within a group of actors involved.

2. Each distributed contexture developed by the process of diamondization is entailing its own logic. This immanent logic of a contexture is symbolized by its tree. The logic has, in principle, a binary tree structure. This holds for the syntactic as well the semantic and deductional structures of logic.

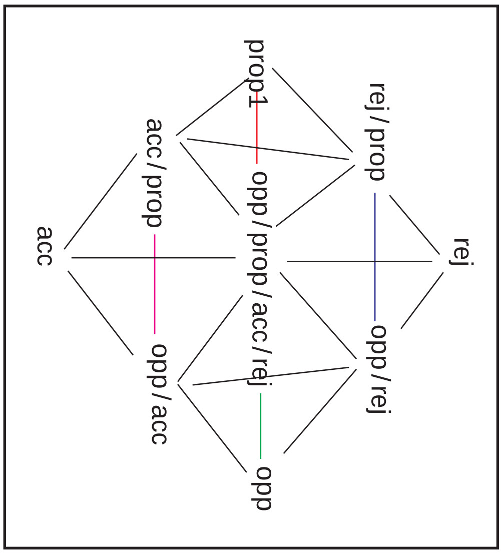
3. Also the diamond is giving place to the distributed contextures and determining their possible interactional meaning, it is not yet establishing an interactional and reflectional mediation between the contextures and their trees. This is realized by the *proemial relationship* between the basic structure of the trees. The basic structure of a binary tree is its conceptual triad. The full tree is an iterative application of the basic conceptual triad of the binary tree.

4. Distribution and mediation of trees is constituting together the *dissemination* of trees. Dissemination of trees may involve different strength of mediation.

5. On the base of the established dissemination of trees further operations have to be introduced. First, the accretive *interactivity* between trees and second, the action of *reflectionality* between trees. Further more, *intervention* and *interlocution* (anticipation).

6. After this introduction of reflectional and interactional disseminated trees, all the apparatus of the so-called *super-operators* have to be involved. The super-operators are the actions or morphisms between trees like *identification*, *permutation*, *reduction*, *replication* and *bifurcation*. To do this properly we have to move to a more mathematical presentation, leaving the grid and its trees as an introductory step behind us.

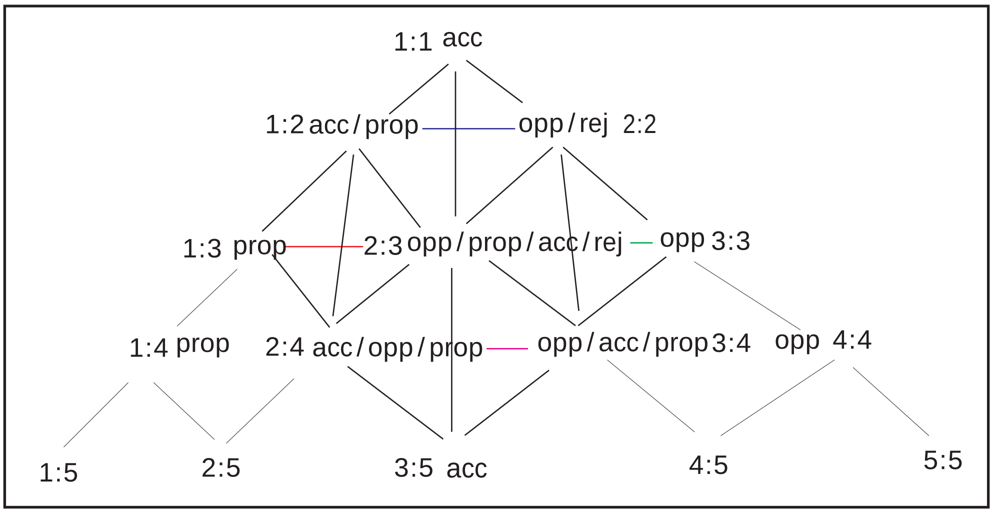
7. After the grid has been constructed by diamondization the strict formal pattern of the grid, without its contextural thematizations, can be abstracted from the process of diamondization to a the strict formal structure of diamondization. This then, is the proto-structure of kenogrammatics as a skeleton without contextural flesh. Some flesh is given by an arithmetization of the proto-structure by mapping pairs natural numbers (i:j) onto it.



8. An inter-mediate step of abstraction can be considered as the formal, but not arithmetical application of the Diamond Strategies reduced to the set of the basic terms {proposition, opposition, acceptance, rejection}.

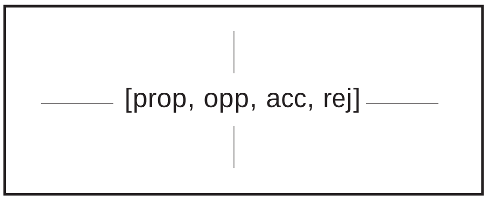
Each knot has a quadruple determination as being at once all basic terms {prop, opp, acc, rej}.
Thus to keep some economy we have to numerate the positions, like $prop_{i:j}$ —> $opp_{i:j+1}$ / $prop_{i+1:j}$ —> $opp_{i+1:j+2}$
If we abstract from the basic terms and keep the nummeration only, we have constructed the numerical interpretation of the proto-structure (i:j).

DM	O_1	O_2	O_3
M_1	$Prop_1$	Rej_1 / $Prop_4$	Rej_4
M_2	Acc_1 / $Prop_3$	Opp_1 / $Prop_2$ / Rej_3 / Acc_4	Rej_2 / Opp_4
M_3	Acc_3	Acc_2 / Opp_3	Opp_2



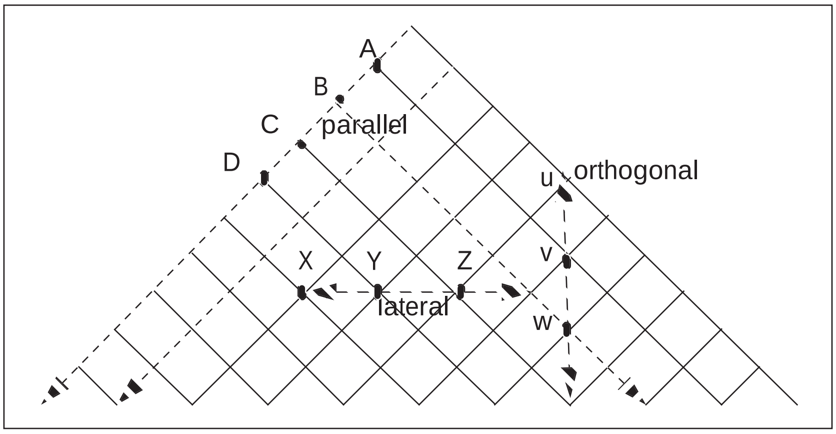
It doesen't matter how the pragmatic starting point (1:1) is interpreted, as rejection (rej), as acceptance (acc), as proposition (prop) or as opposition (opp).

General structure of a knot



The number (1:1) is not an absolute origin like the number 1 in the arithmetics of natural numbers. There, only one number 1 exists. The proto-structural number (1:1) is relative and for notational reasons only. Inn fact it should be written as $(i_1:j_1)$ to emphasize its relativity.

Interogative directions in the proto-structure



Iterative repetition

I : (m:n) → (m+1: n)

Akkretive repetition

A: (m:n) → (m+1: n+1)

Lateral repetition

LD: (m:n) → (m: n+1)
LR: (m:n) → (m: n--1)

Orthogonal repetition

O: (m:n) → (m+2:n+1)

Metaphor: Lo Shu's Magic Square

To use the metaphor of the Turtle, the grid on which the numbers are localised is not pre-given or pre-inscribed onto the shell of the turtle but realized by the *activity* of designing the grid of the Magic Square. Thus, the grid is not abstract in its extension but determined concretely by the structure of the question involved. That is, to produced the numerical Magic Square.

The classic Western way of thinking is presupposing the grid as a mathematical structure and is building on its base new distinctions. This mathematical structure is considered as *neutral* to the task to be studied. The most famous case of such a non-reflectional use of the grid is the grid of *Cellular Automata*. As well known, it is producing the ultimate blind Universe, i.e., the Universe of the Blind.

Ideas, Numbers and Contextures

An arithmetic interpretation of the action of diamondization or tetraktomai is installing the Pythagorean *triangular* number system. This system is, from a systematic point of view, the first step beyond the *dyadic* system of Plato's and Aristotle's understanding of numbers and notions (ideas). Gotthard Gunther has condensed this approach into his design of *"natural numbers in trans-classic systems"*, esp. into the *proto-numbers* of the proto-structure of kenogrammatics. The proto-structure of kenogrammatics is based on the operations *iteration* and *accretion* of kenograms building together a commutative graph.

In contrast to Gunther's approach which is based on kenogrammatic successor operations, the diamond approach proposed inn this paper is not based on single successor operators like iteration and accretion but is using the diamond as the unit of progression, i.e., to do the tetraktomai is based on the tetradic structure of the diamond.

It is said that Pythagorean numbers are *figurative* numbers. Such a characterization shouldn't forget that Pythagorean thinking happened in a situation before the Aristotelian separation of geometry and logic was established. Thus, the term "figurative" is itself figurative.

4 The Square of Opposition from Aristotle to Moretti

GEOMETRY FOR MODALITIES? YES: THROUGH `n-OPPOSITION THEORY'
Alessio Moretti, December 13, 2005
http://www.uni-log.org/second1.html

"limited to the square (the poorest and ugliest)"

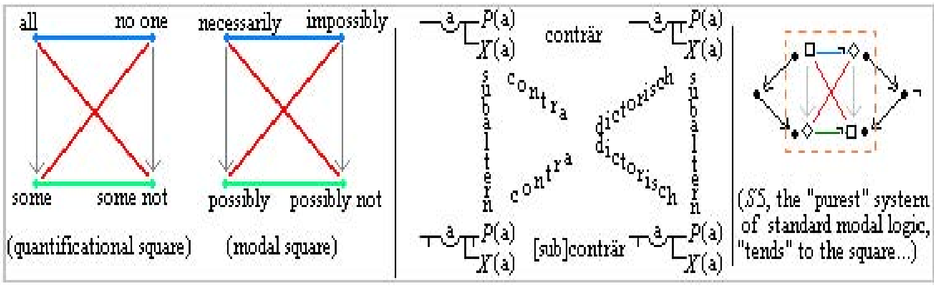
This theory, relevant to both quantification theory and modal logic (both are tied to the logical square) shows that there exists a field, between logic and geometry, where logical-geometrical n-dimensional solids (highly symmetrical structures whose edges are implication arrows), instead of being limited to the square (the poorest and ugliest of them), develop into infinite growing orders according some relatively simple but generally unknown principles.

We recall here Aristotle's basic doctrine. "Opposition" consists in a complex ordering, expressed geometrically by the "logical square" (of oppositions), of four different ways for two terms to be "opposed" one to the other1. These ways are :
(1) contradiction, defined for two terms as, simultaneously, the im-
possibility to be both true and the impossibility to be both false ;
(2) contrariety,
de¯ned for two terms as, simultaneously, the impossibility to be both true but
the possibility to be both false ;
(3) sub-contrariety, defined for two terms as,
simultaneously, the possibility to be both true but the impossibility to be both
false ;
(4) sub-alternation (or implication), defined for an ordered couple of terms
as the impossibility of having the first without having the second (so that, in
some sense, it contains the fourth combinatorial case, i.e., simultaneously, the
possibility of being both true and the possibility of being both false - plus the
possibility that the first is false while the second is true).

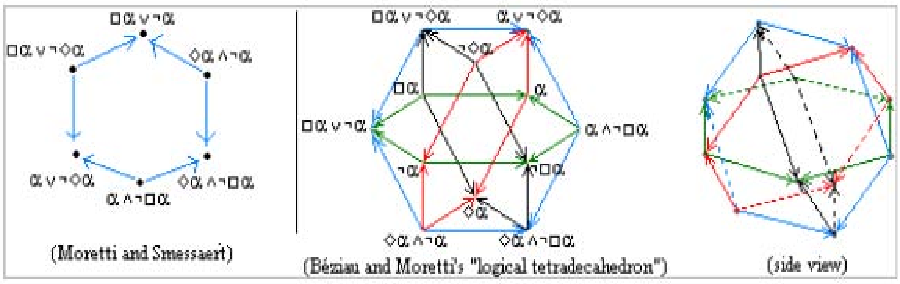
As we see, the 4 kinds of oppositions exhaust the combinatorial possibilities of combined truth and/or falsity of two simultaneous terms. In the square, these 4 kinds constituting the concept of opposition are represented not by the 4 points (the vertices, the corners of the square) but by the lines (the square's 4 edges and 2 diagonals).

Many parts of Aristotle's logic have been abandoned or strongly revised during the "logical turn" of the second half of the nineteenth century (from Boole to Russell) : not the logical square. This structure, in fact, if poor, seems nevertheless impressive by its incredible generality : it expresses graphically the fundamental quantificational relations (holding for 8, 9, :8, :9) and thus - modal logic being related to quanti¯cation theory, as we know now through "possible worlds semantics" - it expresses also the fundamental modal relations, at least those of the 4 "non-naked" modalities among the 6 basic ones of S5 (cf. figure 1).

Instances of the "logical square" by Aristotle, Frege and C.I. Lewis



Moretti and Smessaert's fourth hexagon (in blue), Béziau and



Moretti's "logical tetradecahedron" (ordering the four hexagons)

Oppositions of terms (Aristotle) and sentences (Modal Logic).

Diamond: Oppositions of contextures.

4.1 Diamond Strategies as a computational paradigm

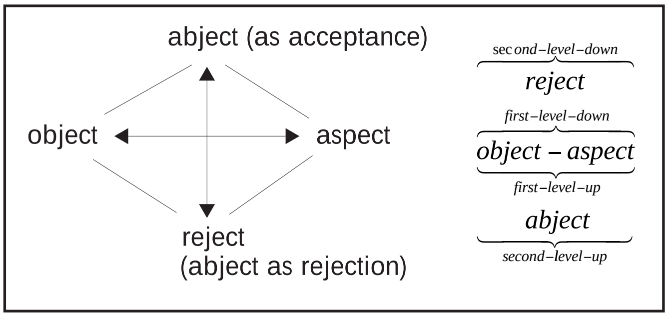
For the OOP paradigm, the object is the contexture set as position. What could be the opposite of the category "object"?

In my paper *"From Ruby to Rudy"* I introduced some new categories, like abjects, rejects, injects, projects additional to object and aspect. One such category, the category "*Aspect*" can be considered as the opposite to the category "*Object*".

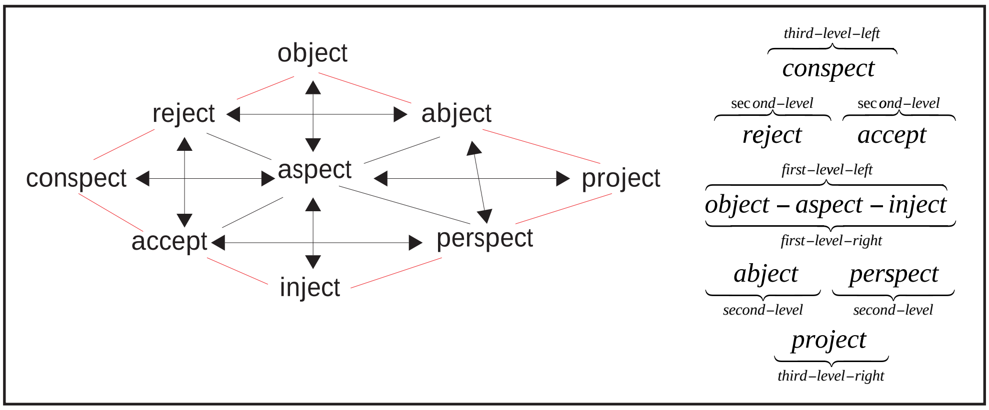
One reason might be this: The category *"Object"* is hierarchically organized, the category "*Aspect*" is heterarchically organized, thus a good opposite to the proposed category "*Object*". Object and Aspect are in a relationship of complementarity. The common treatment in programming languages is to subsume one under the other. Usually, aspects are declared as special objects. A more advanced treatment would be to accept the complementarity as such and to model aspect and object as agents of a complementary logic system.

4.1.1 Diamonds as modi of thematizations

Diamond of object and aspect



Additionally to the presentation given in *"From Ruby to Rudy"* the full Diamond of the terms involved, i.e., the full direct diamondization of [object, aspect, inject] is considered in the following modeling with the help of additional dummies *accept* and *conspect*, configuring the red Diamond.



Diamondization of *Aspect* and *Object*, as used in OOP and AOP, was introduced to implement the idea of poly-paradigmatic programming in the sense of polycontexturality. Only one dimension was considered, enough to introduce interesting concepts and mechanism of a new kind of modeling and programming. A logification of this approach follows quite naturally along the "main-axis" and its different levels. Thus a

3 component system with, say *object*, *aspect* and *inject* produces a 6 contextural logic with additionally the contextures *abject*, *perspect* and *project*.

It would be of interest to develop a consistent mapping from the attributes of "object" of OOP to the attributes of "aspect" of AOP to concretize the idea of diamond-dualization and complementarity of the categories of object and aspect.

In a simple diamond system the slogan *"Everyting is an object"* has to be changed to the new slogan *"Everything is a complementarity of objects and aspects"*. But even this is obviously only have the story.

The Logics of Diamonds

1 Logification of Diamonds

A logification of diamonds is connecting the diamond structure with the tectonic level of logical valuedness of polycontextural logics. Logification is abstracting from the specific positionality of the diamonds considered. Only the logical structures of diamonds are in the focus. Their positioning has to be added after the logification succeded.

Now the question arises, how to model logically the full 4-diamond structure with its 9 components?

First, how to model the full 1-diamond of [object, aspect, abject, reject]?

Each position has its own logic: logic of the first and logic of the second, logic of the acceptance of both and logic of the rejection of both.

A first and quite direct but narrow logification can be realized by a diamond interpretation of the *proemial relationship* of mediated logics. The third sub-system of a 3-contextural logic which is mediating the first and the second sub-system is interpreted as the place for *acceptance* and new, the exchange relation as such between the first and the second sub-system is interpreted as the place for *rejectance*.

A logification of diamonds, which is a logification in the sense of polylogics, may help to clarify the polycontextural character of diamonds. Diamonds may be a reasonable concept for classical mathematical theories, like relation and category theory, too, but logically, diamonds are not to domesticate by classical methods of thinking.

1.1 General Logification Strategy

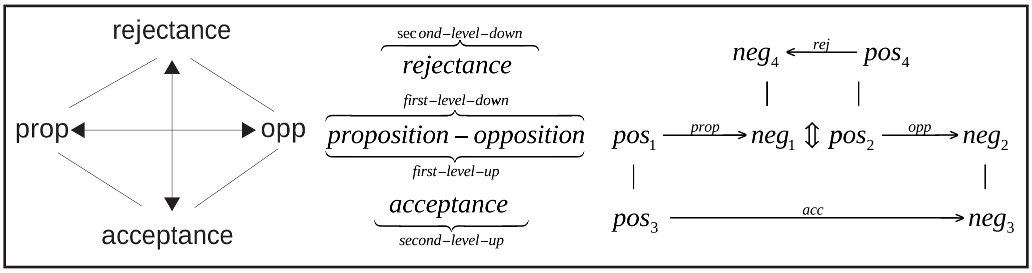
A logification of the diamond strategies has to consider 3 different types of logical systems:

The chiastic chain of core logics, i.e., the *core logics*.

The chains of mediating logics, i.e., the logics of *acceptance*.

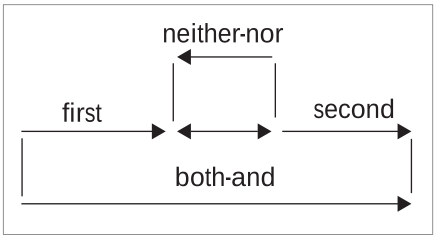
The chains of separating logics, i.e., the logics of *rejectance*.

Logification of a 3-diamond



The chain of core logics corresponds to the chain of proposition and opposition systems. The basic chiastic structure or proemiality of the core logics is mirrored by the mediating and the separating logics, representing the acceptance and the rejectance functions of logics in diamonds.

1.2 The new theme: rejectance (rejectionality)



There is no reason why the mediating sub-logics, based on the coincidence relations and representing acceptance, have a priority towards the (new) sub-system, representing the exchange relation and being interpreted as rejection (or: rejectionality, rejectance). Thus, both mechanisms of distribution and mediation, i.e., of dissemination, the coincidence and the exchange relation have to be logified. Until now, only the order relations had a direct logical interpretation. The third sub-system, based on two coincidence relations, is representing itself as an order relation, too. The fact of an exchange relation between pos_1 and neg_3, which are coinceding with the values of the $sub\text{-}system_3$, wasn't thematized as such but only as the base for S_3. The new thematizations of the *direct* exchange relation producing the place for the rejectance system which itself is an order relation between the coincidence of the values neg_1 and pos_2, i.e., as the values pos_4 and neg_4, has to be added to the polylogical system.

Reduction questions

As much as a composition can not be reduced to its morphisms, the rejectance category cannot be reduced to morphisms and their compositions. Compositions may be build on morphisms but morphisms are not delivering per se the rules of compositions neither of hetero-morphic compositions.

There is no rule given by the composition of morphism to define the hetero-morphisms of rejectance. That is, hetero-morphisms have to be invented and introduced even against the naturality of the laws of composition of morphisms.

Diamonds are based on a non-reducible paradigm of thematization.

"... category theory is based upon one primitive notion – that of composition *of morphisms." D. E. Rydeheard*

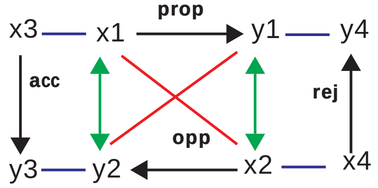
Diamonds are based upon composition and its difference, i.e., on the chiastic interplay of composition and its complementary difference.

CAT=[Obj, Morph, Comp] or "object-free", CAT=[Morph, Comp]

1.3 Diamond objects

Diamond objects are in fact not objects but complexions of polycontextural morphisms.

Diamond-Obj$^{(3)}$: Obj $^{(3)}$ --> Obj$^{(3)}$



$$\begin{bmatrix} X^{1.3.4} \\ X^{1.2.4} \\ X^{2.3} \end{bmatrix}$$

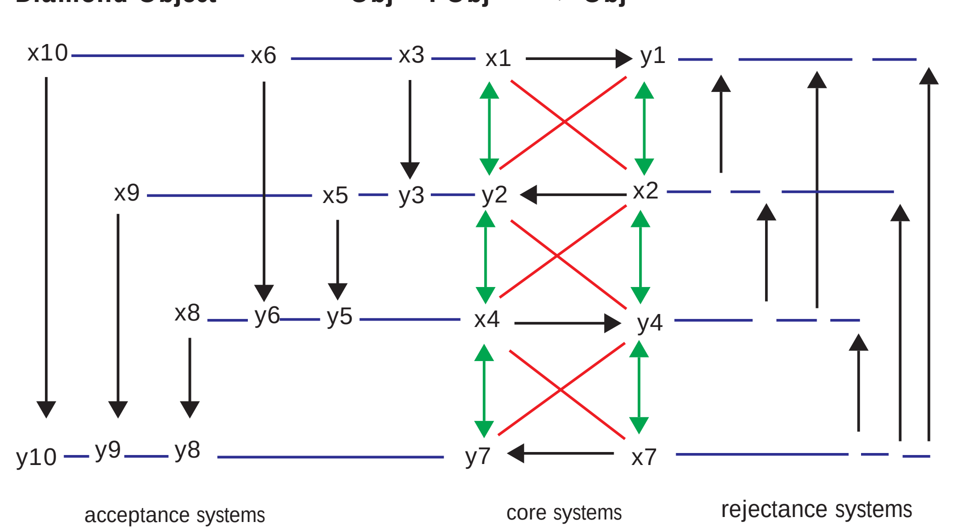
$\forall i \in s(m): pos_i \to neg_i,$

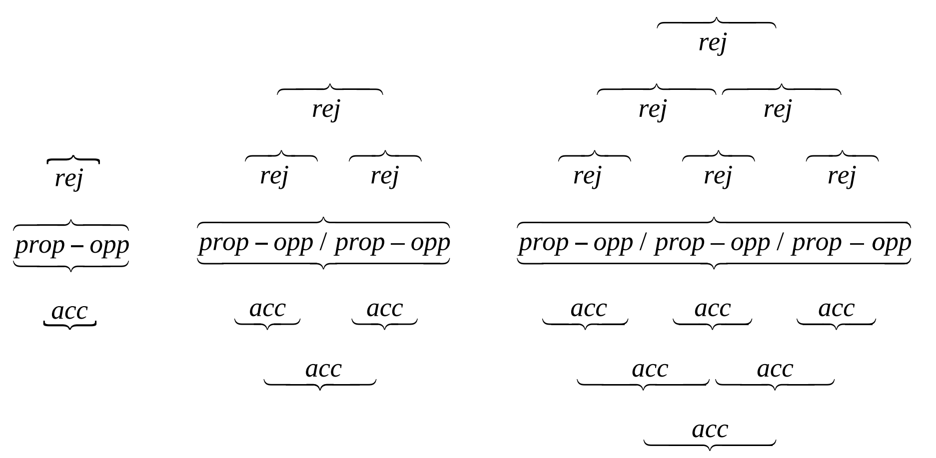
$m = 3:$

$pos_1 \cong pos_3$

$neg_4 \cong neg_1 \Updownarrow pos_2 \cong pos_4$

$neg_2 \cong neg_3$





Complementarity in Diamonds

Interesting new situations can be studied. How are the parts of the complementarity formally related. Is there a new dualism between "acceptance" and "rejectance" parts?

A first answer is given by the fact that the number of acceptional and rejectional systems are the same. There are as many rejectional systems as there are acceptional systems. Until now, only the part of the acceptional systems, understood as mediating systems, has been studied in PolyLogics.

A second observation shows that both parts are in an inverse order, organized in opposite directions or to use a medical term, their organization is *antidromic*.

Hence, for a 3-diamond, a negation of the acceptance system S_3 corresponds to a negation of the rejectance system S_4. Both are producing an inversion of the full system. For diamond systems with m≥4, interesting partial correspondences occur.

A diamond based PolyLogic can be seen as a three dimensional or 3-level system: there are 3 chains of disseminated logical systems, the *core* logics and their neighbors, the *acceptance* and the *rejectance* logics. Diamond based PolyLogics are polycontextural logics augmented with antidromic logics.

Interpretations

With some phantasy we can correlate the "acceptance" systems with a cognitive attitude and the "rejectance" systems with a volitive attitude. The neither-nor of proposition and opposition means that no decision has been drawn. The both-and of proposition and opposition means that both are accepted and included into the cognitive domain. The "mediated systems" or the basic (core) systems are the systems of propositions and its oppositions, thus the systems representing the "reality" of the cognitive and volitive domains.

With this in mind we learn that diamond logics are not logics of mental reflections.

PM	O_1	O_2
M_1	$log_{1.1}$	$log_{2.1}$
M_2	$log_{1.2}$	$log_{2.2}$

PM	O_1	O_2
M_1	$Prop_{1.1}$	$Acc_{2.1}$
M_2	$Rej_{1.2}$	$Opp_{2.2}$

The logical system $log_{2.1}$, as a mediating system between system $log_{1.1}$ and $log_{2.2}$, can be interpreted as the *acceptance* system, and the system $log_{2.1}$ as the *rejection* of the systems $log_{1.1}$ and $log_{2.2}$. Thus, realizing the full diamond.

Grids of conjunctions and disjunctions in normed representations

$$\begin{bmatrix} [X^{1.4} \wedge Y^{2.4}] \\ X^1 \wedge Y^1,\ X^2 \vee Y^2 \\ [X^{1.3} \vee Y^{2.3}] \end{bmatrix} \quad \begin{bmatrix} [X \wedge Y] \\ X \wedge \vee Y \\ [X \vee Y] \end{bmatrix} \quad \begin{bmatrix} X^{(4)} \begin{pmatrix} \wedge \\ \wedge\ \vee \\ \vee \end{pmatrix} Y^{(4)} \end{bmatrix} \quad \begin{bmatrix} X^{(5)} \begin{pmatrix} \wedge \\ \wedge \vee \\ \wedge\ \vee \wedge \\ \vee \wedge \\ \vee \end{pmatrix} Y^{(5)} \end{bmatrix}$$

The question which remains to be answered, after the systems are distributed over the diamond, is how are they mediated? The first part of the question is answered by the well known mediation conditions for polylogical systems. The new part is introduced by the additional rejectional system as a modelling of the exchange relation of mediated systems.

1.3.1 Mediation of Diamonds

The question which remains to be answered, after the systems are distributed over the diamond, is how are they mediated? The first part of the question is answered by the well known mediation conditions for polylogical systems. The new part is introduced by the additional rejectional system as a modelling of the exchange relation of mediated systems.

Full Diamond structure with rank, r=1

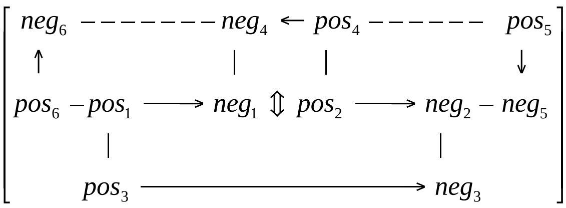
DM	O_1	O_2	O_3
M_1	$Prop$	Acc	–
M_2	Rej	Opp / $Prop$	Acc
M_3	–	Rej	Opp

DM	O_1	O_2	O_3
M_1	$Prop_1$	Rej_1 / $Prop_4$	Rej_4
M_2	Acc_1 / $Prop_3$	Opp_1 / $Prop_2$ / Rej_3 / Acc_4	Rej_2 / Opp_4
M_3	Acc_3	Acc_2 / Opp_3	Opp_2

Diamond structure with linear rank, r≤2.

DM	O_1	O_2	O_3
M_1	$Prop_1$ / $Prop_5$	Rej_1 / $Prop_4$	Rej_4 / Rej_5
M_2	Acc_1 / $Prop_3$	Opp_1 / $Prop_2$ / Rej_3 / Acc_4	Rej_2 / Opp_4
M_3	Acc_3 / Acc_5	Acc_2 / Opp_3	Opp_2 / Opp_5

And where are we here?



$$\begin{bmatrix} pos_{1.3.6} & \\ neg_{1.4} & pos_{2.4} \\ neg_{2.3.5} & \end{bmatrix}$$

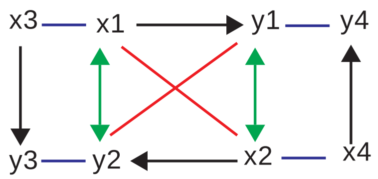
2 Logics of Diamonds

A change of strategy is on the way. With a logification of diamonds an inversion in the strategy of formalization is happening. Polycontextural logics got a lot of studies under the procedure of chiastification and proemialization of polycontexturality. Now, the diamonds are the starting point and diamonds get a logification. That is, the figure of chiasm, the mechanism of proemiality and the strategy of diamondization are first. They are leading the logification of polycontexturality. As a first result, the diamond logics or the logics of diamonds are introduced. Logification is generally open to logification of more complex structures than planar diamonds. The question is not how to logify abstract patterns but which logical sense or use such a logification could deliver. A logification of diamonds is, furthermore, connecting the genuine, but yet unknown, direct and Ancient diamond way of thinking with the concepts, techniques and apparatus of Western logic. Today, it is not enough to meditate diamonds they have to be computed.

2.1 Logification

2.2 General Logification Strategy

Diamond-Obj$^{(3)}$: Obj $^{(3)}$ --> Obj$^{(3)}$



$$\begin{bmatrix} X^{1.3.4} \\ X^{1.2.4} \\ X^{2.3} \end{bmatrix} = \begin{bmatrix} X^{4} \\ X^{1}X^{2} \\ X^{3} \end{bmatrix}$$

$\forall i \in s(m): pos_i \rightarrow neg_i,$

$m = 3:$

$pos_1 \cong pos_3$

$neg_4 \cong neg_1 \Updownarrow pos_2 \cong pos_4$

$neg_2 \cong neg_3$

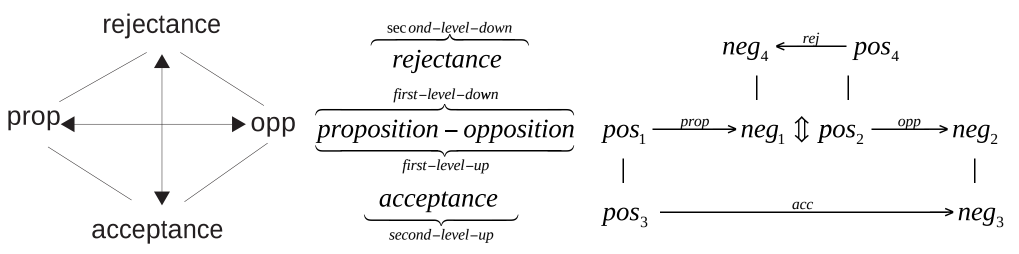
A logification of the diamond strategies has to consider 3 different types of logical systems:

The chiastic chain of core logics, i.e., the core logics.

The chains of mediating logics, i.e., the logics of acceptance.

The chains of separating logics, i.e., the logics of rejectance.

Logification of a 3-diamond



The chain of core logics corresponds to the chain of proposition and opposition systems. The basic chiastic structure or proemiality of the core logics is mirrored by the mediating and the separating logics, representing the acceptance and the rejectance functions of logics in diamonds.

General Logification Strategy

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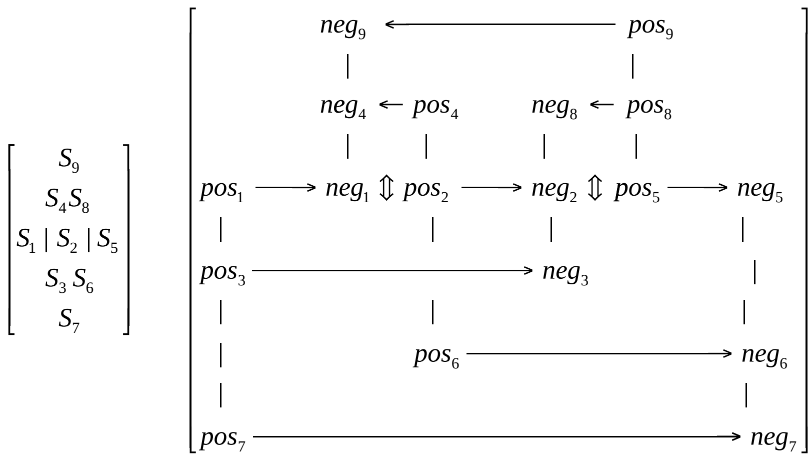
The chains of separating logics, i.e., the logics of rejectance.

The chain of core logics corresponds to the chain of proposition and opposition systems.

The basic chiastic structure or the proemiality of the basic logics is mirrored by the mediating and the separating logics, representing the acceptance and the rejectance functions of logics in diamonds.

Mediation scheme for 4-diamonds



As for acceptance systems, there are direct and indirect rejectance systems, like S_9.

2.3 Conditions of mediation for diamonds

General Conditions of Mediation

0. Universal Positioning *in Logic*, $m = 2$

$$\{\alpha, \beta\}_{/dox} \in S^{(2)} \Leftrightarrow \{\alpha, \beta\} \in 2-CF_{classic}$$

$$2-CF_{classic} = \{(c), (f)\}$$

$$f = \{\wedge, \vee\}$$

$$c = \{\rightarrow, \leftarrow, \leftrightarrow\}$$

1. Proemial Mediation *in PolyLogics*, $m = 3$

1.1. *Junctional mediation* :

$$\{\alpha, \beta\}_{/mediation} \in S^{(3)} \Leftrightarrow \{\alpha, \beta\} \in 3-CF_{proemial}$$

$$3-CF_{proemial} = \left\{ \begin{pmatrix} cc \\ c \end{pmatrix}, \begin{pmatrix} cf \\ f \end{pmatrix}, \begin{pmatrix} fc \\ f \end{pmatrix}, \begin{pmatrix} ff \\ c \end{pmatrix}, \begin{pmatrix} ff \\ f \end{pmatrix} \right\}$$

$$f = \{\wedge, \vee\}$$

$$c = \{\rightarrow, \leftarrow, \leftrightarrow\}$$

1.2. *Transjunctional mediation* :

$$\{\alpha, \beta, \delta, \gamma\}_{/mediation} \in S^{(3)} \Leftrightarrow \{\alpha, \beta\ \delta, \gamma\} \in 3-CF_{proemial}$$

$$f = \{\wedge, \vee, <, >, <>, \triangleleft, \triangleright\}$$

$$c = \{\rightarrow, \leftarrow, \leftrightarrow, \Uparrow, \Downarrow\}$$

2. Diamond Mediation *in PolyLogics*, $m = 3$

$$\{\alpha, \beta, \delta, \gamma\}_{/mediation} \in S^{(3)} \Leftrightarrow \{\alpha, \beta\ \delta, \gamma\} \in 4-CF_{diamond}$$

$$4-CF_{diamond} = \left\{ \begin{bmatrix} f \\ ff \\ f \end{bmatrix}, \begin{bmatrix} f \\ fc \\ f \end{bmatrix}, \begin{bmatrix} c \\ fc \\ f \end{bmatrix}, \begin{bmatrix} c \\ cf \\ f \end{bmatrix}, \begin{bmatrix} c \\ ff \\ c \end{bmatrix}, \begin{bmatrix} c \\ cc \\ c \end{bmatrix} \right\}$$

$$f = \{\wedge, \vee, <, >, <>, \triangleleft, \triangleright\}$$

$$c = \{\rightarrow, \leftarrow, \leftrightarrow, \Uparrow, \Downarrow\}$$

Diamond Interpretation

$$\begin{bmatrix} X^{1.3} \\ X^{1.2} \\ X^{2.3} \end{bmatrix} \equiv \begin{bmatrix} T_1, \varnothing, \; T_3 \\ F_1, T_2, \varnothing \\ \varnothing, F_2, F_3 \end{bmatrix} = \begin{bmatrix} f \\ ff \\ f \end{bmatrix} = (abc)$$

$$\begin{bmatrix} X^{1.1} \\ X^{1.2} \\ X^{2.1} \end{bmatrix} \equiv \begin{bmatrix} T_1, \varnothing, \; T_1 \\ F_1, T_2, \varnothing \\ \varnothing, T_2, F_1 \end{bmatrix} = \begin{bmatrix} f \\ fc \\ f \end{bmatrix} = (abb)$$

$$\begin{bmatrix} X^{1.1} \\ X^{1.1} \\ X^{1.1} \end{bmatrix} \equiv \left\{ \begin{bmatrix} T_1, \varnothing, \; T_1 \\ F_1, F_1, \varnothing \\ \varnothing, F_1, F_1 \end{bmatrix}, \begin{bmatrix} T_1, \varnothing, \; T_1 \\ F_1, F_1, \varnothing \\ \varnothing, T_1, T_1 \end{bmatrix}, \begin{bmatrix} T_1, \varnothing, \; T_1 \\ T_1, T_1, \varnothing \\ \varnothing, F_1, F_1 \end{bmatrix}, \begin{bmatrix} T_1, \varnothing, \; T_1 \\ T_1, T_1, \varnothing \\ \varnothing, T_1, T_1 \end{bmatrix} \right\}$$

$$\equiv \left\{ \begin{bmatrix} c \\ fc \\ f \end{bmatrix} \quad \begin{bmatrix} c \\ ff \\ c \end{bmatrix} \quad \begin{bmatrix} c \\ cf \\ f \end{bmatrix} \quad \begin{bmatrix} c \\ cc \\ c \end{bmatrix} \right\}$$

$$= \{(abb), \quad (aba), \quad (aab), \quad (aaa)\}$$

2.4 Negational patterns for diamonds $D^{(3)}$

$$[\ non_i\ ]:\begin{bmatrix}(neg_4\ \ pos_4)\\(pos_1\ neg_1),\ (pos_2\ \ neg_2)\\(pos_3\ \ neg_3)\end{bmatrix}\xrightarrow{peri}\begin{bmatrix}(neg_4\ \ pos_4)\\(pos_1\ neg_1),\ (pos_2\ \ neg_2)\\(pos_3\ \ neg_3)\end{bmatrix}$$

$$[\ non_i\ ]:\begin{bmatrix}S_4\\S_1\mid S_{2.}\\S_3\end{bmatrix}\xrightarrow{permi}\begin{bmatrix}S_4\\S_1\mid S_{2.}\\S_3\end{bmatrix}$$

$$\begin{bmatrix}id_4\\ \\non_1 id_2\\ \\id_3\end{bmatrix}:\begin{bmatrix} & & neg_4 \leftarrow pos_4 & & \\ & & \mid \qquad \mid & & \\ pos_1 & \longrightarrow & neg_1 \Updownarrow pos_2 & \longrightarrow & neg_2\\ \mid & & & & \mid\\ pos_3 & & \longrightarrow & & neg_3\end{bmatrix}\xrightarrow{neg1}\begin{bmatrix}neg_4 - neg_1 & \longleftarrow & pos_1 \mid pos_3 & \longrightarrow & neg_3\\ \uparrow \qquad \Updownarrow & & & & \mid\\ pos_4 - pos_2 & & \longrightarrow & & neg_2\end{bmatrix}$$

$$\begin{bmatrix}id_4\\ \\id_1 non_2\\ \\id_3\end{bmatrix}:\begin{bmatrix} & & neg_4 \leftarrow pos_4 & & \\ & & \mid \qquad \mid & & \\ pos_1 & \longrightarrow & neg_1 \Updownarrow pos_2 & \longrightarrow & neg_2\\ \mid & & & & \mid\\ pos_3 & & \longrightarrow & & neg_3\end{bmatrix}\xrightarrow{neg2}\begin{bmatrix}pos_3 & \longrightarrow & neg_3 \mid neg_2 & \longleftarrow & pos_2 - pos_4\\ \mid & & & & \Updownarrow \qquad \downarrow\\ pos_1 & & \longrightarrow & & neg_1 - neg_4\end{bmatrix}$$

$$\begin{bmatrix}id_4\\ \\id_1 id_2\\ \\non_3\end{bmatrix}:\begin{bmatrix} & & neg_4 \leftarrow pos_4 & & \\ & & \mid \qquad \mid & & \\ pos_1 & \longrightarrow & neg_1 \Updownarrow pos_2 & \longrightarrow & neg_2\\ \mid & & & & \mid\\ pos_3 & & \longrightarrow & & neg_3\end{bmatrix}\xrightarrow{neg4}\begin{bmatrix} & & pos_4 \rightarrow neg_4 & & \\ & & \mid \qquad \mid & & \\ neg_2 & \longleftarrow & pos_2 \Updownarrow neg_1 & \longleftarrow & pos_1\\ \mid & & & & \mid\\ neg_3 & & \longleftarrow & & pos_3\end{bmatrix}$$

$$\begin{bmatrix}non_4\\ \\id_1 id_2\\ \\id_3\end{bmatrix}:\begin{bmatrix} & & neg_4 \leftarrow pos_4 & & \\ & & \mid \qquad \mid & & \\ pos_1 & \longrightarrow & neg_1 \Updownarrow pos_2 & \longrightarrow & neg_2\\ \mid & & & & \mid\\ pos_3 & & \longrightarrow & & neg_3\end{bmatrix}\xrightarrow{neg4}\begin{bmatrix} & & pos_4 \rightarrow neg_4 & & \\ & & \mid \qquad \mid & & \\ neg_2 & \longleftarrow & pos_2 \Updownarrow neg_1 & \longleftarrow & pos_1\\ \mid & & & & \mid\\ neg_3 & & \longleftarrow & & pos_3\end{bmatrix}$$

Negation Schemes for diamonds $D^{(3)}$

$$\begin{bmatrix} id_4 \\ non_1 id_2 \\ id_3 \end{bmatrix} : \begin{bmatrix} S_4 \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix} \xrightarrow{perm1} \begin{bmatrix} \overline{S_4} \\ \overline{S}_1 \mid S_{3.} \\ S_2 \end{bmatrix}$$

$$\begin{bmatrix} id_4 \\ id_1 non_2 \\ id_3 \end{bmatrix} : \begin{bmatrix} S_4 \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix} \xrightarrow{perm2} \begin{bmatrix} S_4 \\ S_3 \mid \overline{S_{2.}} \\ S_1 \end{bmatrix}$$

$$\begin{bmatrix} id_4 \\ id_1 id_2 \\ non_3 \end{bmatrix} : \begin{bmatrix} S_4 \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix} \xrightarrow{perm3} \begin{bmatrix} \overline{S_4} \\ \overline{S}_2 \mid \overline{S_{1.}} \\ \overline{S}_3 \end{bmatrix}$$

$$\begin{bmatrix} non_4 \\ id_1 id_2 \\ id_3 \end{bmatrix} : \begin{bmatrix} S_4 \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix} \xrightarrow{perm4} \begin{bmatrix} \overline{S_4} \\ \overline{S_2} \mid \overline{S}_1 \\ \overline{S_3} \end{bmatrix}$$

Simplified notation for negation

Negation - Table for non_1

$$\begin{bmatrix} id_4 \\ non_1 id_2 \\ id_3 \end{bmatrix} : \begin{bmatrix} (neg_4 \;\; pos_4) \\ (pos_1 \; neg_1), (pos_2 \;\; neg_2) \\ (pos_3 \;\; neg_3) \end{bmatrix} \xrightarrow{perm} \begin{bmatrix} (pos_4 \;\; neg_4) \\ (neg_1 \; pos_1), (pos_3 \;\; neg_3) \\ (pos_2 \;\; neg_2) \end{bmatrix}$$

$$\begin{bmatrix} id_4 \\ non_1 id_2 \\ id_3 \end{bmatrix} : \begin{bmatrix} S_4 \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix} \xrightarrow{perm1} \begin{bmatrix} \overline{S_4} \\ \overline{S}_1 \mid S_{3.} \\ S_2 \end{bmatrix}$$

Negation - Table for non_2

$$\begin{bmatrix} id_4 \\ id_1 non_2 \\ id_3 \end{bmatrix} : \begin{bmatrix} (neg_4 \;\; pos_4) \\ (pos_1 \; neg_1), (pos_2 \;\; neg_2) \\ (pos_3 \;\; neg_3) \end{bmatrix} \xrightarrow{perm2} \begin{bmatrix} (pos_4 \;\; neg_4) \\ (pos_3 \;\; neg_3)(neg_2 \; pos_2) \\ (pos_1 \;\; neg_1) \end{bmatrix}$$

$$\begin{bmatrix} id_4 \\ id_1 non_2 \\ id_3 \end{bmatrix} : \begin{bmatrix} S_4 \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix} \xrightarrow{perm2} \begin{bmatrix} S_4 \\ S_3 \mid \overline{S_{2.}} \\ S_1 \end{bmatrix}$$

Different notational representation

??????

Full chiastic scheme

$$\begin{bmatrix} pos_3 - pos_1 & \longrightarrow & neg_1 - neg_4 \\ \downarrow \quad \Updownarrow & & \Updownarrow \quad \uparrow \\ neg_3 - neg_2 & \longleftarrow & pos_2 - pos_4 \end{bmatrix} \xrightarrow{non1} \begin{bmatrix} pos_4 - neg_1 & \longleftarrow & pos_1 - pos_3 \\ \downarrow \quad \Updownarrow & & \Updownarrow \quad \downarrow \\ neg_4 - pos_2 & \longrightarrow & neg_2 - neg_3 \end{bmatrix}$$

$$\begin{bmatrix} pos_3 - pos_1 & \longrightarrow & neg_1 - neg_4 \\ \downarrow \quad \Updownarrow & & \Updownarrow \quad \uparrow \\ neg_3 - neg_2 & \longleftarrow & pos_2 - pos_4 \end{bmatrix} \xrightarrow{non2} \begin{bmatrix} pos_1 - pos_3 & \longrightarrow & neg_3 \\ \downarrow & {}^1\nwarrow\!\searrow_2 & | \\ neg_1 \Updownarrow pos_2 & \longrightarrow & neg_2 \\ | \qquad | & & \\ neg_4 \leftarrow pos_4 & & \end{bmatrix}$$

Reduced chiastic scheme

$$\begin{bmatrix} pos_3 - pos_1 & \longrightarrow & neg_1 - neg_4 \\ \downarrow & & \Updownarrow \quad \uparrow \\ neg_3 - neg_2 & \longleftarrow & pos_2 - pos_4 \end{bmatrix} \xrightarrow{non2} \begin{bmatrix} pos_1 - pos_3 & \longrightarrow & neg_3 \\ \downarrow & & | \\ neg_1 \Updownarrow pos_2 & \longrightarrow & neg_2 \\ | \qquad | & & \\ neg_4 \leftarrow pos_4 & & \end{bmatrix}$$

$$non_2 : S_{1234} \longrightarrow S_{3\bar{2}14}$$

2.5 Negation cycles for 3-diamonds

$$neg_1\left(neg_2\left(neg_1\left(D^{(3)}\right)\right)\right) = neg_2\left(neg_1\left(neg_2\left(D^{(3)}\right)\right)\right)$$

$$neg_1\left(neg_2\left(neg_1\ D^{(3)}\right)\right) =$$

$$\begin{bmatrix} S_4 \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix} \xrightarrow{perm1} \begin{bmatrix} \overline{S_4} \\ \overline{S}1 \mid S_{3.} \\ S_2 \end{bmatrix} \xrightarrow{perm2} \begin{bmatrix} \overline{S_4} \\ \overline{S}3 \mid S_1 \\ \overline{S_{2.}} \end{bmatrix} \xrightarrow{perm1} \begin{bmatrix} \overline{S_4} \\ \overline{S}2 \mid \overline{S}1 \\ \overline{S_3} \end{bmatrix}$$

$$neg_2\left(neg_1\left(neg_2\ D^{(3)}\right)\right) =$$

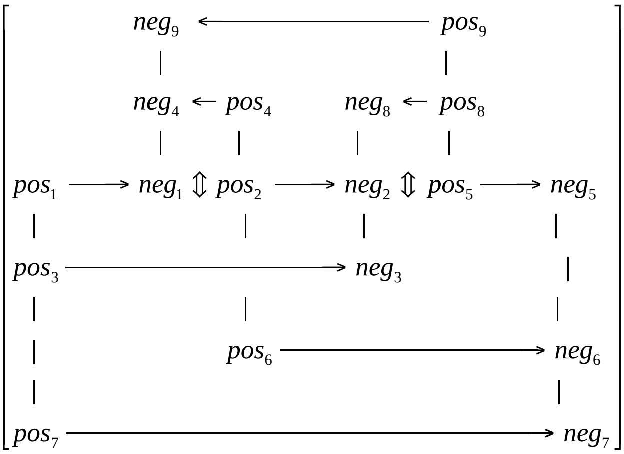
$$\begin{bmatrix} S_4 \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix} \xrightarrow{perm2} \begin{bmatrix} S_4 \\ S_3 \mid \overline{S_{2.}} \\ S_1 \end{bmatrix} \xrightarrow{perm1} \begin{bmatrix} \overline{S_4} \\ S_{2.} \mid \overline{S_3} \\ \overline{S}1 \end{bmatrix} \xrightarrow{perm2} \begin{bmatrix} \overline{S_4} \\ \overline{S}2 \mid \overline{S}1 \\ \overline{S_3} \end{bmatrix}$$

$$neg_3\left(D^{(3)}\right) = neg_1\left(neg_2\left(neg_1\left(D^{(3)}\right)\right)\right) = neg_2\left(neg_1\left(neg_2\left(D^{(3)}\right)\right)\right)$$
$$neg_3\left(D^{(3)}\right) = neg_4\left(D^{(3)}\right)$$

$$\begin{aligned} neg-cycle\left(D^{(3)}\right) &= neg_1\left(neg_2\left(neg_1\left(neg_2\left(neg_1\left(neg_2\left(D^{(3)}\right)\right)\right)\right)\right)\right) \\ &= neg_2\left(neg_1\left(neg_2\left(neg_1\left(neg_2\left(neg_1\left(D^{(3)}\right)\right)\right)\right)\right)\right) \end{aligned}$$

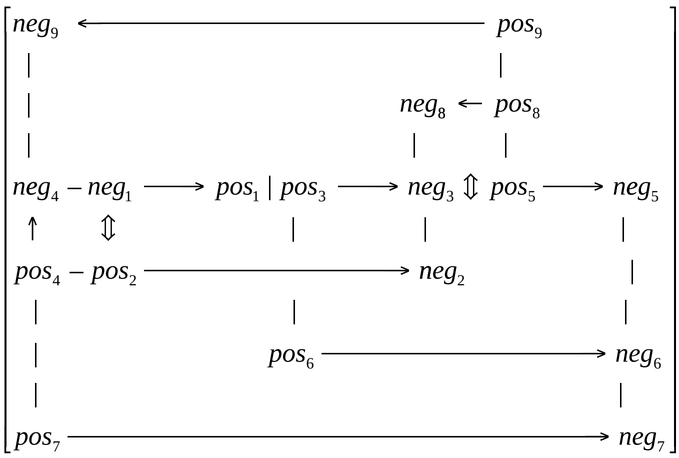
An inversion of the acceptance logic in a 3-diamond has the same effect on the system as an inversion of the rejectance logic of the 3-diamond.

2.6 Negational patterns for 4-contextural diamonds

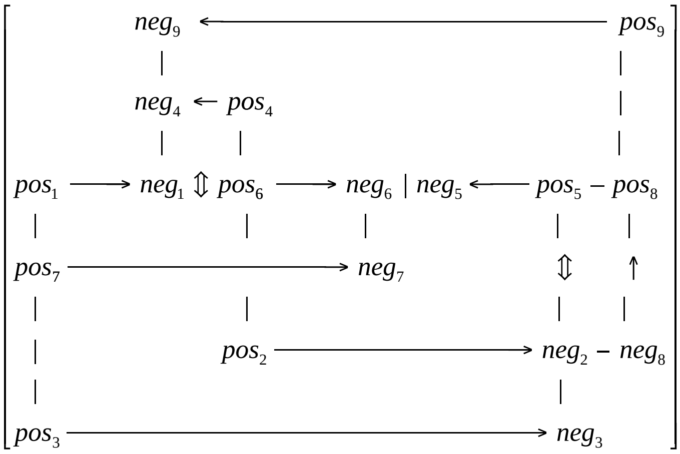


$$\begin{bmatrix} S_9 \\ S_4 S_8 \\ S_1 | S_2 | S_5 \\ S_3\, S_6 \\ S_7 \end{bmatrix}$$

$$\begin{bmatrix} id_9 \\ id_4 id_5 \\ non_1 id_2 id_5 \\ id_3 id_6 \\ id_7 \end{bmatrix} : \begin{bmatrix} S_9 \\ S_4 | S_5 \\ S_1 | S_2 | S_5 \\ S_3 | S_6 \\ S_7 \end{bmatrix} \xrightarrow{perm1} \begin{bmatrix} S_9 \\ \overline{S_4} | S_8 \\ \overline{S}_1 | S_3 | S_5 \\ S_2 | S_7 \\ S_6 \end{bmatrix}$$



$$\begin{bmatrix} id_9 \\ id_4 id_5 \\ id_1 id_2 non_5 \\ id_3 id_6 \\ id_7 \end{bmatrix} : \begin{bmatrix} S_9 \\ S_4 \mid S_8 \\ S_1 \mid S_2 \mid S_5 \\ S_3 \mid S_6 \\ S_7 \end{bmatrix} \xrightarrow{perm5} \begin{bmatrix} S_9 \\ S_4 \mid \overline{S_8} \\ S_1 \mid S_6 \mid \overline{S_5} \\ S_7 \mid S_2 \\ S_3 \end{bmatrix}$$



2.7 Junctional patterns for 3-diamonds

Simplified notation scheme for binary functions in id-mode

$$\begin{bmatrix} op_4 \\ op_1 op_2 \\ op_3 \end{bmatrix} : \left(\begin{bmatrix} (neg_4\ \ pos_4) \\ (pos_1\ neg_1),\ (pos_2\ \ neg_2) \\ (pos_3\ \ neg_3) \end{bmatrix}, \begin{bmatrix} (neg_4\ \ pos_4) \\ (pos_1\ neg_1),\ (pos_2\ \ neg_2) \\ (pos_3\ \ neg_3) \end{bmatrix} \right) \xrightarrow{id} \begin{bmatrix} (neg_4\ \ pos_4) \\ (pos_1\ neg_1),\ (pos_2\ \ neg_2) \\ (pos_3\ \ neg_3) \end{bmatrix}$$

$$\begin{bmatrix} & & neg_4 & \leftarrow & pos_4 & & \\ & & | & & | & & \\ pos_1 & \longrightarrow & neg_1 & \Updownarrow & pos_2 & \longrightarrow & neg_2 \\ | & & & & & & | \\ pos_3 & & & \longrightarrow & & & neg_3 \end{bmatrix} \begin{bmatrix} \lor \\ \\ \land\lor \\ \\ \land \end{bmatrix} \begin{bmatrix} & & neg_4 & \leftarrow & pos_4 & & \\ & & | & & | & & \\ pos_1 & \longrightarrow & neg_1 & \Updownarrow & pos_2 & \longrightarrow & neg_2 \\ | & & & & & & | \\ pos_3 & & & \longrightarrow & & & neg_3 \end{bmatrix}$$

$$\equiv \begin{bmatrix} & & neg_4 & pos_4 & & pos_4 & pos_4 & & \\ & & | & & & | & & & \\ pos_1 & neg_1 & neg_1 & neg_1 & \Updownarrow & pos_2 & pos_2 & pos_2 & neg_2 \\ | & & & & & & & & | \\ pos_3 & neg_3 & & neg_3 & & & & & neg_3 \end{bmatrix} \qquad \equiv sem\left(X^{(3)} \begin{pmatrix} \lor \\ \land\lor \\ \land \end{pmatrix} Y^{(3)} \right)$$

$$\begin{bmatrix} & & neg_4 & \leftarrow & pos_4 & & \\ & & | & & | & & \\ pos_1 & \longrightarrow & neg_1 & \Updownarrow & pos_2 & \longrightarrow & neg_2 \\ | & & & & & & | \\ pos_3 & & & \longrightarrow & & & neg_3 \end{bmatrix} \begin{bmatrix} \rightarrow \\ \\ \land\lor \\ \\ \leftarrow \end{bmatrix} \begin{bmatrix} & & neg_4 & \leftarrow & pos_4 & & \\ & & | & & | & & \\ pos_1 & \longrightarrow & neg_1 & \Updownarrow & pos_2 & \longrightarrow & neg_2 \\ | & & & & & & | \\ pos_3 & & & \longrightarrow & & & neg_3 \end{bmatrix}$$

$$\equiv \begin{bmatrix} & & neg_4 & pos_4 & & neg_4 & neg_4 & & \\ & & | & & & | & & & \\ pos_1 & neg_1 & neg_1 & neg_1 & \Updownarrow & neg_1 & pos_1 & pos_1 & pos_1 \\ | & & & & & & & & | \\ pos_3 & pos_3 & & neg_3 & & & & & pos_3 \end{bmatrix} (id,\ red,\ id,\ id)$$

2.7.1 DeMorgan formulas for $D^{(3)}$

$$N_1\left(N_1X^{(3)}\begin{pmatrix}\wedge\\ \wedge\;\wedge\\ \wedge\end{pmatrix}N_1Y^{(3)}\right)\equiv X^{(3)}\begin{pmatrix}\wedge\\ \vee\;\wedge\\ \wedge\end{pmatrix}Y^{(3)} \qquad N_5\left(N_5X^{(3)}\begin{pmatrix}\wedge\\ \wedge\;\wedge\\ \wedge\end{pmatrix}N_5Y^{(3)}\right)\equiv X^{(3)}\begin{pmatrix}\vee\\ \vee\;\vee\\ \vee\end{pmatrix}Y^{(3)}$$

$$N_2\left(N_2X^{(3)}\begin{pmatrix}\wedge\\ \wedge\;\wedge\\ \wedge\end{pmatrix}N_2Y^{(3)}\right)\equiv X^{(3)}\begin{pmatrix}\wedge\\ \wedge\;\vee\\ \wedge\end{pmatrix}Y^{(3)} \qquad N_4\left(N_4X^{(3)}\begin{pmatrix}\wedge\\ \wedge\;\wedge\\ \wedge\end{pmatrix}N_4Y^{(3)}\right)\equiv X^{(3)}\begin{pmatrix}\vee\\ \wedge\;\wedge\\ \wedge\end{pmatrix}Y^{(3)}$$

2.8 Reductional patterns for 3-diamonds

$$\equiv \left[\begin{array}{ccccccccc} & & neg_1 & pos_1 & neg_1 & neg_1 & & & \\ & & | & & | & & & & \\ pos_1 & neg_1 & neg_1 & neg_1 & \Updownarrow & neg_1 & pos_1 & pos_1 & pos_1 \\ | & & & & & & & & | \\ pos_3 & pos_3 & neg_3 & & & & & & pos_3 \end{array} \right]$$

(id, red, id, red)

$$\equiv \left[\begin{array}{ccccccccc} & & neg_4 & pos_4 & neg_4 & neg_4 & & & \\ & & | & & | & & & & \\ pos_1 & neg_1 & neg_1 & neg_1 & \Updownarrow & neg_1 & pos_1 & pos_1 & pos_1 \\ | & & & & & & & & | \\ pos_1 & pos_1 & neg_1 & & & & & & pos_1 \end{array} \right]$$

(id, red, red, id)

$$\equiv \left[\begin{array}{ccccccccc} & & neg_1 & pos_1 & neg_1 & neg_1 & & & \\ & & | & & | & & & & \\ pos_1 & neg_1 & neg_1 & neg_1 & \Updownarrow & neg_1 & pos_1 & pos_1 & pos_1 \\ | & & & & & & & & | \\ pos_1 & pos_1 & neg_1 & & & & & & pos_1 \end{array} \right]$$

(id, red, red, red)

3 Tableaux Rules For Diamond Logics

Tableaux rules for diamond logics are direct extensions of tableaux rules for polycontextural logics.

$$\pi\left(X^{(3)}\begin{pmatrix}\wedge\\ \vee <>\\ \vee\end{pmatrix}Y^{(3)}\right)=\pi(X\ \vee <> \vee\wedge Y)$$

$$\frac{t_1\ X\ \vee <> \vee\wedge Y}{t_1\ X \;\Big|\; t_1\ Y \;\Big\|\; \begin{array}{c}f_2\ X\\ t_2\ Y\end{array} \Big| \begin{array}{c}t_2\ X\\ f_2\ Y\end{array}} \qquad \frac{f_1\ X\ \vee <> \vee\wedge Y}{\begin{array}{c}f_1\ X\\ f_1\ Y\end{array} \Big\| \begin{array}{c}f_4\ X\\ f_4\ Y\end{array} \Big\| \begin{array}{c}t_2\ X\\ t_2\ Y\end{array}}$$

$$\frac{t_2\ X\ \vee <> \vee\wedge Y}{\begin{array}{c}t_2\ X\\ t_2\ X\end{array} \Big| \begin{array}{c}t_4\ X\\ t_4\ X\end{array}} \qquad \frac{f_2\ X\ \vee <> \vee\wedge Y}{\begin{array}{c}f_2\ X\\ f_2\ Y\end{array}}$$

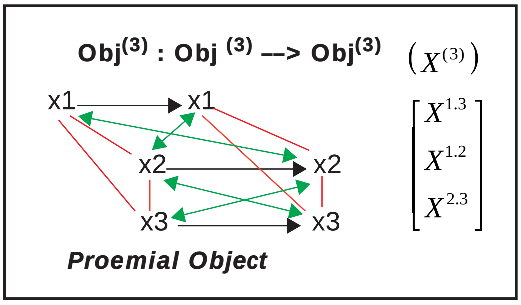
$$\frac{t_3\ X\ \vee <> \vee\wedge Y}{t_3\ X \;\Big|\; t_3\ Y \;\Big\|\; \begin{array}{c}f_2\ X\\ t_2\ Y\end{array} \Big| \begin{array}{c}t_2\ X\\ f_2\ Y\end{array}} \qquad \frac{f_3\ X\ \vee <> \vee\wedge Y}{\begin{array}{c}f_3\ X\\ f_3\ Y\end{array} \Big\| \begin{array}{c}f_2\ X\\ f_2\ Y\end{array}}$$

$$\frac{t_4\ X\ \vee <> \vee\wedge Y}{\begin{array}{c}t_2\ X\\ t_2\ Y\end{array} \Big\| \begin{array}{c}t_4\ X\\ t_4\ Y\end{array}} \qquad \frac{f_4\ X\ \vee <> \vee\wedge Y}{\begin{array}{c}f_1\ X\\ f_1\ Y\end{array} \Big\| \; f_4\ X \;\Big|\; f_4\ Y}$$

4 Matrix and Bracket representation of Diamonds

4.1 Difference between proemial and diamond objects

The logical modeling of the diamond structure is new and shouldn't be confused with the proemial modeling as developed in papers like *PolyLogics*, *ConTeXtures*, etc.



$$\left(X^{(3)} \right) \quad \begin{bmatrix} X^{1.3} \\ X^{1.2} \\ X^{2.3} \end{bmatrix}$$

The proemial modeling is not concerned with the diamond structure of the proemial relation ship. The proemiality has a 4-fold structure with its basic relations of *order*, *exchange* and *coincidence*. The third system was considered as mediating the first and the second system. With the new interpretation of this mediation as *acceptance* the question of its opposite arises: the introduction of the *rejection* system of proemiality.

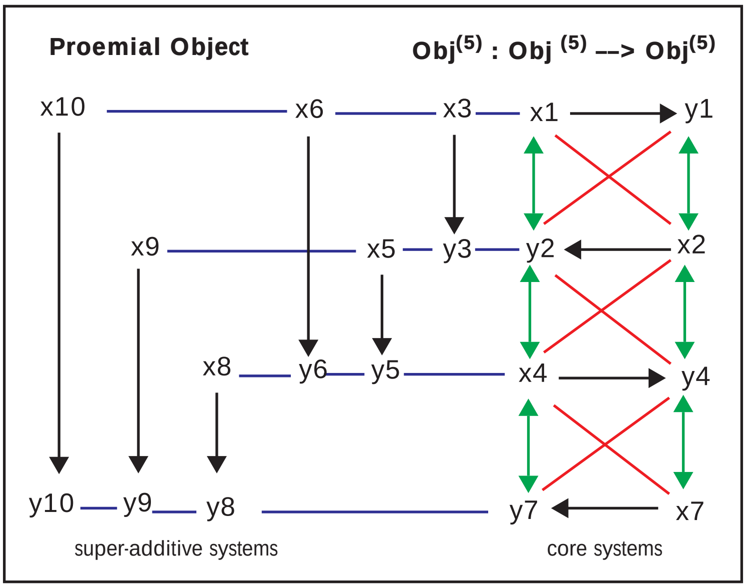
PM	O_1	O_2	PM	O_1	O_2
M_1	$log_{1.1}$	$log_{2.1}$	M_1	$Prop_{1.1}$	$Acc_{2.1}$
M_2	–	$log_{2.2}$	M_2	–	$Opp_{2.2}$

The logical system S3, as a mediating system between system S1 and S2, can be interpreted as the acceptance system of system S1 and S2. Thus, realizing the triangle part of the diamond.

Acceptance and Rejection can be considered as a kind of reflections on the difference between the categories of Proposition and Opposition.

PM	$O1$	$O2$	$O3$	PM	$O1$	$O2$	$O3$
$M1$	$log1$	$\varnothing$	$\varnothing$	$M1$	and	$\varnothing$	$\varnothing$
$M2$	$\varnothing$	$log2$	$\varnothing$	$M2$	$\varnothing$	and	$\varnothing$
$M3$	$\varnothing$	$\varnothing$	$log3$	$M3$	$\varnothing$	$\varnothing$	and

In **PolyLogics**, the representation of the 3 logical subsystems of a 3-contextural logic was along the main diagonal. The diamond representation above is different.



4.2 Diamonds in reflectional/interactional matrix and bracket systems

After having introduced and motivated the idea of the diamond and its additional sub-system representing rejection we can re-connect to the well known notational convention introduced in earlier papers. Thus, we are back to the common notation of reflectionality and interactionality of logical sub-systems represented by the matrix and the bracket method. The diamond system gets its own place in the notation. Thus, S_4 is the diamond sub-system, introduced above as the placeholder for rejection in the 3-contextural complexion.

DM	O_1	O_2	O_3	O_4
M_1	S_1	$S_{2.1}$	–	–
M_2	S_1	$S_{2.0}$	S_3	–
M_3	S_1	$S_{2..3}$	S_3	S_4
M_4	S_4	–	–	S_4

The diamond sub-system S4 at its position and additionally as a reflectional and an interactional sub-system at (O1M4) and (O4M3) emphasized in red.

$$\left[\begin{array}{l}\left[\begin{array}{l}O1\\ \left(\begin{array}{r}M1M2M3M4\\ (G1114)\end{array}\right)\end{array}\right.\\ \left[\begin{array}{l}O2\\ \left(M1\left(\begin{array}{l}(G1000)\\ \left(M2\left(\begin{array}{l}M3\\ (G0030)\end{array}\right)\right.\\ \qquad (G2220)\end{array}\right)\right)\end{array}\right.\\ \left[\begin{array}{l}O3\\ \left(\begin{array}{r}M1M2M3M4\\ (G0330)\end{array}\right)\end{array}\right.\\ \left[\begin{array}{l}O4\\ \left(\begin{array}{r}M1M2M3M4\\ (G0044)\end{array}\right)\end{array}\right.\end{array}\right.$$

To not to overload the picture I omit the right part of the main brackets.

4.3 Further formal interpretations

Diamond systems had been introduced as a combination of basic, acceptional and rejectional logical systems.

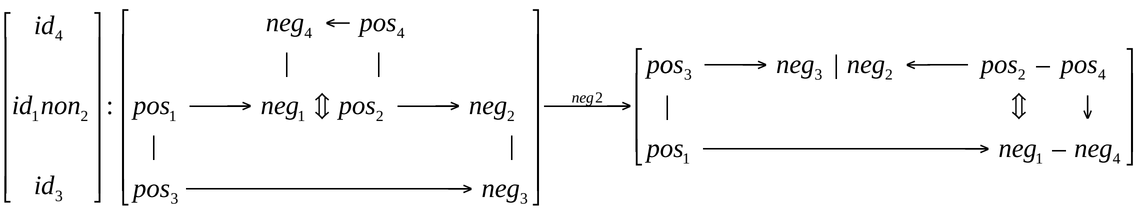
Permutations in polylogical systems without rejectional sub-systems are displacing basic and acceptional (mediated) systems. Obviously, with the introduction of a new category of logical systems a more complex interchange inside the architectonics of polylogical systems is emerging.

An exchange between the basic logic S_2 and the mediating logic S_3 happens with the permutation of negation non_1.

$$\begin{bmatrix} id_4 \\ non_1 id_2 \\ id_3 \end{bmatrix} : \begin{bmatrix} S_4 \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix} \xrightarrow{perm1} \begin{bmatrix} \overline{S_4} \\ \overline{S}_1 \mid S_{3.} \\ S_2 \end{bmatrix}$$

How could a similar permutation happen between basic logics and rejectional logics? Or even between acceptance and rejectional logics?

What exactly is the meaning of the permutation produced by non_2 in 3-diamonds?



$$\begin{bmatrix} id_9 \\ id_4 id_5 \\ id_1 id_2 non_5 \\ id_3 id_6 \\ id_7 \end{bmatrix} : \begin{bmatrix} S_9 \\ S_4 \mid S_8 \\ S_1 \mid S_2 \mid S_5 \\ S_3 \mid S_6 \\ S_7 \end{bmatrix} \xrightarrow{perm5} \begin{bmatrix} S_9 \\ S_4 \mid \overline{S_8} \\ S_1 \mid S_6 \mid \overline{S_5} \\ S_7 \mid S_2 \\ S_3 \end{bmatrix}$$

5 Diamonds of contextures

On the other hand, as I have introduced above, the diamond is organizing the distribution of different contextures with their internal logics and trees over knots. Thus, the 9 components of the full diamond are incorporating at all their places a full logical system. It depends on the complexity of the logical modeling of the situation how many logical systems are involved and how much independence between the logical systems is installed.

To diamondize is a method to create contextures. A given contexture always has at least 3 environmental contextures due to its involvement and positioning into the diamond structure. On bases grater than 4, i.e., for m-diamonds, the number of environmental contextures is growing too.

In classic logic, *deduction* is creating intra-contexturally new propositions out of existing propositions, axioms, with the help of the deduction rules. In this sense, deduction has two and only two environments, the premises and the conclusions, full filling the linearity of classical logical structures.

The DeMorgan rules, duality or more general, Smullyan's conjugation rules for logical frameworks are good examples for dualization as a first step of diamondization.

Hence, a dissemination of logical frameworks according to their conjugation rules plus the mechanisms of acceptance and rejection would do the game. With such a diamondization of logical frameworks demands of asking for classical concept analysis (Wille, Ganther) instead of diamondizations are getting obviously obsolete.

Gunther's *negation cycles* and Diamonds

Gunther's *negation cycles* are well known generalizations of the classic dualization operation. But they are still not considering the diamond structure of distributed contextures. Negation cycles are touring around the complexity of compound contextures. Hence, the concept of negativity (Hegel, Gunther) is still conceived as a complex linear order of some homogeneity, expressed by transitivity.

In contrast, the interplay of iteration and accretion in kenogrammatics can be seen as a kind of diamondization.

> "For that reason in our fundamentals of negative language it is not a matter of static facts - I and You are not static facts - *but of exchange, ordering, and circular movements*. All names for operations and processes which do not deny themselves to an engineer's interpretation and which insist on a technical implementation of the calculus."
>
> "Each individual circle represents a 'word' in a technical dictionary of negative language that does not describe existing - already created - Being in a positive language; rather, each of the 3744 cycles represents *a specific instruction, how something can be performed, how something can be constructed."* Gunther, p. 50
> http://www.vordenker.de/ggphilosophy/gg_identity-neg-language_biling.pdf

6 Diamonds and Bilattices

http://hdl.handle.net/1842/434

Definition 3.4 T(I,I)

The bilattice T(I,I) consists of pairs (x,y) where $x, y \in I = [0,1]$ *and*
$(x,y) \leq_k (x',y') :\Leftrightarrow x \leq x' \wedge y \leq y'$,
$(x,y) \leq_t (x',y') :\Leftrightarrow x \leq x' \wedge y' \leq y$,
$\neg(x,y) = (y,x)$.

The elements of T(I,I) are pairs (X,Y) that can be taken as two-dimensional truth values: X refers to what is evidential for a fact, Y to what is against.

Now, returning to the example, a model has to evaluate readable(α) to *-0.5 or a k-greater value so we can conclude from the result that there are divergent opinions about the readability of the paper.

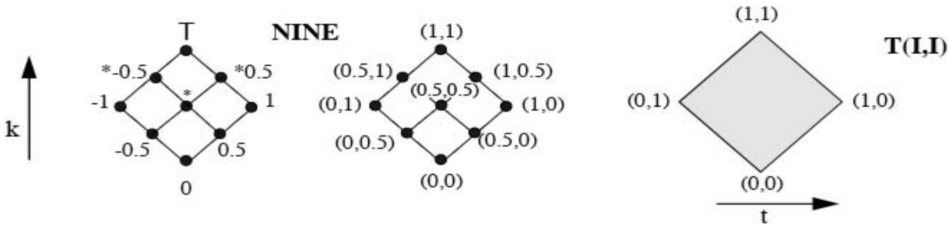


figure 3. T(I,I) and finite subsets

http://www.ubka.uni-karlsruhe.de/cgi-bin/psgunzip/1995/wiwi/10/10.pdf

Knowledge Representation in Many-Valued Horn Clauses
Barbara Messing
Institut für Angewandte Informatik und Formale Beschreibungsverfahren
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7 Logic of Diamonds vs. Logification of Diamonds

After having sketched a kind of a logification of diamonds, an inverse strategy, the logic of diamond can be risked.

Like explored in the chapter *"Diamonds of Computation"*, diamonds are dealing with complementary objects, called bi-objects. Hence, a logic of diamonds has to deal with such bi-objects. This, obviously, is different from a logification of diamonds, where morphisms are treated as logics.

While the logification of diamonds is realized in a framework of polycontexturality, the diamond of logics remains in some kind of a mono-contextural setting.

The logic of diamonds is the contextural logic of complementarity.

Steps Towards a Diamond Category Theory

Steps Towards a Diamond Category Theory

Steps Towards a Diamond Category Theory

To accept the difference isn't easy; to enjoy it, a challenge.

1 Options of graphematic thematizations

1.1 Mono-contextural thematizations

Established as conflicts between dyads and monads.

1.2 Polycontextural thematizations

Introduced as a general theory of mediation.

1.2.1 Proemial thematizations

Realized as mediated triads of proposition / opposition and acceptance.

1.3 Diamond thematizations

Proposed as practicing the diamond, i.e., to diamondize.

An *example* of diamondizing object-oriented conceptualizations.

– Dyadic / monadic approach: MyClass = YourClass = Class

– Triadic Approach: Differences introduced as: [MyClass, YourClass, OurClass]

– Tetradic or Diamond approach: Transition from triadic to a tetradic appraoch with [MyClass, YourClass, OurClass, OthersClass]

1.3.1 Diamond class structure

$$\overbrace{\text{OthersClass}}$$

$$\underbrace{\overbrace{\text{MyClass – YourClass}}}$$

$$\underbrace{\text{OurClass}}$$

The harmonic My-Your-Our-Class conceptualization has to be augmented by a class which is incorporating the place for the other, the unknown, the difference to the harmonic system. That is, the NotOurClass is thematized positively as such as the class for others, called the *OthersClass*. Hence, the OthersClass can serve as the place where intruders, attacks, disturbance, etc. can be observed and defended. But also, it is the place where the new, inspiration, surprise and challenge can be localized and welcomed.

Again, this is a logical or conceptual place, depending in its structure entirely from the constellation in which it is placed as a whole. The OthersClass is representing the otherness to its own system. It is the otherness in respect of the structure of the system to which it is different. This difference is not abstract but related to the constellation in which it occurs. It has, thus, nothing to do with information processing, sending unfriendly or too friendly messages. Before any de-coding of a message can happen the logical correctness of the message in respect to the addressed system has to be realized.

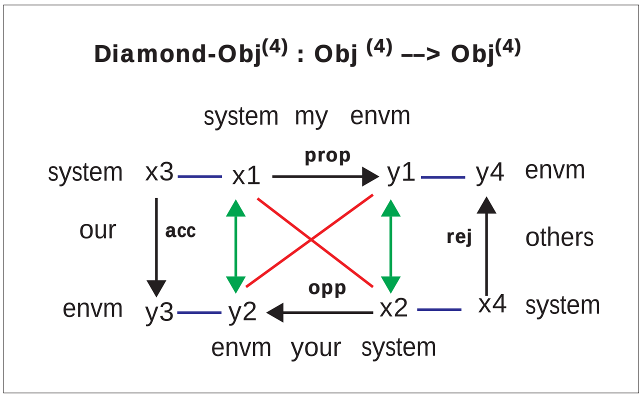
In more metaphoric terms, it is the place where security actions are placed. While the OurClass place is responsible for the togetherness of the MyClass / YourClass interactions, i.e., mediation, the OthersClass is responsible for its segregation. Both, OurClass and OthersClass are second-order conceptualizations, hence, observing the complex core system "MyClass–YourClass". Internally, OurClass is focussed on what MyClass and YourClass have in common, OthersClass is focusing on the difference of both and its correct realization. In contrast to mediation it could be called *segregation*.

In other words, each polycontextural system has not only its internal complexity but also an instance which is representing its external environment according to its own complexity. In this sense, the system *has* its own environment and is not simply inside or embedded into an environment.

1.3.2 Diamond of system / environment structure

Some wordings to the diamond system / environment relationship.

What's my environment is your system,
What's your environment is my system,
What's both at once, my-systen and your-system, is our-system,
What's both at once, my-environment and your-environment, is our-environment,
What are our environments and our systems is the environment of our-system.
What's our-system is the environment of others-system.
What's neither my-system nor your-system is others-system.
What's neither my-environment nor your-environment is others-environment.



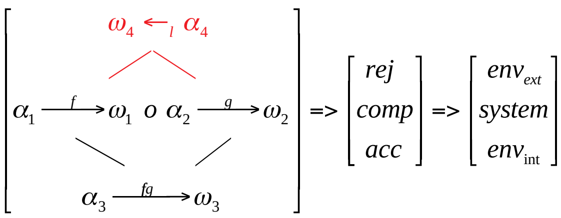
The diamond modeling of the otherness of the others is incorporating the otherness into its own system. An external modeling of the others would have to put them into a different additional contexture. With that, the otherness would be secondary to the system / environment complexion under consideration. The diamond modeling is accepting the otherness of others as a "first class object", and as belonging genuinely to the complexion as such.

Again, it seems, that the diamond modeling is a more radical departure from the usual modal logic and second-order cybernetic conceptualizations of interaction and reflection. The diamond is reflecting onto the same (our) and the different (others) of the reflectional system.

Internal vs. external environment

In another setting, without the "antropomorphic" metaphors, we are distinguishing between the system, its internal and its external environment. The external environment corresponds the rejectional part, the internal to the acceptional part of the diamond. Applied to the diamond scheme of diamondized morphisms we are getting directly the *diamond system scheme* out of the diamond-object model.

Diamond System Scheme



Thus, a diamond system is defined from its very beginning as being constituted by an internal and an external environment.

reflectional / interactional

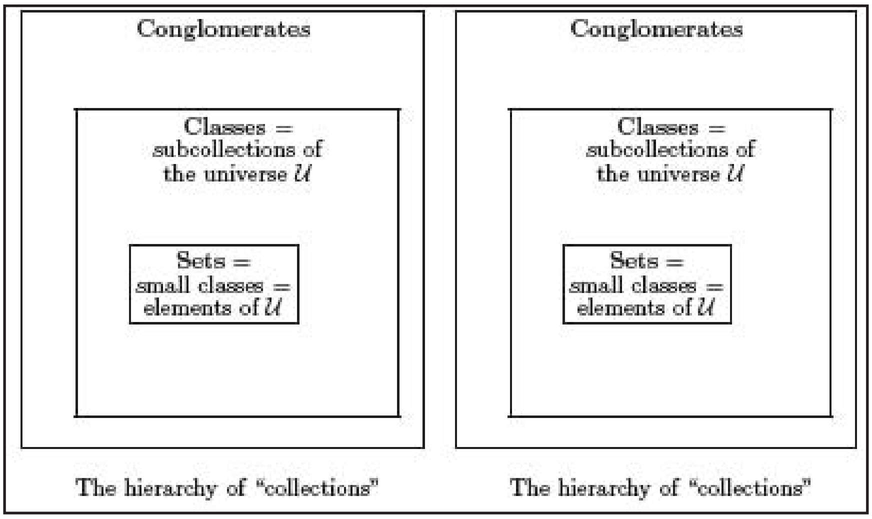
Further interpretations could involve the reflectional / interactional terminology of logics. The acceptional part fits together with the *interactional* and the rejectional part with the *reflectional* function of a system. Obviously, a composition is an interaction between the composed morphisms. The interactionality of the composition is represented by the acceptional system, the rejectionality of the composition is representing its reflectionality.

2 Categories and conglomerations

It is said that category theory is a departure from set theory, other are more radical and insists that category theory has nothing to do with set theory.

From a foundational point of view, Herrlich makes it clear that a proper mathematical formalization of categories needs different sorts of *collections* of different generality. He distinguishes sets, classes and conglomerates as the collections appropriate to deal with categories.

A di-verse of collections



Collections of the universe U = [sets, classes, conglomerates].

The objects of category theory belong to these collections. Obviously, categorical objects are not simply sets but, e.g., categories of categories, hence surpassing all reasonable, i.e., contradiction-free notions of set theory. Hence, *"One universe as a foundation of category theory"*, Mac Lane, 1969)

Diamond theory is in now way less general than category theory, but the objects of diamonds are not only collections of different degrees of abstractions, but are bi-objects from their very beginning. Bi-objects are complementary objects constructed as an interplay between acceptional and rejectional aspects of the diamond theory.

Hence the objects of diamonds are not simply belonging to the universe U of conglomerates with its classes and sets, but to the 2-verse (di-verse) as a complementarity of the universe of acceptional and the "universe" of rejectional objects.

Category theory happens in an universe, polycontexturality in a pluri-verse and diamond theory in a di-verse 2-U of complementarity.

Thus, 2-U = [collections || $\overline{\text{collections}}$].

Hence, 2-U = [(set || $\overline{\text{set}}$), (class || $\overline{\text{class}}$), (conglomerate || $\overline{\text{conglomerate}}$)].

A di-verse conception of collections opens up the possibility of *metamorphic* chiasms between their constituents [set, class, conglomerate]. This happens in a similar way like in polycontexturally disseminated categories. That is, a set in one contexture can be seen as a class in another contexture, etc. This happens on the base of the as-abstractions. In category theory as set is a set, a class is a class and a conglomerate is a conglomerate; and nothing else happens. The hierarchy is strict and well defined. The notions, set, class, conglomerate, are defined by is-abstractions.

This is different for polycontextural systems but also in diamond theory. For both, collections are still well defined and placed in their hierarchy. But because of the multitude of universes, interactions are possible between different kinds of collections. These interactions are strictly defined, too. They are ruled by the mechanism of chiastic metamorphosis.

Obviously, to describe the rules of sets, classes and conglomerates in di-verses we need some knowledge from diamond theory, which is based then just on such rules. That is, the whole idea of a di-verse is based on conceptions of diamond theory.

In diamond theory, conglomerates are not covering the situations of bi-objects. Bi-objects are polycontextural, thus they are members of disseminated conglomerates.

Contexture(Conglomerate(Class(Set)))

On the base of other conceptualizations of the diamond way of thematization, a transition from 2-verses to n-verses is not excluded. This should not be confused with the generally pluri-verses of polycontextural systems.

2.1 Laws for sets

2.2 Laws for classes

2.3 Laws for conglomerates

2.4 Laws for universes

Universes are founded in uniqueness.

2.5 Laws for chiasms between universes

Metamorphic interchanges between universes, conglomerates, classes and sets.

3 Object-based Category Theory

Herrlich's definition of Category

3.1 DEFINITION

A **category** is a quadruple $\mathbf{A} = (\mathcal{O}, \hom, id, \circ)$ consisting of

(1) a class $\mathcal{O}$, whose members are called **A-objects**,

(2) for each pair (A, B) of **A**-objects, a set $\hom(A, B)$, whose members are called **A-morphisms from** A **to** B — [the statement "$f \in \hom(A, B)$" is expressed more graphically[6] by using arrows; e.g., by statements such as "$f : A \to B$ is a morphism" or "$A \xrightarrow{f} B$ is a morphism"],

(3) for each **A**-object A, a morphism $A \xrightarrow{id_A} A$, called the **A-identity** on A,

(4) a **composition law** associating with each **A**-morphism $A \xrightarrow{f} B$ and each **A**-morphism $B \xrightarrow{g} C$ an **A**-morphism $A \xrightarrow{g \circ f} C$, called the **composite** of f and g,

subject to the following conditions:

(a) composition is associative; i.e., for morphisms $A \xrightarrow{f} B$, $B \xrightarrow{g} C$, and $C \xrightarrow{h} D$, the equation $h \circ (g \circ f) = (h \circ g) \circ f$ holds,

(b) **A**-identities act as identities with respect to composition; i.e., for **A**-morphisms $A \xrightarrow{f} B$, we have $id_B \circ f = f$ and $f \circ id_A = f$,

(c) the sets $\hom(A, B)$ are pairwise disjoint.

Comments

"If **A** = (O, *hom*, *id*, o) is a category, then

(1) The class O of **A**-objects is usually denoted by *Ob*(**A**).

(2) The class of all **A**-morphisms (denoted by *Mor*(**A**)) is defined to be the union of all the sets hom(A, B) in **A**.

(3) If f: A —> B is an **A**-morphism, we call A the **domain** of f [and denote it by *dom*(f)] and call B the **codomain** of f [and denote it by *cod*(f)].

Observe that condition (c) guarantees that each **A**-morphism has a *unique* domain and a *unique* codomain.

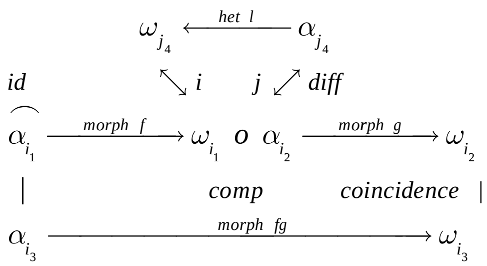
However, this condition is given for technical convenience only, because whenever all other conditions are satisfied, it is easy to "force" condition (c) by simply replacing each morphism f in hom(A, B) by a triple (A, f, B). For this reason, when verifying that an entity is a category, we will disregard condition (c).

(4) The composition, o , is a partial binary operation on the class Mor(**A**). For a pair (f, g) of morphisms, f o g is defined if and only if the domain of f and the codomain of g coincide." (Herrlich)

Descriptive definition of a diamond

$$
\begin{aligned}
&If\ \ exch\left(\omega_1,\ \alpha_2\right),\ and\\
&\begin{pmatrix} coinc\left(\alpha_1,\ \alpha_3\right), \\ coinc\left(\omega_2,\ \omega_3\right) \end{pmatrix},\\
&then\\
&morph\left(\alpha_1,\ \omega_1\right)\ o\ \ morph\left(\alpha_2,\ \omega_2\right) = morph\left(\alpha_3,\ \omega_3\right),\\
&and\ \ if\\
&\begin{pmatrix} diff\left(\alpha_2\right) = \alpha_4, \\ diff\left(\omega_1\right) = \omega_4 \end{pmatrix},\\
&then\\
&compl\left(morph\left(\alpha_3,\ \omega_3\right)\right) = het\left(\alpha_4,\ \omega_4\right)
\end{aligned}
$$

$$
\begin{aligned}
&Diamond\left(morph\right) = \chi\left\langle accept,\ reject\right\rangle\\
&accept\ \left(morph_1,\ morph_2\right) = morph_3\\
&reject\ \left(morph_1,\ morph_2\right) = morph_4
\end{aligned}
$$



Terms

morph / het
coinc / diff
id / div
o / ||
dual / compl
accept / reject

Morphisms with 2-objects

Morphisms as 2-objects consists of 2 pairs of distinctions:
1. domain (dom) and codomain (cod),
2. alpha and omega.
Thus, (g o f): cod(f) = dom(g) .simul. omega(f) exch alpha(g).
With diff(alpha(g))=dom(l) and diff(omega(f))= cod(l).

$$(g \ \Diamond \ f) = \chi \langle g \ o \ f; l \rangle$$

iff

$$(g \ o \ f) \in MC = \begin{pmatrix} cod(f) \triangleq dom(g) \\ \omega(f) \Updownarrow \alpha(g) \end{pmatrix}$$

$$diff(\alpha(g)) = dom(l)$$
$$diff(\omega(f)) = cod(l)$$

Composition

(α, ω) – **Diamond Composite**

$$\forall f, g : \begin{bmatrix} f : A \to B, g : B \to C \\ f : \alpha_1 \to \omega_1, g : \alpha_2 \to \omega_2 \end{bmatrix}$$

1. acceptional composite:

$$\forall f, g : f : A \to B, g : B \to C$$
$$cod(f) \equiv dom(g) \Rightarrow g \ o \ f : A \to C$$
$$dom(g \ o \ f) = dom(f)$$
$$cod(g \ o \ f) = cod(g).$$

2. rejectional composite:

$$\forall f, g : f : \alpha_1 \to \omega_1, g : \alpha_2 \to \omega_2$$
$$cod(f) \Updownarrow dom(g) \Rightarrow g \ o \ f : \alpha_3 \to \omega_3$$
$$\begin{aligned} compl(g \ o \ f) &= compl\ (compl(g) \ o \ compl(f)) \\ &= compl(diff(cod(f)) \Updownarrow diff(dom(g))) \\ &= compl((\overline{\omega_1}) \Updownarrow (\overline{\alpha_2})) = \alpha_4 \leftarrow \omega_4 \end{aligned}$$

3. diamond composite:

$$Hence, \ \forall f, g : g \ \Diamond \ f : [A \to C; \alpha_4 \leftarrow \omega_4]$$
$$\forall f, g : g \ \Diamond \ f : [g \ o \ f; \overline{g \ o \ f}]$$

Object-related composition

Diamond Composite

$\forall f, g : f : A \rightarrow B, g : B \rightarrow C$

acceptional composite:

$cod(f) = dom(g) \Rightarrow g \ o \ f : A \rightarrow C$

$dom(g \ o \ f) = dom(f)$

$cod(g \ o \ f) = cod(g).$

rejectional composite:

$$\left.\begin{array}{l} diff(cod(f)) = \overline{A}, \\ diff(dom(g)) = \overline{C} \end{array}\right\rangle$$

$rej(g \ o \ f) = u : \overline{A} \leftarrow \overline{C}.$

diamond composite:

$Hence, \ \forall f, g : g \ \Diamond \ f : \left[A \rightarrow C; \overline{A} \leftarrow \overline{C}\right]$

$$\forall f, g : g \ \Diamond \ f : \left[g \ o \ f; \overline{g \ o \ f}\right]$$

het / morph – **Diamond Composition**

1. het - composition

$\forall u, v : u : \omega_1 \leftarrow \alpha_1, v : \omega_2 \leftarrow \alpha_2$

$\forall u, v : (u \parallel v) \in Comp :$

$cod(u) \cup dom(v) = \varnothing \Rightarrow u \parallel v : \omega_3 \leftarrow \alpha_3$

$dom(u \parallel v) = dom(u)$

$cod(u \parallel v) = cod(v).$

2. morph - composition

$\forall f, g, h : (h \ o \ g \ o \ f) \in Comp :$

$\forall f, g, h : f : A \rightarrow B, g : B \rightarrow C, h : C \rightarrow D$

$$\left.\begin{array}{l} cod(f) \equiv dom(g) \\ cod(g) = dom(h) \end{array}\right] \Rightarrow h \ o \ g \ o \ f : A \rightarrow D.$$

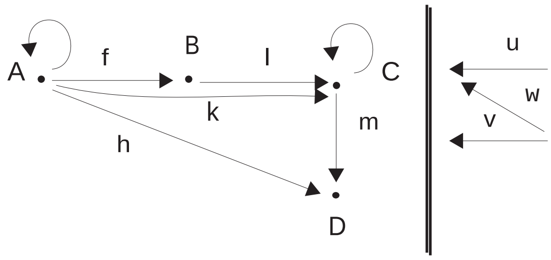
3. het / morph - interaction

$(u \parallel v) \in Comp$

iff

$(h \ o \ g \ o \ f) \in Comp.$

3.1 Diamond Associativity




```
f o l = k, k o m = h
f o (l o m) = h = (f o l) o m)

rej(f o l) = rej(k) = u
rej(k o m) = rej(h) = v

rej(h) = rej(f o (l o m))
rej(h) = rej(f o rej(l o m))
rej(h) = u || rej(l o m))
rej(h) = u || v
f ∂ (l ∂ m) = [(f o(l o m);(u||v)]

rej(h) = rej((f o l) o m))
rej(h) = rej(rej(f o l) o m))
rej(h) = (rej(f o l) || v))
rej(h) = (u || v)
(f ∂ l) ∂ m) = [((f o l) o m);(u||v)]
```

Hence, (f ∂ l) ∂ m) = f ∂ (l ∂ m)

```
(u||v) = w, acc(w) = h, acc(u||v) = h = f o l o m
acc(u||v) = acc(u)||acc(v)
acc(u) = f o l, acc(v) = k o m
acc(acc(u)||acc(v)) = acc((f o l)||(k o m)) = (f o l) o (k o m)
acc(u||v) = (f o l) o ((f o l) o m)) = ((f o l) o (f o l )) o m)
```

acc(u||v) = (f o l) o m

Different aspects of the same

Diagram	Chiasm	Diamond

$$\begin{bmatrix} & \omega_4 \leftarrow_l \alpha_4 & \\ \alpha_1 \xrightarrow{f} \omega_1 & \Updownarrow & \alpha_2 \xrightarrow{g} \omega_2 \\ \alpha_3 & \xrightarrow{fg} & \omega_3 \end{bmatrix} \equiv \begin{bmatrix} \alpha_3 - \alpha_1 \xrightarrow{f} \omega_1 - \omega_4 \\ \downarrow \quad \Updownarrow \quad \times \quad \Updownarrow \quad \uparrow \\ \omega_3 - \omega_2 \xleftarrow{g} \alpha_2 - \alpha_4 \end{bmatrix} \equiv \begin{bmatrix} \omega_4 \leftarrow_l \alpha_4 \\ \diagup \quad \diagdown \\ \alpha_1 \xrightarrow{f} \omega_1 \; o \; \alpha_2 \xrightarrow{g} \omega_2 \\ \diagdown \quad \diagup \\ \alpha_3 \xrightarrow{fg} \omega_3 \end{bmatrix}$$

diamond composition of morphisms

$$\forall i \in s(m),$$

$$morph^i \in MORPH^{(m)} : \frac{morph^1 \; o \; morph^2}{morph^3 \mid \overline{morph^4}}$$

$$thus, \;\; MORPH^{(4)} = \begin{bmatrix} \overline{morph^4} \\ morph^1, \, morph^2 \\ morph^3 \end{bmatrix}$$

4 Object-free categories

3.53 DEFINITION

An **object-free category** is a partial binary algebra $\mathbf{C} = (M, \circ)$, where the members of M are called **morphisms**, that satisfies the following conditions:

(1) *Matching Condition*: For morphisms f, g, and h, the following conditions are equivalent:

(a) $g \circ f$ and $h \circ g$ are defined,

(b) $h \circ (g \circ f)$ is defined, and

(c) $(h \circ g) \circ f$ is defined.

(2) *Associativity Condition*: If morphisms f, g, and h satisfy the matching conditions, then $h \circ (g \circ f) = (h \circ g) \circ f$.

(3) *Unit Existence Condition*: For every morphism f there exist units u_C and u_D of $(M, \circ)$ such that $u_C \circ f$ and $f \circ u_D$ are defined.

(4) *Smallness Condition*: For any pair of units (u_1, u_2) of $(M, \circ)$ the class $\hom(u_1, u_2) = \{f \in M \mid f \circ u_1 \text{ and } u_2 \circ f \text{ are defined}\}$ is a set.

3.54 PROPOSITION

If $\mathbf{A}$ *is a category, then*

(1) $(Mor(\mathbf{A}), \circ)$ *is an object-free category, and*

(2) an $\mathbf{A}$*-morphism is an* $\mathbf{A}$*-identity if and only if it is a unit of* $(Mor(\mathbf{A}), \circ)$.

Proof: $(Mor(\mathbf{A}), \circ)$ is clearly a partial binary algebra, where $f \circ g$ is defined if and only if the domain of f is the codomain of g. Thus each $\mathbf{A}$-identity is a unit. If $A \xrightarrow{u} B$ is a unit in $(Mor(\mathbf{A}), \circ)$, then $u = u \circ id_A = id_A$, where the first equality holds since id_A is a $\mathbf{A}$-identity and the second one holds since u is a unit. Thus (2) is established. From this, (1) is immediate. □

The "standard" and the "object-free" definitions of category are equivalent. For both definitions, the *sine qua non* is the *coincidence* of the co-domain and the domain of the morphisms to be composed. In the "object-free" definition the matching conditions for morphisms has to be matched. Any mismatch of the *"if and only if the domain of f is the codomain of g"* condition is destroying the category definitively.

Nevertheless, a purely "structural" or "operational" definition of category has to acknowledge that a target is not a source and a source is not a target. Their functionality are different, they are even opposites. Thus, to ask for a match or coincidence of a target (co-domain) and a source (domain) is abstracting from such fundamental differences. In favor of what? Let's say, of "objects", and their formal coincidence.

Diamonds are object-free. Their only objects are functional, i.e., categorial distinctions, alpha and omega of morphisms, and sameness and difference of distinctions. Nothing else. And this might emerge as the real departure from set-theory and object-orientedness. The idea of a *categorial* definition of categories goes back to my *Materialien 1973-75*, but at this time I didn't recognize the importance of the complementary construction of the "*jumpoids*".

4.1 Matching conditions

In this little sketch about a diamondization of the basic constructions of category theory some clarification of the basics of the diamond approach might be risked.

$$\begin{bmatrix} & \omega_4 \xleftarrow{l} \alpha_4 & \\ \alpha_1 \xrightarrow{f} & \omega_1 \Updownarrow \alpha_2 & \xrightarrow{g} \omega_2 \\ \alpha_3 & \xrightarrow{fg} & \omega_3 \end{bmatrix} \Rightarrow \begin{cases} CAT \; iff \; \omega_1 \triangleq \alpha_2 \\ DIAM \; iff \; \omega_1 \simeq \alpha_2 \end{cases}$$

A purely functional or operational thematization of the composition operation between morphisms has to make a difference between a strict, entity- or object-based, *coincidence*, and an operational based *difference* (similarity) between domain and codomain, target and source, of composed morphisms.

The concept of composition is fundamental for category theory, thus we have to start our diamond deconstruction with it. *"... category theory is based upon one primitive notion – that of* composition *of morphisms." D. E. Rydeheard*

Composition of morphisms as *coincidental*, and

Composition of morphisms as *differential*.

Or: Composition mode "sameness" and composition mode "difference".

Both modi, sameness and difference, together are defining a diamond category.

For diamonds, compositions of morphisms are realising both distinctions at once, the sameness and the difference of target and source, i.e., of composition.

For categories to work they have to realize the associativity conditions, which themselves are based on the matching conditions for the composition of morphisms.

> *"Associativity Condition:*
> If morphisms f, g, and h satisfy the matching conditions, then h o (g o f) = (h o g) o f."

The diamond approach is parallelizing the associativity conditions with the matching conditions. Instead of a succession of If-conditions, diamonds have to realize at once matching and associativity within their definition. This could be called an *in-sourcing* of the matching conditions into the definition of compositions. The main strategy to formalize diamonds should consider an interplay between matching conditions and asociativity.

For morphisms f, g, h and k, associativity is realized only if associativity for acceptional and rejectional morphisms are realized at once. Hence, the interplay of acceptional and rejectional systems is choosing its matching conditions to realize associativity as a feature of diamonds. The strategy of formalizing diamonds should reverse the order of the categorical architecture. Not first morphisms, the matching conditions for compositions, then functors, then natural transformation, etc.

For classical categorical definitions, the matching conditions are *out-sourced* as *sine qua non* of compositions.

To follow, in analogy, step by step, the pre-given formalizations of categories to formalize diamonds is only a very first step towards a genuine diamond approach.

Matching conditions

$$\begin{aligned} &If\ cod(f) = dom(g) \\ &then: \\ &\qquad diff(cod(f)) \cong cod(l) \\ &\qquad diff(dom(g)) \cong dom(l) \\ &that\ is: \quad diff(g\ o\ f) \cong het(l) \end{aligned}$$

Domain and codomain of morphisms to compose have to match: cod(f)=dom(g).

Witin diamonds, morphisms have one "level" more, additional to a domain and codomain there is a differential or rejectional level to each domain and codomain: diff(cod(f))=cod(l) and diff(dom(g))= dom(l), defining a hetero-morphism l.

Strictly, the domain and codomains distinctions of hetero-morphisms should be separated from their equivalents for morphisms because their objects are not belonging to the same universe of classes and sets.

Diamond Composition Definition

$$((k \lozenge h) \lozenge g) \lozenge f = k \lozenge (h \lozenge (g \lozenge f)):$$

$$\left\langle \begin{matrix} ((k\ o\ h)\ o\ g)\ o\ f \\ (l \parallel m) \parallel n \end{matrix} \right\rangle \triangleq \left\langle \begin{matrix} k\ o\ (h\ o\ (g\ o\ f)) \\ l \parallel (m \parallel n) \end{matrix} \right\rangle$$

Diamond Composition Derivations

$$1.\ (g \lozenge f) = \left\langle \begin{matrix} g\ o\ f \\ (f\ \bar{o}\ g) = l \end{matrix} \right.$$

$$2.\ (h \lozenge g) \lozenge f = h \lozenge (g \lozenge f):$$

$$\left\langle \begin{matrix} (h\ o\ g)\ o\ f = h\ o\ (g\ o\ f) \\ (m \parallel l) \end{matrix} \right.$$

Diamond Identity / Difference Definition

$$\lozenge_{ID} = \left\langle \begin{matrix} id_X :\ f\ o\ id_X = f = id_Y\ o\ f \\ diff_{fg} : (fg)\ o\ diff_{fg} = l = diff_{gf}\ o\ (gf) \end{matrix} \right.$$

Essential for the definition of the *category* is the composition operation and its associativity. Associativity enters the game with the composition of 3 morphisms.

In the same way, the definition of *diamonds* is ruled by the diamond composition and the necessity of 4 morphisms.

A composition in a *category* is defined by the coincidence of the codomain *cod* and the domain *dom* of the composed morphisms.

A composition in a *diamond* has always to reflect additionally the difference, i.e., the *complement* of the categorical composition operation. Thus, a diamond composition is producing a *composite* and a *complement* of the composed morphisms. The composite is the *acceptional*, and the complement the *rejectional* part of the diamond operation.

Morphisms with 2-objects

Morphisms as 2-objects consists of 2 pairs of distinctions:

1. domain (dom) and codomain (cod),
2. alpha and omega.

Thus, (g o f): cod(f) = dom(g) .simul. omega(f) ≠ alpha(g).

With diff(alpha(g))=dom(l) and diff(omega(f))= cod(l).

4.1.1 Identity and difference

$$\left(bi-object\right) \in \begin{bmatrix} id_{obj} \\ diff_{obj} \end{bmatrix}$$

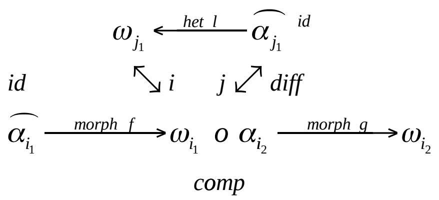
Identity is a mapping onto-itself.
Difference is a mapping onto-others.

iff

$$\begin{bmatrix} id_{obj} \ o \ morph = morph \\ id_{obj} \ o \ het = het \\ diff_{obj} \ o \ morph = het \\ diff_{obj} \ o \ het = morph \end{bmatrix}$$

The formula "$diff_{obj}$ o morph = het" is an abbreviation for : "$diff_{obj}$ o ($morph_1$ o $morph_2$) = het".

General scheme



4.2 In-sourcing the matching conditions

Morphisms are representing mappings between objects, seen as domains and codomains of the mapping function.

Hetero-morphisms are representing the conditions of the possibility (Bedingungen der Möglichkeit) of the composition of morphisms. That is, the conditions, expressed by the matching conditions, are reflected at the place of the hetero-morphisms. Hetero-morphisms as reflections of the matching conditions of composition are therefore *second-order* concepts. Morphisms and their composition are *first-order* concepts, which have to match the matching conditions defined by the axiomatics of the categorical composition of morphisms. But these matching conditions are nor explicit in the composition of morphism but implicit, defined "outside" of the compositional system. Hence, in diamonds, the matching conditions of categories are explicit, and moved from the "outside" to the inside of the system.

In this sense, the rejectional system of hetero-morphisms is a reflectional system, reflecting the interactions of the compositions of the acceptional system. Hetero-morphisms are, thus, are the "morphisms" of the matching conditions for morphisms.

Hetero-morphisms are "composed" by the jump operation, which is not interactional in the sense of the acceptional system.

Finiteness and Diamonds

The idea of *in-sourcing* the matching conditions into the definition of diamonds seems to be in correspondence with the two main postulates of *"Chinese Ontology"*, i.e., the permanent change of things and the endlessness or closeness of situations. That is, diamonds should be designed as structural explications of the *happenstance* of compositions and not as a succession of events (morphisms). More exactly, diamonds are contemplating the interplay of acceptional and rejectional thematizations. Thus, morphisms with their matching conditions and composability are in fact of secondary order for the understanding of diamonds.

The complementarity of construction and verification, which is happening at once and not in a temporal delay, is a consequence of the *finiteness* and *dynamics* postulate of polycontextural "ontology". This simultaneous interplay is based on the insight that a delayed verification (or testing in programming) would not necessarily verify the construction in question because, at least, the context will have changed in-between. Delayed verification is possible only in the very special case of frozen dynamics.

Hence, hetero-morphisms and rejectional systems and their interplay with acceptional systems in diamond constellations are a strict consequence of the structures of their ontology.

Matching conditions for Diamonds

$a'.\ g\ o\ f,\ h\ o\ g,\ k\ o\ g\ \text{are defined}$

$$iff \begin{bmatrix} g\ o\ f,\ h\ o\ g,\ k\ o\ g \\ l\ ,\ m\ ,\ n \end{bmatrix}$$

$b'.\ h\ o\ ((g\ o\ f)o\ k)\ \text{is defined}$

$$iff \begin{bmatrix} h\ o\ ((g\ o\ f)o\ k) \\ l\ \|\ (m\ \|\ n) \end{bmatrix}$$

$b''.\ h\ o\ ((g\ o\ f)o\ k)\ \text{is defined}$

iff

$l\ \|\ (m\ \|\ n)\ \text{is defined}$

$c'.\ ((h\ o\ g)\ o\ f)\ o\ k\ \text{is defined}$

iff

$(l\ \|\ m)\ \|\ n\ \text{is defined}$

$$\forall f,\ g,\ h,\ \forall u,\ v:$$
$$(h\ o\ g\ o\ f) \in MC_{acc}$$
$$iff$$
$$(u\ \|\ v) \in MC_{rej}$$

Composition of morphisms is defined, i.e., is an element of the matching conditions MC, if and only if their hetero-morphisms are defined. That is, composition is defined iff the interaction between morphisms and hetero-morphisms is realized. In the case of simple compositions and their single hetero-morphisms, the interplay between the different compositions (gof, hog, kog) and the hetero-morphisms (l, m, n) may not be very clear. Hence, the order given by the alphabetic order should be made explicit, say as n-tuples.

The interdependency of morphisms and hetero-morphisms is marked by the logical *"if and only if"* (iff), which is in this situation more or less a *metaphorical* use of logic because between acceptional and rejectional systems there is in fact no mono-contextural logical correlation.

4.2.1 How does the in-sourcing work?

A first answer was given in direct analogy to the associativity condition for morphisms.

2. Associativity Condition

$$a.\ If\ \ f, g, h \in MC,\ then\ \ h\ o\ ((g\ o\ f)\ o\ k) = ((h\ o\ g)\ o\ f)\ o\ k\ \ and$$
$$l, m, n \in MC \qquad\qquad l \parallel (m \parallel n) = (l \parallel m) \parallel n$$

For categories it seems to be clear that matching conditions (coincidences) are defining the composition of morphisms. For diamonds, with their double characterization, it seems to make sense that compositions are defining their matching conditions, too. Both, compositions and matching conditions, are in an interplay of mutual construction and verification. Hence, there is no circularity to state that matching conditions are defining composition and compositions are defining matching conditions because both are in a chiastic interplay, distributed over acceptional and rejectional abstraction-levels of the diamond.

$$a'.\ If\ \ f, g, h, k \in MC$$
$$l, m, n \in JC,$$
$$then \begin{bmatrix} h\ o\ ((g\ o\ f)\ o\ k) = ((h\ o\ g)\ o\ f)\ o\ k \\ l \parallel (m \parallel n) = (l \parallel m) \parallel n \end{bmatrix}$$

The matching conditions should be differentiated into matching conditions for morphisms (MC) and matching conditions for hetero-morphisms as jump-conditions (JC). Both are complementary to each other.

$$a''.\ h\ o\ ((g\ o\ f)\ o\ k) = ((h\ o\ g)\ o\ f)\ o\ k$$
$$iff$$
$$l \parallel (m \parallel n) = (l \parallel m) \parallel n$$

As a next step of in-sourcing the matching conditions into the diamond definition of associativity, the mutual implications of acceptional and rejectional compositions have to be implemented.

$$Diamond\ \ Associativity\ \ D - ASS$$
$$iff \begin{bmatrix} morph \in morph - ASS \\ het \ \in het - ASS \end{bmatrix}$$

In an other version, diamond associativity D-ASS is realized if and only if (iff) morphisms are elements of the class of morphism-associativity (morph-ASS) and at once hetero-morphisms are elements of the counter-class of hetero-morphism associativity (het-ASS). It would be to much of misleading wordings if this interplay would be modeled by a logical conjunction (and).

$$Diamond\ \ Associativity$$
$$iff\ \left[\chi(morph,\ het) \in ASS\right]$$

The interplay can be made explicit as a *chiasm* between morphisms and hetero-morphisms.

Diamond Associativity

$$morphisms\ k, g, h, f \in m-ASS$$
$$hetero-morphisms\ l, m, n \in h-ASS,$$
$$iff \begin{bmatrix} h\ o\ ((g\ o\ f)\ o\ k) = ((h\ o\ g)\ o\ f)\ o\ k \\ l \parallel (m \parallel n) = (l \parallel m) \parallel n \end{bmatrix}$$

To involve hetero-morphisms into associativity, diamonds needs 4 morphisms on the acceptional level to produce 3 hetero-morphisms able to have the property of hetero-associativity.

Both together, in their interplay, written in brackets [-], are realizing diamond-associativity.

Operational definition of Diamond Category

A radical operational definition of Diamonds should get rid of any connections to set-theory. Thus, the matching condition based on sets has to be abandoned in favor to a functional matching, which is an exchange relation between alpha and omega of a morphism. Secondarily, the set-based matching can be re-introduced as a nivellation of the differences of alpha- and omega-functionality.

$$\textbf{Diamond - Category DC} = (\mathbf{A}, \mathbf{A^a})$$
$$Category: A = (Morph, hom, id, o)$$
$$Jumpoid: A^a = (Morph^a, het, id, \parallel)$$
$$Diamond: DC = (A, A^a, diff)$$
$$DC = (Morph, hom, id, diff, compl)$$
$$DC = (M, o, \parallel)$$

$$diff\ (comp(\alpha, \omega)_i) = het\ (\alpha, \omega)_j$$
$$diff\ (\alpha\ o\ \omega)_i = morph(\omega \leftarrow \alpha)_j$$

$$diff\ (comp(\alpha, \omega)_i) = het\ (\alpha, \omega)_j$$
$$diff\ (\alpha_1\ o\ \omega_2) = morph(\omega_3 \leftarrow \alpha_3)$$
$$If\ (\alpha_1\ o\ \omega_2)\ then \begin{pmatrix} diff\ (\alpha_1) = \alpha_3 \\ diff\ (\omega_2) = \omega_3 \end{pmatrix}$$

Diff is the difference of compl, i.e., the complementary composition function.

5 Properties of diamonds

5.1 Diamond rules for morphisms

$h = (g \ o \ f) \,||\, k:$

$$\begin{array}{l} A \xrightarrow{f} B \xrightarrow{g} C \\ \quad b_1 \xleftarrow{k} b_2 \end{array} \qquad \begin{array}{l} -\ commutativity\ of\ \ g \ o \ f = k \ o \ h \\ -\ jump\ of\ \ l \,||\, m \end{array}$$

$$\left.\begin{array}{ccc} A & \xrightarrow{f} & B \\ & h \searrow & \downarrow g \\ & & C \end{array}\right\| \ b_1 \xleftarrow{k} b_2 \qquad \left.\begin{array}{ccc} A & \xrightarrow{f} & B \\ \downarrow h & & \downarrow g \\ C & \xrightarrow{k} & D \end{array}\right\| \left.\begin{array}{ccc} b_1 & \xleftarrow{l} & b_2 \\ & || & \\ c_1 & \xleftarrow{m} & c_2 \end{array}\right| \ b_1 \xleftarrow{n} c_2$$

Diamond

$$\left.\begin{array}{c} \begin{array}{ccc} A & \xrightarrow{f} & B \\ \downarrow h & & \downarrow g \\ C & \xrightarrow{k} & D \end{array} \\ \hline category \end{array}\right\| \begin{array}{c} saltatory \\ \hline \begin{array}{ccc} a & \xleftarrow{l} & b \\ n \nwarrow & & \uparrow m \\ & & c \end{array} \end{array}$$

With such a separation of the types of morphisms, *diagram chasing* might be supported.

Diamond rules

$$\frac{\begin{pmatrix} A \xrightarrow{f} B \xrightarrow{g} C \\ b_1 \xleftarrow{k} b_2 \end{pmatrix}}{A \xrightarrow{h} C \mid b_1 \xleftarrow{k} b_2} \qquad \frac{\begin{pmatrix} A \xrightarrow{f} B \xrightarrow{g} C \xrightarrow{h} D \\ b_1 \xleftarrow{k} b_2 \,||\, c_1 \xleftarrow{l} c_2 \end{pmatrix}}{A \xrightarrow{m} D \mid b_1 \xleftarrow{n} c_2}$$

$$\frac{\begin{pmatrix} id_A \ o \ f \\ diff_A \ o \ f \end{pmatrix}}{f \mid b} \qquad \frac{\left(A \xrightarrow{f} B \xrightarrow{g} C \xrightarrow{h} D\right) \in CAT}{\begin{pmatrix} A \xrightarrow{f} B \xrightarrow{g} C \xrightarrow{h} D \\ a \xleftarrow{k} b \xleftarrow{l} c \end{pmatrix} \in DIAM}$$

$$\frac{f \in Morph,\ g \in Morph}{fg \in Morph}$$

$$\frac{g \in Morph,\ h \in Morph}{gh \in Morph}$$

$$\frac{fg \in Morph,\ gh \in Morph}{fgh \in Morph}$$

$$\frac{fg \in Morph}{k \in \overline{Morph}} \qquad \frac{gh \in Morph}{l \in \overline{Morph}}$$

$$\frac{fg \in Morph,\ gh \in Morph}{m \in \overline{Morph}}$$

$$\frac{k \in \overline{Morph},\ l \in \overline{Morph}}{m \in \overline{Morph},\ m = k \parallel l}$$

$$\frac{k \in \overline{Morph},\ g \in Morph,\ l \in \overline{Morph}}{kgl \in \overline{Morph}}$$

$$\frac{k \in \overline{Morph}}{fg \in Morph} \quad \frac{k \in \overline{Morph}}{gh \in Morph}$$

5.2 Sub-Diamonds

4.1 DEFINITION

(1) A category $\mathbf{A}$ is said to be a **subcategory** of a category $\mathbf{B}$ provided that the following conditions are satisfied:

(a) $Ob(\mathbf{A}) \subseteq Ob(\mathbf{B})$,

(b) for each $A, A' \in Ob(\mathbf{A})$, $\hom_{\mathbf{A}}(A, A') \subseteq \hom_{\mathbf{B}}(A, A')$,

(c) for each $\mathbf{A}$-object A, the $\mathbf{B}$-identity on A is the $\mathbf{A}$-identity on A,

(d) the composition law in $\mathbf{A}$ is the restriction of the composition law in $\mathbf{B}$ to the morphisms of $\mathbf{A}$.

(2) $\mathbf{A}$ is called a **full subcategory** of $\mathbf{B}$ if, in addition to the above, for each $A, A' \in Ob(\mathbf{A})$, $\hom_{\mathbf{A}}(A, A') = \hom_{\mathbf{B}}(A, A')$.

A diamond A is said to be a sub-diamond of a diamond B provided that the following conditions are satisfied. Chiastic composition in diamonds are not excluding sub-set relations for sub-diamonds of diamonds. In a strict analogy to the category definitions of sub-categories, the definitions for sub-diamonds are introduced.

Sub - Diamonds

1. $[\mathbf{A};\ \mathbf{a}], [\mathbf{B};\ \mathbf{b}] \in Diam,\ then\ [\mathbf{A};\ \mathbf{a}] \subseteq [\mathbf{B};\ \mathbf{b}], if$

$(a)\quad Ob(\mathbf{A};\ \mathbf{a}) \subseteq Ob(\mathbf{B};\ \mathbf{b})$

$(b)\quad \forall \mathbf{A},\ \mathbf{A}' \in Ob(\mathbf{A}), \forall \mathbf{a},\ \mathbf{a}' \in Ob(\mathbf{a})$

$\quad hom_{\mathbf{A}}(\mathbf{A},\ \mathbf{A}') \subseteq hom_{B}(\mathbf{A},\ \mathbf{A}')$

$\quad het_{\mathbf{a}}(\mathbf{a'},\ \mathbf{a}) \subseteq het_{\mathbf{b}}(\mathbf{a'},\ \mathbf{a})$

$(c)\quad \forall \mathbf{A} - obj,\ id_{\mathbf{B}}(\mathbf{A}) = id_{\mathbf{A}}(\mathbf{A})$

$\quad \forall \mathbf{a} - obj,\ diff_{\mathbf{b}}(\mathbf{a}) = diff_{\mathbf{a}}(\mathbf{a})$

$(d)\quad comp(\mathbf{A};\ \mathbf{a}) = comp(\mathbf{B};\ \mathbf{b}) \setminus hom_{\mathbf{A}}(\mathbf{A},\ \mathbf{A}')$

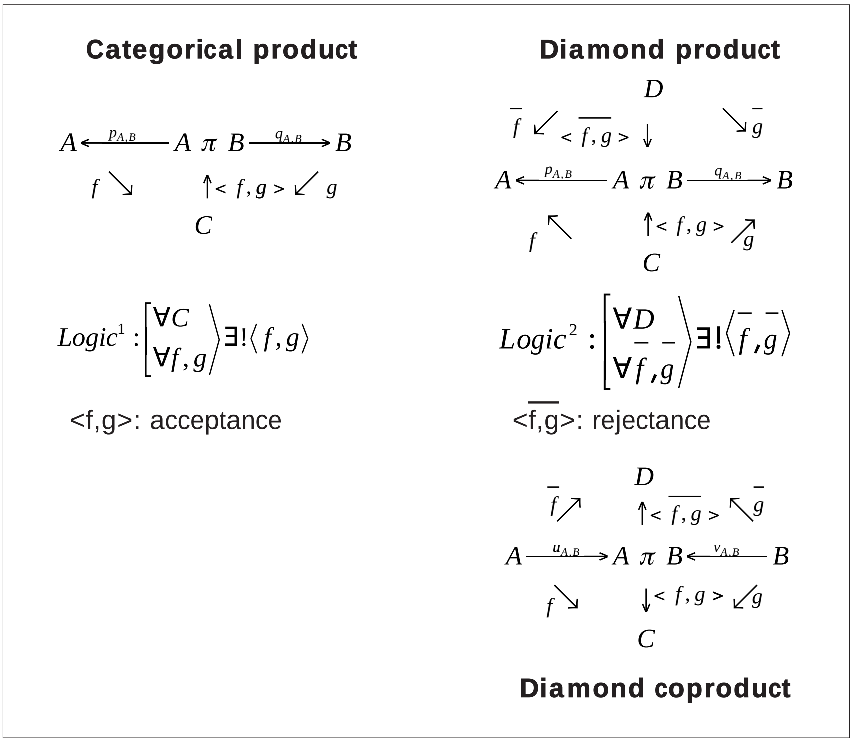
$\quad comp(\mathbf{a'},\ \mathbf{a}) = comp(\mathbf{b'},\ \mathbf{b}) \setminus het_{\mathbf{a}}(\mathbf{a'},\ \mathbf{a})$

2. $[\mathbf{A};\ \mathbf{a}] \in full\ \ sub - diamond\ \ of\ \ [\mathbf{B};\ \mathbf{b}],\ if$

$\quad \forall \mathbf{A},\ \mathbf{A}' \in Ob(\mathbf{A}),\ hom_{\mathbf{A}}(\mathbf{A},\ \mathbf{A}') = hom_{B}(\mathbf{A},\ \mathbf{A}')$

$\quad \forall \mathbf{a},\ \mathbf{a}' \in Ob(\mathbf{a}),\qquad het_{\mathbf{a}}(\mathbf{a'},\ \mathbf{a}) = het_{\mathbf{b}}(\mathbf{a'},\ \mathbf{a}).$

5.3 Diamond products



5.4 Terminal and initial objects in diamonds

To each diamond, if there is a terminal object for its morphisms then there is a final object for its hetero-morphisms.

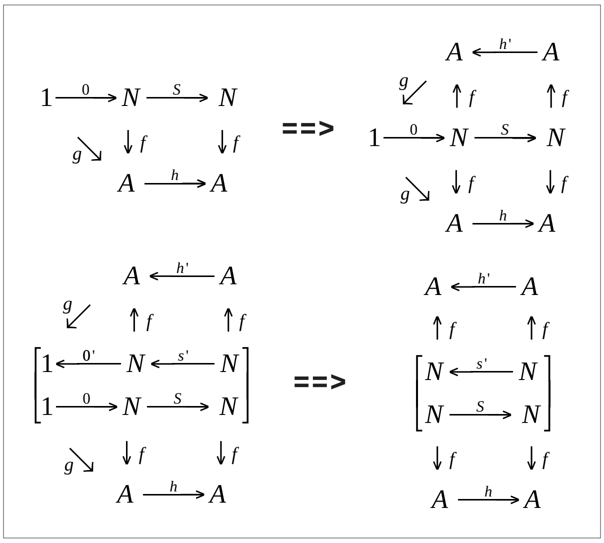
To each diamond, if there is a initial object for its morphisms then there is a final object for its hetero-morphisms.

In diamond terms, rejectance has its own terminal and initial objects, like acceptance is having its own initial and terminal objects.

But both properties are distinct, there can be a final (terminal) object in a category, and another construction in a saltatory.

Morphisms are ruled by equivalence; hetro-morphisms are ruled by bisimulation.

Equivalence belongs to the algebraic and constructive system (structure), bisimulation to the coalgebraic deconstructive system (process).



In an open world it wouldn't make much sense to run numbers forwards and backwards at once. But in a closed world, which is open to a multitude of other worlds, numbers are situated and distributed over many places and running together in all directions possible. Each step in a open/closed world goes together with its counter-step. There is no move without its counter-move.

If we respect the situation for closed/open worlds, then we can omit the special status of an *initial* object. That is, there is no zero as the ultimate beginning or origin of natural numbers in a diamond world. Everything begins everywhere. Thus, parallax structures of number series, where numbers are *ambivalent* and *antidromic*, are natural. It has to be shown, how such ambivalent and antidromic number systems are well founded in diamonds.

5.5 Natural Transformation and Diamonds

"Hence, it would be conceived as a formal explanation of a new intuition with the help of known or specially invented methods belonging to the traditional way of thinking and formalizing. In other words, as it turned out, the idea of natural transformation is a 2-category formalized with the tools of 1-category.

Thus, the notion of natural transformation can play a double game. It can be part of category theory as a special category, i.e., as a functor category.

"Our slogan proclaimed: With each type of Mathematical object, consider also the morphisms. So, what is the morphism of functors; that is, a morphism from F to G where both F and G are functors F, G: ***C*** *–>* ***D*** *between categories* ***C*** *and* ***D****?"* MacLane, p. 390

Or it can play the role of the starting point of a new concept of formality and operativity, first thematized as irreducible 2-category.

Thus the introduction of categories and functors are not more than the tools to define and *"understand natural transformations"*. To concentrate on functors and categories makes the tools the theory they should support. In traditional category theory, the servants are becoming the masters.

Classic category, also it is trying to abandon its classical heritage, like set theory and first-order logic, is still too much relied on its rejected past. There is no big paradigmatic jump from set theory to category theory. But it would be a remarkable paradigm change to start, conceptually and with its corresponding operative apparatus, with “natural transformation”. A first step into this direction may be opened up by the movement of n-categorial studies.

In polycontextural terms, the two categories, compared and brought into relation by the functor of natural transformations are two different contextures. Their difference is basic and best understood as dis-contexturality. Each contexture is giving place for its own formality, i.e., formal rationality: logic, semiotics, category theory, etc." (Kaehr)

Hence, the new slogan, additionally to Mac Lane’s, could be:

With each type of mathematical morphism, with its mathematical objects, consider also the diamonds *of the compositions of morphisms.*

So, what is the Diamond of Natural Transformations?

So, what is the diamond-morphism of functors; that is, a morphism from F to G where both F and G are functors F, G: ***C*** *–>* ***D*** *between diamonds* ***C*** *and* ***D****?*

6 Aspects of diamonds

Diamonds are produced by the interplay of acceptional and rejectional parts. Acceptional parts correspond to categories, and rejectional parts are corresponding to saltatories. Another thematization considers that diamonds consists of 3 parts: the *core* systems, the *acceptional* and the *rejectional* parts.

Core systems, as compositions of morphisms are in this respect the basic systems. They might have the property of transitivity (commutativity) and associativity. But these properties are result of a specific interpretation of the linear composition structure of the core system. Other properties, instead of transitivity and associativity, are possible for linear compositions. This may depend on the definition of the identity function ID.

Acceptional systems, therefore, have an own status as specific properties of core systems. Their properties, combined with the core system, are studied by *category theory*.

Rejectional systems, hence, also acceptional systems haven't been recognized until now, they have an equal legitimacy like the acceptional systems. Thus, they represent another set of properties of core systems. The properties of rejectional systems, combined with their core systems, are studied by *saltatory theory*.

Complementarity of acceptional and rejectional systems are a topic to be studied.

Diamond theory is studying the properties of the complementarity of acceptional and rejectional systems as an interplay of category and saltatory theory.

These are the first-order properties of diamonds. Their "data" are morphisms and hetero-morphisms, their "structure" composition and identity. Additional to the category theoretic distinction of *Data*, *Structure*, *Property* (DSP), diamond theory is considering the "meta-property" of the *Interplay* of saltatories and categories, hence, the diamond system is characterized by diamondized DSPI.

Second-order properties of diamonds are accessible by diamondization. The diamondization of diamonds is discovering new properties of diamonds.

Localization of diamonds in the contextural and kenomic grid with its tectonic of proto-, deutero- and trito-structure has to be considered. The localization of diamonds in the tabular position system is ruled by its system of "place-designators".

6.1 Data, Structure, Property (DSP) for Categories

1.1.1 Categories I: graphs with structure

Definition 1 *A category is given by*

i) DATA*: a diagram* $C_1 \underset{t}{\overset{s}{\rightrightarrows}} C_0$ *in* Set

ii) STRUCTURE*: composition and identities*

iii) PROPERTIES*: unit and associativity axioms.*

The data $C_1 \underset{t}{\overset{s}{\rightrightarrows}} C_0$ is also known by the (over-used) term "". We can interpret it as a set C_1 of arrows with source and target in C_0 given by s, t.

6.2 Data, Structure, Property, Interactionality (DSPI) for Diamonds

DSPI-List

i) *Data*: 2-diagram C1–$_{s,t}$—>Co / Co<–$_{diff}$–C1 in 2-Set

ii) *Structure*: composition, identities + jump, difference

iii) *Properties*: unit, associativity + diversity, jump law

iv) *Interplay*: chiasm between category and saltatory.

(v) *Interactions*: diamonds with diamonds, iterative / accretive

vi) *Localisation:* kenomic grid, place-designator

DSPI-Explications

i) *Data*: 2-diagram C1–$_{s,t}$—>Co / Co<–$_{diff}$–C1 in 2-Set

Diamond - Data

$$C_0 \xrightarrow[target]{source} C_1 : Set_{Salt}$$
$$\Updownarrow$$
$$C_1 \xrightarrow[target]{source} C_0 : Set_{Cat}$$

Objects in diamonds are involved into 2 operations: coincidence and difference.

Coincidence is enabling composition and therefore, commutativity.

Differences are enabling hetero-morphisms and therefore jumpoids (jump commutativity).

Each object is involved in a difference and double identity relation.

ii) *Structure*: commutative composition, identities + complement, differences

commutative composition – complementation

$$h = (g\ o\ f) \| k : \left[\begin{array}{c} A \xrightarrow{f} B \xrightarrow{g} C \\ b_1 \xleftarrow{k} b_2 \end{array} \right]$$

$$\begin{array}{ccc} A & \xrightarrow{f} & B \\ h \searrow & & \downarrow g \\ & C & \end{array} \Bigg\| \; b_1 \xleftarrow{k} b_2$$

Communicative composition of morphisms in categories is based on a *binary* operation

hom(X, Y) x hom(Y, Z) —> hom(X, Z).

Composition in diamonds is based on a "*ternary*" operation "composed" by composition and complementation of composition:

hom(X, Y) [x $\overline{\text{x}}$] hom(Y, Z) —> hom(X, Z) || $\overline{\text{hom}}$(X, Z).

identity – difference

Each object of a diamond is involved in a difference and double identity relation. Hence, diamond objects as bi-objects are polarities, i.e., their inner structure is that of a complementary polarity.

Identity rule

$$\frac{\begin{array}{l} idX \xrightarrow{morph} Y \\ X \xrightarrow{morph} Yid \end{array}}{X \xrightarrow{morph} Y}$$

Difference rule

$$\frac{\begin{array}{l} diffX \xrightarrow{morph} Y \\ X \xrightarrow{morph} Ydiff \end{array}}{X \xleftarrow{het} Y}$$

The difference operation separates the polarity of the bi-object into its acceptional and its rejectional parts (aspects).

Diamond objects are not only involved into *right* and *left* identity but in *transversal* difference.

iii) *Properties*: unit, associativity + diversity, jump law

Diamond

$$\left.\begin{array}{ccc} A & \xrightarrow{f} & B \\ \downarrow h & & \downarrow g \\ C & \xrightarrow{k} & D \\ \hline \multicolumn{3}{l}{category} \end{array}\right\| \begin{array}{ccc} \multicolumn{3}{c}{\underline{saltatory}} \\ a & \xleftarrow{l} & b \\ & n \nwarrow & \uparrow m \\ & & c \end{array}$$

Meta-properties

iv) *Interplay*: chiasm between category and saltatory.

Interactivity

$$\begin{bmatrix} (k \,||\, l) \; o \; g \\ g \; o \; (k \,||\, l) \end{bmatrix} = \begin{bmatrix} (g \,||\, l) \; o \; (g \,||\, k) \\ (g \; o \; l) \,||\, (k \; o \; g) \end{bmatrix}$$

Distributivity

$$(k \,||\, l) \bullet g = (g \bullet l) \,||\, (g \bullet k)$$
$$(k \,||\, l) \bullet g = (g \bullet l) \; o \; (g \bullet k)$$
$$(k \,||\, l) \bullet g = (g \bullet l) \bullet (g \bullet k)$$

v) *Interactions*: diamonds with diamonds

Iterative interactions

accretive interactions

vi) *Localisation:* kenomic grid, place-designator

Objects – Morphisms – Interactions/ /Structures – Properties

For diamonds, the categorical architectonics of DSP has to be reversed to IPSD:
First are *interactions* between diamonds, iterative and accretive compositions,
Second are interplays between categories and saltatories,
third, morphisms/hetero-morphisms happens between objects.
Interactions have structures and properties.

6.3 Diamondization of diamonds

Like the possibility of categorization of categories there is a similar strategy for diamonds: *the diamondization of diamonds.* Categorizations and diamondizations are activities producing the conceptual fields for category and diamond theory. Diamond strategies are opening up the worlds of diamond theories. As a self-application of the diamond questions, the diamond of the diamond can be questioned. Diamond are introduced as the quintuple of proposition, opposition, acceptionality, rejectionality and positionality, D=[prop, opp, acc, rej; pos].

The complementarity of *acceptional* and *rejectional* properties of a diamond can themselves be part of a new diamondization.

What is both together, acceptional and rejectional systems? As an answer, *core* systems can be considered as belonging at once to acceptional as well to rejectional systems.

What is neither acceptional nor rejectional? An answer may be the *positionality* of the diamond. Positionality of a diamond is neither acceptional nor rejectional but still belongs to the definition of a diamond.

Hence, diamond of diamonds or second-order diamonds:

DD=[Acc, Rej, Core, Pos].

Thus,

[Acc, Rej]-*opposition* can be studied on a second-level as a complementarity per se,

[Acc, Rej]-*both-and* can be studied as the core systems per se (Core),

[Acc, Rej]-*neither-nor* can be studied as the mechanisms of positioning (Pos), esp. by the place-designator.

What are the specific formal laws of the diamond of diamonds?

Between the first-order opposition of acceptional and rejectional systems of diamonds there is a complementarity, which can be studied as such on a second-level of diamondization. What are the specific features of this complementarity? Like category theory has its *duality* as a meta-theorem, second-order diamond theory has its *complementarity* theorem.

Hence, it is reasonable to study core systems per se, without their involvement into the complementarity of acceptional and rejectional systems. What could it be? Composition without commutativity and associativity? The axioms of identity and associativity are specific for categories. But, on a second-order level, they may be changed, weakened or augmented in their strength.

The study of the positionality per se of diamonds might be covered by the study of the functioning of the place-designator as an answer to the question of the positionality of the position of a diamond. Without doubt, positionality and its operators, like the *"place-designator"* and others, in connection to the kenomic grid, can be studied as a topic per se.

The first-order positionality of diamonds has become itself a topic of second-order diamonds, the neither-nor of acceptance and rejectance. Hence, because also second-order diamonds are positioned, a new kind of localization enters the game: the localization of second-order diamonds into the tectonics of kenomic systems, with their proto-, deutero- and trito-kenomic levels.

All together is defining a second-order diamond theory.

6.4 Conceptual graphs of higher-order diamondization

A kind of a higher-order diamondization is introduced by the basic terms of diamondization: *morphism, composition, duality, complement, inversion.*

Diamond of

[morph, comp, compl, invers]

$$\left[\begin{array}{c} [invers(o)]_4 \\ \diagup \quad \diagdown \\ \{morph(A,B)\}_1 \quad \{comp(fg)\}_2 \\ \diagdown \quad \diagup \\ (compl(o))_3 \end{array}\right]$$

morph(A, B) = *morphisms* between A and B,
comp(fg) = *composition* of morphisms f, g,
compl(o) = *complement* of composition (f o g)
invers(o) = *morphogram* of compositor (o).

A different notation is focusing more on the operators of diamonds (morph, comp, compl, invers) instead of the operands (A, B, f, g) of the previous graph.

Diamond of

[morph, comp, compl, invers]

$$\left[\begin{array}{c} [invers(comp)]_4 \\ \diagup \quad \diagdown \\ \{morph(A,B)\}_1 \quad \{comp(morph)\}_2 \\ \diagdown \quad \diagup \\ (compl(comp))_3 \end{array}\right]$$

invers(comp) could also be seen as
invers(compl(comp)), i.e.,
invers(comp)$=_{mg}$invers(compl(comp))

Diamond of

[comp, dual, compl, invers]

$$\left[\begin{array}{c} [invers(comp)]_4 \\ \diagup \quad \diagdown \\ \{comp(comp)\}_1 \quad \{dual(comp)\}_2 \\ \diagdown \quad \diagup \\ (compl(comp))_3 \end{array}\right]$$

One more abstraction is achieved with the transition to the diamond of the main operations over compositions of morphisms: *compositionality, duality, complementarity and subversionality.*

– *comp(comp)* is realizing *categories as* compositions of morphisms,
– *dual(comp)* is realizing the *duality* of a category. The relation between both is meta-theoretical.
– *compl(comp)* is realizing *saltatories*, and
– *invers(comp)* is introducing the *morphogrammatics* of categories and saltatories.

6.4.1 Meta-properties of Diamonds

Compositionality
Duality
Complementarity
Interactionality
Subversiveness
Positionality

6.4.2 Compositionality of diamonds

Additive and super-additive compositionality for morphisms.

Composition of morphisms

Commutativity
Associativity
Identity
etc.

Compositions of Diamonds

According to the principles of polycontextural iterability, repetition has to be distinguished as *iterative* and *accretive* repetition. In classical category composition is of iterative nature.That is, the iteration of the operation "composition" is enclosed in its contexture, and there is no chance to leave this contexture. Hence, composition in categories is closed. The complementary aspect of iterability in polycontextural systems is accretivity. Accretive operations are leaving the contexture for another contexture, augmenting the structural complexity of the system.

As a possible proposal to an implementation of full iterability, i.e., accretivity and iterativity, for diamond systems, the following strategy is risked.

Iterability of composition

$$\begin{array}{ccccccc} \alpha_1 & \longrightarrow & \omega_1 & \Leftrightarrow^{iter} & \alpha_1{}' & \longrightarrow & \omega_1{}' \\ \Updownarrow^{acc} & & \Updownarrow^{acc} & & \Updownarrow^{acc} & & \Updownarrow^{acc} \\ \omega_2 & \longleftarrow & \alpha_2 & \Leftrightarrow^{iter} & \omega_2{}' & \longleftarrow & \alpha_2{}' \end{array}$$

$$\begin{array}{ccccccc} \alpha_1 & \longrightarrow & \omega_1 & \Leftrightarrow^{iter} & \alpha_1{}' & \longrightarrow & \omega_1{}' \\ & & \Updownarrow^{acc} & & \Updownarrow^{acc} & & \\ & & \alpha_2 & \Leftrightarrow^{iter} & \omega_2{}' & & \end{array}$$

To each order relation (morphism, arrow) a *double exchange* relation is attached, the iterative and the accretive exchange relation.

To show the essentials of the double-exchange relations, this graph is omitting the additional properties of the diamond, i.e., the coincidence relations and the acceptional and rejectional morphisms of the full diamond structure.

This structure of complex iterativity for categories was never studied in detail before. But it was introduced, informally in my papers, as iterative and accretive grids of chiasms, long ago. No precise mechanism of complex composition was given at that time. For polycontextural logics and contextural programming, tabularity was developed to some extend.

Thus, this construction risked now has to be regarded as a very first step of introducing accretivity and iterativity into the rules of morphism composition. This construction is obviously based on the functional distinction of alpha- and omega-properties of morphisms. It seems not to be naturally accessible with the classic definition of categorical objects alone. Nor is it simply a kind of products of categories, say fibred categories or similar, which had been used to formalize polycontextural logics (Pfalzgraf).

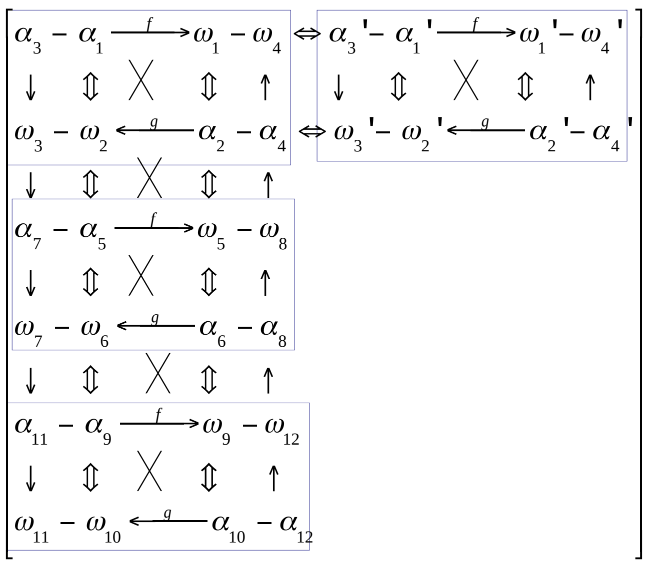
Tabular dissemination of diamonds happens on the very base of their definition, and not as a secondary construction. This, surely, is in no way excluded by basic dissemination of diamonds.

$$\coprod_{m,n}\left[\mathbf{A};\,\mathbf{a}\right]^{(m,\,n)} = \left(\begin{array}{c} \left[\mathbf{A};\,\mathbf{a}\right]\odot\left[\mathbf{A};\,\mathbf{a}\right]\odot,\ldots,\,\odot\left[\mathbf{A};\,\mathbf{a}\right] \\ \oplus \\ \left[\mathbf{A};\,\mathbf{a}\right] \\ \oplus \\ . \\ \oplus \\ \underbrace{\left[\mathbf{A};\,\mathbf{a}\right]\odot\left[\mathbf{A};\,\mathbf{a}\right]\odot,\ldots,\,\odot\left[\mathbf{A};\,\mathbf{a}\right]}_{s(m,\,n)} \end{array}\right)$$

Block diagrams for diamond grids

The notation of the chiastic composition structure can be omitted by the block representation of the composition of the basic chiasms. Hence, the bracket are symbolizing chiastic composition at all of their 4 sides, left/right and top /bottom. That is, the top and bottom aspects are representing chiastic compositions in the sense of accretion of complexity. The right/left-aspects are connections in the sense of iterative complication. Iteration per se is not chiastic but compositional in the usual sense.

Accretive and mixed iterative+accretive iterability



Iterative composition is coincidental, accretive composition is chiastic. Coincidental composition is based on the coincidence of domains and codomains of morphisms, chiastic composition is based on the exchange relation between alpha and omega properties of morphisms. Both together, are defining the free composition of diamonds. This wording might be misleading if we consider the introduction of two types of exchange relations, the accretive and the iterative.

$$Iter\left(Diam^{(m,\,n)}\right) = Diam^{(m,\,n+1)}$$
$$Acc\left(Diam^{(m,\,n)}\right) = Diam^{(m+1,\,n)}$$
$$Acc\left(Iter\left(Diam^{(m,\,n)}\right)\right) = Iter\left(Acc\left(Diam^{(m,\,n)}\right)\right)$$

As in category theory where the pattern for linear composition is a ternary composite of morphisms, for diamond theory, the basic pattern of tabular composition is the chiastic diamond with its interplay of categories and saltatories.

Hence, there are places in the kenomic grid which are occupied with chiasms and some which are not. A *place-designator* has to manage such a placing of empty and occupied places in a kenomic grid.

6.4.3 Duality of Diamonds

Duality for Categories

"The concept of category is well balanced, which allows an economical and useful duality. Thus in category theory the “two for the price of one” principle holds: every concept is two concepts, and every result is two results." (Herrlich)

"The **Duality Principle for Categories** states
Whenever a property P holds for all categories,
then the property P^{op} holds for all categories.
The proof of this (extremely useful) principle follows immediately from the facts that for all categories A and properties P
(1) $(\mathbf{A}^{op})^{op} = \mathbf{A}$, and
(2) $P^{op}(\mathbf{A})$ holds if and only if $P(\mathbf{A}^{op})$ holds." (Herrlich)

THE DUALITY PRINCIPLE

3.5 DEFINITION

For any category $\mathbf{A} = (\mathcal{O}, \hom_{\mathbf{A}}, id, \circ)$ the **dual** (or **opposite**) **category of A** is the category $\mathbf{A}^{op} = (\mathcal{O}, \hom_{\mathbf{A}^{op}}, id, \circ^{op})$, where $\hom_{\mathbf{A}^{op}}(A, B) = \hom_{\mathbf{A}}(B, A)$ and $f \circ^{op} g = g \circ f$. (Thus $\mathbf{A}$ and $\mathbf{A}^{op}$ have the same objects and, except for their direction, the same morphisms.)

Duality for Saltatories

Obviously, *jumpoids* in diamonds are not the dual of a category. Simply because they are not categories but jumpoids, not being defined in the same way as categories.

But diamonds can have duals. Different strength of duality of diamonds, categories and jumpoids, can be introduced.

The dualization of a category is a dual category, thus, still a category.

A dualization of a jumpoid is dualizing its category, and vice versa, a dualization of a category in a diamond is dualizing its jumpoid. A dualization of a diamond is a dualization of its categories and its jumpoids together.

Duality in Diamonds

$X = g \lozenge f = [(g\ o\ f); u]$

1. $X \in Cat$ iff $dual(X) \in Cat^{op}$

$(g\ o\ f) = A \to C$

$$dual(g\ o\ f) = dual\ (dual(B \to C)\ o\ dual(A \to B))$$
$$= dual\ ((B \leftarrow C)\ o\ (A \leftarrow B))$$
$$= ((A \leftarrow B)\ o\ (B \leftarrow C))$$
$$= (A \leftarrow B \leftarrow C)$$
$$= A \leftarrow C.$$

Hence, $((g\ o\ f) = A \to C) \in Cat$ iff $(dual(g\ o\ f) = A \leftarrow C) \in Cat^{op}$.

2. $X \in Salt$ iff $dual(X) \in Salt^{op}$

$u = (\omega_4 \leftarrow \alpha_4) = compl(g\ o\ f)$

$dual(compl(g\ o\ f)) = dual(u)$

$$dual(u) = dual(\omega_4 \leftarrow \alpha_4)$$
$$= (\alpha_4 \to \omega_4).$$

$compl(dual(g\ o\ f)) = compl(f\ o\ g) = (\alpha_4 \to \omega_4).$

Hence, $(u = (\omega_4 \leftarrow \alpha_4)) \in Salt$ iff $(dual(u) = \alpha_4 \to \omega_4) \in Salt^{op}$.

Duality for Diamonds

$$
\begin{aligned}
X &= g \diamond f = \left[\left(g \; o \; f\right); u\right] \\
dual\left(X\right) &= dual\left(g \diamond f\right) \\
&= dual\left(dual\left(g\right) \diamond dual\left(f\right)\right) \\
&= \left(dual\left(f\right) \diamond dual\left(g\right)\right) \\
&= \left[\left(dual\left(f\right) \; o \; dual\left(g\right)\right); dual\left(u\right)\right]
\end{aligned}
$$

$$
\begin{aligned}
&For \; \left[\mathbf{A} = category; \; \mathbf{a} = saltatory\right]: \\
&\left[\mathbf{A}; \; \mathbf{a}\right] \in Diam \;\; iff \;\; dual\left(\left[\mathbf{A}; \; \mathbf{a}\right]\right) \in Diam^{op} \\
&iff \\
&\left[\begin{matrix} \mathbf{A} \in Cat \;\; iff \;\; dual\left(\mathbf{A}\right) \in Cat^{op} \\ \mathbf{a} \in Sal \;\; iff \;\; dual\left(\mathbf{a}\right) \in Salt^{op} \end{matrix}\right].
\end{aligned}
$$

$$
\begin{aligned}
&\left[\mathbf{A}; \; \mathbf{a}\right] \in Diam \;\; iff \;\; dual\left(dual\left(\left[\mathbf{A}; \; \mathbf{a}\right]\right)\right) \in Diam \\
&dual\left(P\right)\left(\left[\mathbf{A}; \; \mathbf{a}\right]\right) \; iff \;\; P\left(dual\left(\left[\mathbf{A}; \; \mathbf{a}\right]\right)\right) \\
&= P\left(dual\left(\left[dual\left(\mathbf{A}\right), \; dual\left(\mathbf{a}\right)\right]\right)\right) \\
&\left(P^{op}\right)\left(\left[\mathbf{A}; \; \mathbf{a}\right]\right) \; iff \;\; P\left(\left[\mathbf{A}; \; \mathbf{a}\right]^{op}\right) = P\left(\left[\mathbf{A}^{op}; \; \mathbf{a}^{op}\right]\right)
\end{aligned}
$$

$$
\begin{aligned}
&\left[Cat; \; Salt\right] \in Diam: \\
&\;\; dual\left(Cat\right) \; iff \;\; dual\left(Salt\right)
\end{aligned}
$$

$$
\begin{aligned}
&\left[\mathbf{A}; \; \mathbf{a}\right] \in Diam: \\
&dual\left(\left[\mathbf{A}; \; \mathbf{a}\right]\right) = \left[dual\left(\mathbf{A}\right); dual\left(\mathbf{a}\right)\right]
\end{aligned}
$$

$$
\left[\mathbf{A}; \; \mathbf{a}\right] \in Diam: \left[\mathbf{A}; \; \mathbf{a}\right]^{op} = \left[\mathbf{A}^{op}; \; \mathbf{a}^{op}\right]
$$

Diamonds are not elements of the "periodic" system of n-categories.

6.4.4 Complementarity of Diamonds

Complementarity is a feature of the interplay between categories and saltatories.

Between acceptional and rejectional configurations a complementarity is involved.

As much as duality is an important principle of category theory the corresponding transversal principle of complementarity is of the same importance as duality. The complementarity principle for diamonds is a new property of formal systems unknown to category theory.

Complementarity and duality

The interplay of duality and complementarity get a more intricate picture if we introduce partial dualities and partial complementarities.

More general: **Categorification and Diamondization**.
[(Categorification, Diamondization), Dissemination]
The two main trans-classical strategies are: dissemination and diamondization.

The Diamond was introduced as a complexion of 4 basic properties:
1. proposition,
2. opposition,
3. acceptance,
4. rejectance.

The relationship between those diamond properties and the categorial definition of the diamond is re-established by the equations for *acceptance* and *rejectance* relative to their morphisms.

complementarity of accept, reject

$$reject(gf) = k \text{ iff } accept(k) = (gf)$$
$$reject(hg) = l \text{ iff } accept(l) = (hg)$$
$$reject(hgf) = m \text{ iff } accept(m) = (hgf)$$

lThus, the operation *reject(gf)* of the the acceptance morphisms f and g is producing the rejectance morphism k.
And the operation *accept(k)* of the rejectance morphism k is producing the acceptance of the morphisms g and f.

The acceptance of f*g, acc(f,g), is the *composition* of f and g, (fg).

The rejectance of f*g, rej(f,g) is the *hetero-morphism* of f and g, (g^{o},f^{o}).

The acceptance of f*g*h, acc(f,g,h), is the *composition* of f, g and h, (fgh).

The rejectance of f*g*h, rej(f,g,h) is the *jump* morphism of f^{a} and h^{o}, (h^{o},f^{o}).

The acceptance f^{a} and h^{o}, acc(h^{o},f^{o}) is the *spagat* of f^{o} and h^{o}, ($f^{o}h^{o}$).

The acceptance f^{a}, g and h^{o}, acc(h^{o},g, f^{o}) is the *bridge* g of f^{o} and h^{o}, ($f^{o}gh^{o}$).

Diamond

category	**saltatory**
objects	*abjects*
morph	*hetero – m*
identity	*difference*
composition	*jump*
bridge	*spagat*
duality	*compl*

Diamond - Category DC

$$Category : \mathbf{A} = (Obj, hom, id, o)$$
$$Jumpoid : \mathbf{A}^{\circ} = (Obj^{\alpha}, het, diff, ||)$$
$$DC = (Obj, Obj^{\alpha}, hom, het, id, diff, o, ||, \bullet)$$
$$DC = (\mathbf{A}, \mathbf{A}^{a}, \bullet)$$

Interactivity in diamonds/diamonds of interactions

Essential for the definition of the *category* is the composition operation and its associativity. Associativity enters the game with the composition of 3 morphisms.

In the same way, the definition of *diamonds* is ruled by the diamond composition and the necessity of 4 morphisms.

A composition in a *category* is defined by the coincidence of the codomain *cod* and the domain *dom* of the composed morphisms.

A composition in a *diamond* has always to reflect additionally the difference, i.e., the *complement* of the categorical composition operation. Thus, a diamond composition is producing a *composite* and a *complement* of the composed morphisms. The composite is the *acceptional*, and the complement the *rejectional* part of the diamond operation.

Skeleton

Not very surprisingly, the whole story of diamond category theory begins with a 4-diamond category.

The 3-diamond category is a reduction delivering the seminal idea of a new topic in category theory and the common category is a genuine part of the 4-diamond.

The 3-diamond, categorial or as conceptual graph, is introducing the new, 4th theme, giving it a position in the conceptual framework but it is not yet offering any formal laws of it, like it happens for ordinary categories. This well positioned new theme with its localisation in the kenomoc grid is characterized in 3-diamonds only up to the counter-direction of its new morphism. There is no possibility given in a 3-diamond to further characterize the laws of this counter-morphism. It is as it is, a singularity, based on a category, focusing on the difference possible in its composition laws. That is, elucidating the possible difference in/of the necessary coincidence of codomain and domain in a composition of morphisms.

Formal laws of the new theme of diamonds enter the game only for m≥4, that is the story has to start with 4-diamonds. A proper definition of associativity for counter-morphisms (hetero-morphisms) occur only for a m-diamond, m≥5. That is a composition of diamonds.

– Categories are dealing with morphism, identity and composition.

– Jumpoids are dealing with hetero-morphism, difference and jumps.

– Diamonds are dealing with interaction of categories and jumpoids.

Both, categories and jumpoids, are in some respect complementary but not dual.

A full 4-diamond is a mediation of two categories and one jumpoid.

What are the complementary morphisms for?

The 2-level definition of the diamond composition as a composition and a complement, opens up the possibility to control the fulfilment of the conditions of coincidence of the categorial composition from the point of view of the complementary level.

If the morphism *l* is verified, then the composition *(f o g)* is realized. The verification is checking at the level *l* if the coincidence of cod(f) and dom(g), i.e., *cod(f)=dom(g)*, for the composition "o", is realized.

Thus, simultaneously with the realization of the composition, the complementary morphism *l* is controlling the (logical, categorical) adequacy of the composition (fg).

Diamonds are involved with bi-objects. Objects of the category and counter-objects of the *jumpoid* of the diamond. Both are belonging to different contextures, thus being involved with 2 different logical systems. The interplay between categories and jumpoids is ruled by a third, mediating logic for both.

6.4.5 Complementarity – formal exposition

compl(Diamond)

$$\begin{aligned}&For\ \ \forall X \in Comp:\\ &X \in Acc \ \ iff \ \ compl\left(X\right) \in Rej,\\ &compl\left(compl\left(X\right)\right) = X.\end{aligned}$$

For all compositions X, X is an element of the acceptional domain Acc iff the complement of X, compl(X), is an element of the rejectional domain Rej.

In a strict sense there is no complementation to a single morphism. There may be a duality but no complementarity. For that, there is also no complement of a categorial object in a saltatary. For technical reasons it could be argued that the complementarity of a morphism in a category is an object in a saltatory.

$$\begin{aligned}&\left[\mathbf{A};\ \mathbf{a}\right] \in Diam\\ &iff\\ &compl\left(\left[\mathbf{A};\ \mathbf{a}\right]\right) = \left[\mathbf{a};\ \mathbf{A}\right] \in Diam\end{aligned}$$

$$\begin{aligned}&revrs\left(\left[\mathbf{A};\ \mathbf{a}\right]\right) \in Diam\\ &iff\\ &\forall x \in \mathbf{A},\ \forall y \in \mathbf{a}\\ &\left[compl\left(\mathbf{A}\right);\ compl\left(\mathbf{a}\right)\right] \in Diam\end{aligned}$$

The complement of a categorical morphism can be introduced by the "trick" of using the identity operation id:

$$f : A \to B,\ id_A\ o\ f = f = f\ o\ id_B$$
$$\Rightarrow \overline{id_A\ o\ f} = \overline{f} = \overline{f\ o\ id_B}$$

$$1.\ \overline{f} = compl\left(id_A\ o\ f\right)$$
$$\overline{f} = compl\left(compl\left(id_A\right)\ o\ compl\left(f\right)\right)$$
$$\overline{f} = compl\left(diff\left(A\right)\ o\ compl\left(f\right)\right)$$
$$\overline{f} = compl\left(diff\left(A\right)\ o\ compl\left(A \to B\right)\right)$$
$$\overline{f} = compl\left(diff\left(A\right)\ o\ \left(diff\left(A\right) \leftarrow diff\left(B\right)\right)\right)$$
$$\overline{f} = \left(diff\left(A\right) \leftarrow \left(diff\left(A\right) \leftarrow diff\left(B\right)\right)\right)$$
$$\overline{f} = \left(diff\left(A\right) \leftarrow diff\left(B\right)\right)$$
$$\overline{f} = \left(\overline{A}\right) \leftarrow \left(\overline{B}\right)$$

$$2.\ \overline{f} = compl\left(f\ o\ id_B\right)$$
$$\overline{f} = compl\left(compl\left(f\right)\ o\ compl\left(id_B\right)\right)$$
$$\overline{f} = compl\left(compl\left(f\right)\ o\ diff\left(B\right)\right)$$
$$\overline{f} = compl\left(compl\left(A \to B\right)\ o\ diff\left(B\right)\right)$$
$$\overline{f} = \left(\left(diff\left(A\right) \leftarrow diff\left(B\right)\right) \leftarrow diff\left(B\right)\right)$$
$$\overline{f} = \left(diff\left(A\right) \leftarrow diff\left(B\right)\right)$$
$$\overline{f} = \left(\overline{A}\right) \leftarrow \left(\overline{B}\right)$$
$$Hence,\ \left(1.\right) = \left(2.\right) = \overline{f}$$

The complement of a right-identity of A is a left-identity over the complement of A, $\overline{A}$.

Thus, complementarity of objects for categories and saltatories is identical with the change in direction of the identity operation. Such a property is of no meaning for categories alone. The new properties for objects, i.e., bi-objects, are identity, diversity, left, right.

$$\left.\begin{array}{l} f : A \to A \\ id_A \ o \ f = f \end{array}\right\rangle : \left(\overline{f}\right) = \overline{id_A \ o \ f}$$

$$\begin{aligned}
\overline{f} &= compl\left(id_A \ o \ f\right) \\
\overline{f} &= compl\left(compl\left(id_A\right) \ o \ compl\left(f\right)\right) \\
\overline{f} &= compl\left(diff\left(A\right) \ o \ compl\left(f\right)\right) \\
\overline{f} &= compl\left(diff\left(A\right) \ o \ compl\left(A \to A\right)\right) \\
\overline{f} &= compl\left(diff\left(A\right) \ o \ \left(diff\left(A\right) \leftarrow diff\left(A\right)\right)\right) \\
\overline{f} &= \left(diff\left(A\right) \leftarrow \left(diff\left(A\right) \leftarrow diff\left(A\right)\right)\right) \\
\overline{f} &= \left(diff\left(A\right) \leftarrow diff\left(A\right)\right) \\
\overline{f} &= \left(\overline{A}\right) \leftarrow \left(\overline{A}\right)
\end{aligned}$$

The complement of a binary composition (g o f), is a *heter-omorphism* u.

Complementarity of Acc and Rej

$$\begin{aligned}
& X \in Acc \ \ iff \ compl\left(X\right) \in Rej \\
& X = g \ o \ f : \\
& compl\left(g \ o \ f\right) = compl\left(compl\left(g\right) \ o \ compl\left(f\right)\right) \\
& \qquad = compl\left(diff\left(cod\left(f\right)\right) \ o \ diff\left(dom\left(g\right)\right)\right) \\
& \qquad = compl\left(\left(\overline{B_{cod}}\right) \ o \ \left(\overline{B_{dom}}\right)\right) = \omega_4 \leftarrow \alpha_4 \\
& \left(u : \omega_4 \leftarrow \alpha_4\right) \in Rej \\
& Hence, \left(g \ o \ f\right) \in Acc \ \ iff \ \left(u : \omega_4 \leftarrow \alpha_4\right) \in Rej \\
& \qquad \left(g \ o \ f\right) \in Acc \ \ iff \ \left(\overline{g \ o \ f}\right) \in Rej
\end{aligned}$$

Complementarity of Acc and Rej

$$
\begin{aligned}
&X \in Acc \ \ iff\ compl\left(X\right) \in Rej \\
&X = g\ o\ f : \\
&compl\left(g\ o\ f\right) = compl\ \left(compl\left(g\right) o\ compl\left(f\right)\right) \\
&\qquad = compl\left(diff\left(cod\left(f\right)\right) o\ diff\left(dom\left(g\right)\right)\right) \\
&\qquad = compl\left(\left(\overline{B_{cod}}\right) o\ \left(\overline{B_{dom}}\right)\right) = \omega_4 \leftarrow \alpha_4 \\
&\left(u : \omega_4 \leftarrow \alpha_4\right) \in Rej \\
&Hence,\ \left(g\ o\ f\right) \in Acc\ \ iff\ \left(u : \omega_4 \leftarrow \alpha_4\right) \in Rej \\
&\qquad \left(g\ o\ f\right) \in Acc\ \ iff\ \left(\overline{g\ o\ f}\right) \in Rej
\end{aligned}
$$

The complement of a ternary composition (f o g o h) is a *jumpoid* (u||v).

$$
\begin{aligned}
&\left(f\ o\ l\ o\ m\right) \in Acc\ \ iff\ \left(\overline{f\ o\ l\ o\ m}\right) \in Rej \\
&\left(f\ o\ l\ o\ m\right) = h \\
&rej(h) \ = \ (u \parallel v) \in Rej \\
&acc(u \parallel v) = h \in Acc
\end{aligned}
$$

Duality between categories is symmetrical and thus preserving complexity of a situation. Complementarity for diamonds is establishing an asymmetry between categories and saltatories. Saltatories of categories are of lower complexity than their complementary categorical part they are representing by complementation. In this sense, saltatories are abstractions from categories.

Complementarity and Duality

$$
\begin{aligned}
&\forall X \in Diam : \\
&compl\left(dual\left(X\right)\right) = dual\left(compl\left(X\right)\right)
\end{aligned}
$$

6.4.6 Interactionality in Diamonds

Interactionality of diamonds is studying the interaction between categories and saltatories. Taken in separation, topics like complementarity are interactional, but are not considering the inertwining and intervening properties of interactivity.

One main property of interaction between categories and saltatories in diamonds is introduced by the operation of bridging.

Between the hetero-morphism k, l, the morphism g is offering a bridge, marked in red, and thus interacting between the saltatorical and the categorical domain of the diamond.

Bridging Conditions and Associativity for Interactions

Bridging Conditions

$\forall \bar{k}, \bar{l} \in HET,$

$\forall f, g \in MORPH:$

$g \circ f, l \,||\, k, g \bullet k, l \bullet g,$

$(\bar{l} \bullet g) \bullet \bar{k},$

$\bar{l} \bullet (g \bullet \bar{k})$ are in $MC^{\bullet}$

$l \bullet g \bullet k \in MC^{\bullet}:$

$cod(l) = diff(cod(g))$

$dom(k) = diff(dom(g))$

Bridging

If $\bar{k}, g, \bar{l} \in MC^{\bullet}$, then $(\bar{k} \bullet g) \bullet \bar{l} = \bar{k} \bullet (g \bullet \bar{l})$

Interactivity

$(k \,||\, l) \bullet g = g \bullet (k \,||\, l)$

$(k \,||\, l) \bullet g = (g \bullet l) \,||\, (g \bullet k)$

$(k \,||\, l) \bullet g = (g \bullet l) \circ (g \bullet k)$

$(k \,||\, l) \bullet g = (g \bullet l) \bullet (g \bullet k)$

Interactivity

$$\begin{bmatrix} (k \,||\, l) \circ g \\ g \circ (k \,||\, l) \end{bmatrix} = \begin{bmatrix} (g \,||\, l) \circ (g \,||\, k) \\ (g \circ l) \,||\, (k \circ g) \end{bmatrix}$$

$$\left[\begin{array}{l}
\qquad\qquad \omega_4 \xleftarrow{\quad m \quad} \alpha_4 \\
\qquad\qquad \omega_4 \leftarrow_k \alpha_4 \qquad\qquad \omega_8 \leftarrow_l \alpha_8 \\
\alpha_1 \xrightarrow{f} \omega_1 \Updownarrow \alpha_2 \xrightarrow{g} \omega_2 \Updownarrow \alpha_5 \xrightarrow{h} \omega_5 \\
\alpha_3 \xrightarrow{\qquad fg \qquad} \omega_3 \\
\qquad\quad \alpha_6 \xrightarrow{\qquad gh \qquad} \omega_6 \\
\alpha_7 \xrightarrow{\qquad\qquad fgh \qquad\qquad} \omega_7
\end{array}\right]$$

As a consequence, the compositions (f o g) and m=(k | | l) are mixed: m= (l | | k) o g).

Duality for Bridging

$$X = (f \bullet k),\ f : A \to B,\ k : \omega_4 \leftarrow \alpha_4 :$$

$$\begin{aligned}
dual(f \bullet k) &= dual(dual(f) \bullet dual(k)) \\
&= dual((B \to A) \bullet (\alpha_4 \to \omega_4)) \\
&= (\alpha_4 \to \omega_4) \bullet (B \to A).
\end{aligned}$$

$$X = (g \bullet l) \,||\, (g \bullet k),\ g : B \to C,\ l : \omega_4 \leftarrow \alpha_4,\ k : \omega_8 \leftarrow \alpha_8 :$$

$$\begin{aligned}
dual(X) &= dual(dual(g \bullet l) \,||\, dual(g \bullet k)) \\
&= dual(g \bullet k) \,||\, dual(g \bullet l) \\
&= (dual(k) \bullet dual(g)) \,||\, (dual(l) \bullet dual(g)) \\
&= (dual(l) \bullet dual(g)) \,||\, (dual(k) \bullet dual(g)) \\
&= (dual(g) \bullet dual(l)) \,||\, (dual(g) \bullet dual(k)) \\
&= dual(g \bullet l) \,||\, dual(g \bullet k).
\end{aligned}$$

Distributivity for Interactions

Distributivity

$$(k \,||\, l) \bullet g = g \bullet (k \,||\, l)$$
$$(k \,||\, l) \bullet g = (g \bullet l) \,||\, (g \bullet k)$$
$$(k \,||\, l) \bullet g = (g \bullet l) \; o \; (g \bullet k)$$
$$(k \,||\, l) \bullet g = (g \bullet l) \bullet (g \bullet k)$$

The interactional composition *(l o g o k)* can be read in different ways:

1. From the position of morphism g, there is an "arrival" hetero-morphism l and a "retro-grade" hetero-morphism k for g.

2. From the position of the hetero-morphisms k, l, there is a bridging morphism g, connecting both hetero-morphisms.

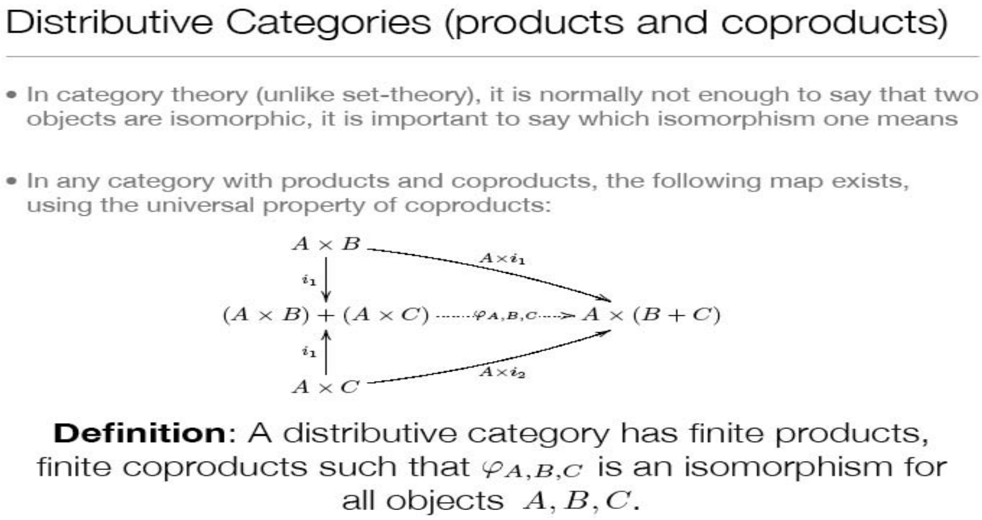
3. The bridging compositions are symmetric: (k | | l) • g = g • (k | | l).

Distributivity in Category theory

Distributivity occurs in category theory as the distributivity of products and coproducts. In the definition of category itself there is no space for such a definition of distributivity, simply because there is one and only one operator involved: *composition*. And to realize distribution, at least two operators are necessary. Compositions are commutative, identive and associative; but not distributive. Categoricity of category theory is highly abstract and is reducing operationality to the single operation of composition. Compositionality is the concept and the operation of categories.

Diversity enters into the formalism with the category-based constructions of products and coproducts of morphisms. Hence, distributive laws of products and coproducts can be constructed and studied. Because diamonds are based on the interplay of categories and saltatories, which are involved with two fundamental operations: composition (o) and jump-operation (||), it is reasonable to find interactive laws as distributivity between those basic operators inside the very definition of the conception of diamonds.

Similar distributivity of products and coproducts can then be introduced, not only for categories but for saltatories, too. And diamond products and coproducts with their internal and external distributivity can be studied.



Pawel Sobocinski, 2007
http://www.mimuw.edu.pl/~tarlecki/teaching/ct/slides/Warszawa1.pdf

"A category with finite products and finite coproducts is said to be distributive, if for all objects A, B, and C, the canonical map

∂ : A x B +A x C –> A x (B +C) is invertible.

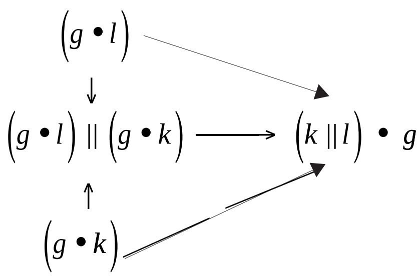
These categories have proved to be important in theoretical computer science as they facilitate reasoning about programs with control and the specification of abstract data types." (J.R.B. Cockett, Stephen Lack) http://www.tac.mta.ca/tac/volumes/8/n22/n22.pdf

Another source
http://www.mathematik.uni-marburg.de/~gumm/Papers/Distributivity.pdf

Distributivity constructions for diamonds

A diamond with composition and jump-operation is said to be d-distributive, if for all morphisms and hetero-morphisms f, g, k, l, the d-canonical map

d-∂: (g • l) || (g • k) —> (k || l) • g is d-invertible.



Complementarity between morphisms and hetero-morphisms

A new kind of complementarity has to be considered. The complementarity between the morphism g and the hetero-morphism m.

The morphism g is understood as an inter-mediate morphism between morphisms f and h, i.e., (f o g o h).

The complements of (f o g o h) are the hetero-morphisms l, m, composed in the jump-composition (k | |)= m.

The direct complement or opposite to the morphism g is compl(g) = m.

In the same sense as (f o g) =h, compl(f o g)= l, the rejectional opposite of h is l.

Interaction between categories and saltatories in diamonds

$$[\mathbf{A};\ \mathbf{a}] \in Diam \ \ iff \ \ rev\left([\mathbf{A};\ \mathbf{a}]\right) \in Diam$$
$$rev\left([\mathbf{A};\ \mathbf{a}]\right) = [\mathbf{a};\ \mathbf{A}]$$
$$rev\left([\mathbf{A};\ \mathbf{a}]\right) = [compl(\mathbf{A});\ compl(\mathbf{a})]$$
$$\left.\begin{array}{l} compl(\mathbf{A}) = \mathbf{a} \\ compl(\mathbf{a}) = \mathbf{A} \end{array}\right\rangle rev\left([\mathbf{A};\ \mathbf{a}]\right) = [\mathbf{a};\ \mathbf{A}]$$

The reversion of a diamond is a diamond.

6.4.7 Subversiveness of Diamonds

Hetero-morphisms and morphograms

Instead of leaving category theoretic terms and topics for kenogrammatics, the neither-nor-question for objects and morphism is leading to hetero-morphisms of rejectionality. This approach was not yet conceived in the study *"Categories and Contextures"*.

> "Given the basic concepts of category theory we are free to apply the Diamond Strategies to re-design the field.
>
> With the basics of objects and morphism naturally 4 positions can be focused.
>
> *First*, the classic focus, is on objects. The categorial results are statements about objects in categories.
>
> *Second*, the more modern focus is on morphisms. Here even objects are conceived as special morphisms.
>
> Both thematizations are of equal value especially because the terms "object" and "morphism" are dual.
>
> More interesting are the two further steps of diamondization of the categorial basics "object" and "morphism".
>
> *Third*, we ask *"What is both at once, object and morphism?*" An answer is given by the distribution and mediation (dissemination) of categories in a *poly-categorial* framework.
>
> *Forth*, the question arises: *"What is neither object nor morphism?"*
>
> Also the following citation of Gunther does not intent to gives a definitional clear explanation of a *neither-nor* situation it is useful as a hint in the right direction.
>
> *„Thus the proemial relation represents a peculiar interlocking of exchange and order. If we write it down as a formal expression it should have the following form:*
>
> $$\square \;\; R^{pr} \;\; \square$$
>
> *where the two empty squares represent kenograms which can either be filled in such a way that the value occupancy represents a symmetrical exchange relation or in a way that the relation assumes the character of an order."* Gunther, p. 227
>
> Obviously, the scheme or formula, represents neither an order nor an exchange relation. With this in mind, we can try to think the *neither-nor* of objects and morphisms of category theory as the inscription of the processuality of „categorization" in itself into a scriptural domain beyond classical formal systems, that is into *kenogrammatics*.
>
> We need this quite wild „anti-concept" of kenogram and kenogrammatics to deal scientifically and technically with the structure of any change, the proemiality, which is not to catch by any construction based on semiotical identity." p. 7 (Kaehr)
>
> http://www.thinkartlab.com/pkl/lola/Categories-Contextures.pdf

Despite an obvious kind of similarity of the complementary pair "morphisms" and "hetero-morphisms" in diamond theory in respect of the terms "object" and "morphisms", it seems to be reasonable to understand hetero-morphisms as belonging to a realm which is governed neither by categorical objects nor categorical morphisms. Hetero-morphisms don't belong to categories but to "*saltatories*" which are studying the "morphisms" of the domain of rejectionality. Categories are studying the morphisms of the field of acceptionality. Both, categories and saltatories together, are inscribing the interplay of diamonds.

Interplay of morphisms and morphograms

"In mathematics, a *morphism* is an *abstraction* of a structure-preserving mapping between two mathematical structures.

A *category* C is given by two pieces of data: a *class* of *objects* and a class of *morphisms*.

There are two operations defined on every morphism, the *domain* (or source) and the *codomain* (or target).

For every three objects X, Y, and Z, there exists a *binary operation*
hom(X, Y) x hom(Y, Z) —> hom(X, Z) called *composition*." WiKi

The "double gesture" of inscription is not enfolded as a succession of different contextural decisions. It is given/installed at once. Hence, there are some similarity in the description of diamond objects to morphograms. Morphograms are inscribing standpoint-free complexity. But there is also another approach to morphograms.

As Heinz von Foerster proposed, morphograms can be regarded as the *inverse* function of a logical function. Hetero-morphisms are inverse to morphisms. Hence, there is a possible connection between hetero-morphisms of a composition and morphograms of such a composition. In this sense, morphograms can be seen as the inscription of the inversion of morphisms, i.e., of rejectional morphisms. But hetero-morphisms as inverse morphisms are not simply dual to morphisms, they are not only "morphisms" with an inverse arrow to acceptional morphisms, they are on a different level of *abstraction*, too. Because morphisms are mapping between objects, and hetero-morphisms are abstractions from the operator of composition, their conceptual status is principally different. Morphisms are mappings as mappings; hetero-morphisms are abstractions from the interaction of morphisms. Hence, the new couple in diamonds is: *morphism/morphogram*.

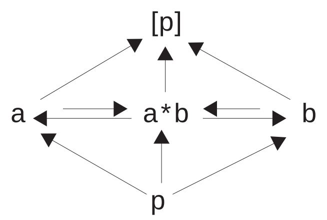
Objects in diamond systems are based on as-abstractions. The core system is abstracted by its acceptional and/or rejectional aspect. There is no neutral object in diamonds like in the lambda calculus. Reference in the lambda calculus is an identification of an object as an identity. This identity can be simple or complex (composed) but its naming and reference is realized by a simple operation of identification, establishing the identity of the object.

Thus, the fundamental properties of hetero-morphisms before questions of identity/diversity and commutativity, associativity properties are studied, are:

1. *inverse morphism* property
2. *actional abstraction* property

These two properties are defining the rejectional status and the saltatory structure of jumpoids.

An accessible, and first interpretation of the two properties of hetero-morphisms can be found in the theory of morphogrammatics. Morphograms can be regarded as inversa of compositions. They are "object-free, thus, more abstract than morphisms. But as morphograms of compositions they are connected to compositions of morphisms. They may be seen as generalizations of compositions of abstract morphisms.



The categorical product "a*b" is founded in p. The categorical product is based on the inverse product, the thematization of the compositor, as a morphogram [p]. The core elements of the diagram, a, b, a*b, have a double meaning. They belong to categories and to saltatories. Insofar, they define the structure of the morphogram [p].

As an example, we can think of a logical disjunction "a v b", which is based on its constituents "a" and "b" as core elements. These together can be inverted to the hetero-morphism [p], which defines the morphogram of the binary disjunction as the operativity of the operator "v", but concretized in its complication, as a binary action, by the constituents "a" and "b".

Because morphograms can be conceived as inversa of compositions, and are generating a generalization of the composition of morphisms, they are representing a permutation-invariant class of compositions. In the example, the morphogram [p] is representing the disjunction "avb" as well as all negations of it "¬(avb)". Hence, again, morphograms are negation-invariant patterns.

If a product composition is called a *process* (Baez) then the complement of the process is the form or structure of the process, hence inscribed as the morphogram of the process.

6.4.8 Positionality of Diamonds

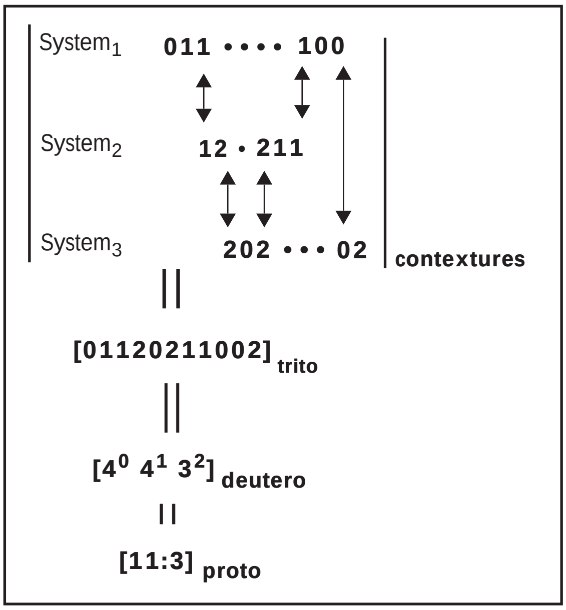
Levels of situatedness of diamonds

1. Diamonds in proto-mode: Distribution of Diamonds onto the proto-structure,
2. Diamonds in deutero-mode: Distribution of Diamonds onto the deutero-structure,
3. Diamonds in trito-mode: Distribution of Diamonds onto the trito-structure,
4. Diamonds in logic-mode: Distribution of Diamonds onto polylogical-structure,
5. Diamond-structure of the modi of distribution [proto, deutero, trito, logic].

Diamonds are directly produced by the operations of iteration and accretion in proto- and deutero-structures and their commutativity. The case is more intricate for trito-structures. The proposed solution is locating, at first, diamonds inside of trito-grams and not between trito-grams of different complexity as for proto- and deutero-grams. Thus it is introducing iteration and accretion inside of the trito-gram and not between trito-grams of different complexity. More correctly, the path producing the tritogram can be interpreted in different ways, thus enabling commutativity. To discover a commutativity between different trito-grams for trito-arithmetic iteration and accretion is another question.

Abstractions

The aim of this endeavour is to develop a mechanism to give the diamonds a concrete position, a *structural place*, before / beyond classical logical systems. Such a placement of diamonds can be succeed on different levels of pre-logical structures, i.e., the kenogrammatic structures of proto-, deutero- and trito-differentiation. Beyond logic, i.e., beyond mono-contexturality, a distribution of diamonds in poly-contextural situations is proposed. The diamond strategies, short the diamonds, are explanations of the metaphor of tetraktomai, i.e., of doing the tetraktys, and its translation into the strategy of diamondization.



Abstractions and concretizations between the levels may help to gain a better understanding of the strategy.

7 Axiomatizations of Diamonds

7.1 Axiomatics One

$$\mathbf{Diamond}^{(m)}_{\mathbf{Category}} = \left(\mathbf{Cat}^{(m)}_{\mathbf{coinc}} \mid \mathbf{Cat}^{(m-1)}_{\mathbf{jump}}\right)$$

$$\mathbb{C} = (M, o, \|)$$

1. Matching Conditions

$a.\ g\ o\ f,\ h\ o\ g,\ k\ o\ g$ *and*

$$b_1 \xleftarrow{\ l\ } b_2$$
$$c_1 \xleftarrow{\ m\ } c_2$$
$$d_1 \xleftarrow{\ n\ } d_2$$

$l \parallel m \parallel n$ *are defined,*

$b.\ h\ o\ ((g\ o\ f)o\ k)$ *and*

$$b_1 \xleftarrow{\ l\ } b_2 \parallel c_1 \xleftarrow{\ m\ } c_2 \parallel d_1 \xleftarrow{\ n\ } d_2$$

$l \parallel (m \parallel n)$ *are defined*

$c.\ ((h\ o\ g)\ o\ f)o\ k$ *and*

$(l \parallel m) \parallel n$ *are defined,*

$d.$ *mixed* $: f, l, m$

$l \parallel m, \bar{l}\ o\ f\ o\ \overline{m}$

$(\bar{l}\ o\ f)\ o\ \overline{m},$

$\bar{l}\ o\ (f\ o\ \overline{m})$ *are defined.*

2. Associativity Condition

$a.$ *If* $f, g, h \in MC$, *then* $h\ o\ ((g\ o\ f)\ o\ k) = ((h\ o\ g)\ o\ f)\ o\ k$ *and*

$l, m, n \in MC \qquad l \parallel (m \parallel n) = (l \parallel m) \parallel n$

$b.$ *If* $\bar{l}, f, \overline{m} \in MC$, *then* $(\bar{l}\ o\ f)\ o\ \overline{m} = \bar{l}\ o\ (f\ o\ \overline{m})$

3. **Unit Existence Condition**

$$a.\ \forall f\ \exists (u_C, u_D) \in (M, o, \|): \begin{cases} u_C\ o\ f,\ u_D\ o\ f, \\ u_C \parallel f,\ u_D \parallel f \end{cases} \text{are defined.}$$

4. Smallness Condition

$$\forall (u_1, u_2) \in (M, o, \|): hom(u_1, u_2) \wedge het(u_1, u_2) =$$
$$\left\{\begin{matrix} f \in M \mid f\ o\ u_1 \wedge u_2\ o\ f, \\ f \in M \mid f \parallel u_1 \wedge u_2 \parallel f \text{ are defined} \end{matrix}\right\} \in SET$$

Bridging Conditions

$\forall \bar{l}, \overline{m} \in HET,$

$\forall f, g \in MORPH:$

$g\ o\ f, l \parallel k,$

$\left(\bar{l}\ o\ g\right) o\ \bar{k},$

$\bar{l}\ o\ \left(g\ o\ \bar{k}\right)$ *are in MC*

Associativity

If $f, g, h \in MC$, *then* $h\ o\ \left(\left(g\ o\ f\right) o\ k\right) = \left(\left(h\ o\ g\right) o\ f\right) o\ k,$

$\bar{k}, \bar{l}, \overline{m} \in MC \qquad \bar{k} \parallel \left(\bar{l} \parallel \overline{m}\right) = \left(\bar{k} \parallel \bar{l}\right) \parallel \overline{m}$

Bridging

If $\bar{k}, g, \bar{l} \in MC$, *then* $\left(\bar{k}\ o\ g\right) o\ \bar{l} = \bar{k}\ o\ \left(g\ o\ \bar{l}\right).$

Interactivity

$$\begin{bmatrix} \left(k \parallel l\right) o\ g \\ g\ o\ \left(k \parallel l\right) \end{bmatrix} = \begin{bmatrix} \left(g \parallel l\right) o\ \left(g \parallel k\right) \\ \left(g\ o\ l\right) \parallel \left(k\ o\ g\right) \end{bmatrix}$$

Proposition

If $\mathbf{A}$ *is a diamond, then*

a. $\left(\left(Mor\left(\mathbf{A}\right), o\right), \left(Het\left(\mathbf{A}\right), \parallel\right)\right)$ *is an object – free diamond, and*

b. *an* $\mathbf{A}$ *– morphism is an* $\mathbf{A}$ *– identity iff it is an unit of* $\left(Mor\left(\mathbf{A}\right), o\right)$,

c. *an* $\mathbf{A}$ *– heteromorphism is an* $\mathbf{A}$ *– difference iff it is an unit of* $\left(Het\left(\mathbf{A}\right), \parallel\right)$.

7.2 Complexity reduction by diamondization

7.2.1 Reduction steps

category —> duality of category ==> complementarity of duality of category.

Hence, in diamond theory, Herrlich’s principle *“two for the price of one”* holds too. But because of the diamond abstraction, which is reducing complexity, we have less to carry home.

Diamond theory is dealing with duality for categories and for saltatories and with the complementarity between saltatories and categories and their dualities.

$$diamonds = \begin{bmatrix} saltatory \\ category \end{bmatrix} x \begin{bmatrix} duality \\ complementarity \end{bmatrix}$$

$$\begin{array}{ccc} Cat & \overset{compl}{\rightleftarrows} & Salt \\ \updownarrow dual & & \updownarrow \\ Dual & \overset{compl}{\rightleftarrows} & Dual \end{array}$$

$$\begin{aligned} &\forall f_1 \dots f_m : length\left(f^{(m)}\right) = \binom{m}{2} \\ &\forall u_1 \dots u_n : length\left(u^{(n)}\right) = \binom{m-1}{2} \\ &comp\left(f_1, \dots, f_m\right) = f^{(m)} \\ &comp\left(u_1, \dots, u_n\right) = u^{(n)} \\ &length\left(f^{(m)}\right) > length\left(u^{(n)}\right) \end{aligned}$$

7.2.2 Reduction by morphograms

Hetero-morphisms as morphograms are enabling a further reduction of complexity.

Levels of Diamond Abstractions

$X = g \;\square\; f = \left[\left(g \;\Diamond\; f\right); \left[u\right]\right] = \left[\left(g \;o\; f\right); \left(u\right); \left[u\right]\right]$

$Category : level\ of\ composition : \left(g \;o\; f\right)$

$Saltatory : \ level\ of\ complementarity : \left(u\right)$

$Morphogrammatics : level\ of\ subversiveness : \left[u\right]$

Reduction steps

$length\left(g \;\square\; f\right) < length\left(g \;\Diamond\; f\right) < length\left(g \;o\; f\right)$

7.2.3 Diamonds as a complementation of Categories

It could be said that diamond theory is simply a complementation aspect of categories. It may be a new, perhaps strange operation, on categories but based on categories and therefore not a concept in its own right. There are many operations possible on categories, especially duality, why not complementarity? With that, we could stay firm to category theory and, if it makes any sense at all, add the operation of complementation to its main operators.

In this sense, diamond theory would have the merit of introducing an new operation to the known categorical operations – and nothing more. It may be even the case, that the diamond operations and notions are appearing somewhere in category theory in a different form not yet accessible to my understanding.

Hence, we would have *compl*: [Cat] —> [Cat; diam].

Against this reduction procedure I would like to argue that it is missing the point.

The only similar operation in category theory to complementation seems to be dualization. But dualization is not part of the very definition of categories but a meta-theoretical property of categories while diamonds, i.e., saltatories which are complementary to categories are introduced on the very basic level of the definition of diamonds. Duality is a meta-theoretical concept, complementarity an object-language or proto-theoretical concept and strategy. Even if diamondization is regarded as a meta-theoretical concept its concepts and strategies have to be defined on a proto-language level. There seems to be no reasonable arguments to introduce complementation as a meta-theoretical concept like it happens for dualization. Dualization in naturally as a reversion of arrows is naturally motivated by the basic concepts of category: arrows and objects. But there is no natural motivation to introduce complementation for categories. Diamonds are realized in a different paradigm of thinking than categories.

Categorical Diamond

sautosition

/ \

objects *arrows*

\ /

composition

In other words, category theory is based on a duality of objects and morphisms (arrows), diamond theory is based on the genuine 4-fold structure of diamonds, i.e., class of objects, class of arrows, neither-nor of objects and arrows, the collection of hetero-morphism and the both-and of objects and arrows, the collection of compositions of morphisms.

That is, (objects, arrows, composition) belong to Class-1 while (object, arrows, sautisition) belongs to Class-2. Class-1 is the class of morphisms. Class-2 is the class of hetero-morphisms. Class-1 and Class-2 are mediated in bi-conglomerates.

Another candidate to reduce diamonds to categories could be seen by the index- or *fibre-categories*. Fibering was used to formalize polycontextural logic by Jochen Pfalzgraf. This is of help to deal mathematically with polycontextural systems. But here again, the diversity and multitude of contextures in polycontexturality is introduced at the very proto-logical level of the formalism while the strategies of fibering are secondary and are based on mono-contextural category theory. Hence, fibering and similar concepts are not doing the job.

As a consequence of the proto-logical status of the diamond definition, techniques like dualization and fibering can be applied, secondarily, on diamonds as such too.

8 Composition and Iter/alter-ability in Diamonds

Compositions with their associativity wouldn't be of much interest if they wouldn't be involved with repeatability. But repeatability is not a well studied concept in math.

8.1 Antidromic repeatability

There is no hint in the analysis of iterability given in my paper *"Lambda Calculi in Polycontextural Situations"*, nor in the work of Derrida (or Caputo, Gasché, or Badiou), as far as I remember, that points to the simultaneous antidromic, retro-grade movement of repeatability, iterative and accretive, as in the diamond conception of composition.

Disremption as a general concept for *iterative* and *accretive* repetition, even in the sense of Kierkegaard's *"Wiederholung des Alten"* vs. *"Wiederholung des Neuen"* or Gehlen's concept of creation as "*Wiederholung*", hasn't made explicit, any components of antidromic behaviors. In Christian theology we encounter the double-face of God as Deus absconditus and as Demiurg.

> "Repetition only means iterability in the modus of identity, excluding all traits of accretive repeatability or alterating disremption. That is, iterability is restricted to the *ITER*, excluding the *ALTER* of the poly-notion *iter/alter-ability*. This decision for identical iterability guarantees strict dis-ambiguity of formal systems. The challenge to introduce the non-concept of iter/alterability is the basic decision to start computation from the very beginning with complex writing and introducing the game of ambiguous calculations." (Kaehr)

Alterability seems still to be connected to a progression-oriented concept of disremption, insiting of the othernes, i.e., the alter of repetition. The alter of alterability is not yet connnected to the other possible meaning of alter as antidromic repetition.

disremption —> iter, alter,
double-disremption —> progression, retro-gression —> iter, alter.

Recursion in its recurrence is not antidromic but is re-running just ran runs.

Even in a dissemination of repeatability in polycontextural systems, the concept of a simultaneous counter-movement at the place of a contextural repetitions is not yet conceived. What is included are movements and counter-movements distributed over different contextures. But the counter-movements are not necessarily inertwind with their movements as in diamond constellations.

Intra-contextural concepts of repetition are: iterability, iteration, recursion.
Trans-contextural concepts of repetition are: accretion, co-creation.
Inter-contextural concepts of repetition are: interaction of iteration and accretion.
Diamond concepts of repetition are: simultaneity of repetition and counter-repetition.

Diamonds, with iterative and accretive compositions, are covering the full range of repeatability as it is known until now.

8.2 Identification vs. thematization

Now we may be prepared to introduce polycontextural strategies at the very beginning of our calculus, combinatory as well as lambda:

Ix=x, identity is often excluded from the calculus, because it is obvious and it can be defined by **S** and **K**. (But this is the same trick as to define the unary negation in logic with the binary Sheffer Stroke, which surely implies in itself negation.)

Because of the complexity of identification in polycontextural systems, the operator **I** deserves its own arena of presentation.

Ix means, identification of x as x, thus **I**x=x.

Therefore, identification is a special case of thematization. Identification is thematization of something as something and not as something similar or different.

Identification in poly-combinatorial systems is involved in *elective* decisions, and has to decide as what something is identified. *Elective* decisions are decisions between contextures, *selective* decisions are decisions made inside of contextures.

Identification of something as something or something else. Identification as what? A step further has to take account of the question "Identification by whom?" because polycontextural systems are societal systems, involving a multitude of acting agents. Classic calculus is "subjectless". It doesn't matter who, where, when etc. the operations are operated. Therefore, in polycontextural constellations, the operator identification **I** is realized in different modi, from the identical $\mathbf{I}^i\ x^i = x^i$ for all sub-systems S^i to the different *transversal* identificators:

$\mathbf{I}^i\ x^{(m)} = x^j$.

Thematization as interpretation and/or thematization as identification. Identification, again is, *"giving something a name"*, that is, identification is abstraction, abstracting identity, an identical property, out of complexity and diversity. Abstraction as identification is the sense of and behind the lambda calculus. To identify is to iterate the same as the identical. And this kind of identification determines the kind of iterability of the operations.

What is *abstraction* for the lambda calculus is *identification* for combinatory logic. And both are, in an abstract sense, equivalent. At least isomorphic. *Thematization* is (the working title) for polycontextural calculi or formal games in general. Another game starts with the process of *morphic* abstraction and subversion of morphogrammatics.

Thus, the meta-language identification or identificator *Ident* is realizing itself as different kinds of specific identificators $\mathbf{I}^i$.

$\mathbf{I}^i\ x^{(m)} = x^i$, means the complexion $x^{(m)}$ identified as x^i.
Or: x^i identified as a part of $x^{(m)}$.

$\mathbf{I}^{i..j}\ x^{(m)} = x^{i..j}$, means the complexion $x^{(m)}$ identified as sub-complexion $x^{i..j}$.

With involvement of the super-operators [id, perm, red, repl, bif] a more complex definition of identificators in polycontextural situations is possible.

Identification is a main operation in the programming scheme *ConTeXtures*. In polycontextural situations contextures have to be identified, thus, *identify contexture(s)* is the programming operation based on the combinatory logic *identifiers* ***I***. Identifiers plays two roles, one as an identificator of a contexture and one intra-contexturally as a local operator.

8.2.1 Iterability and differance

Iterability as repetition is based on the identity of its signs, here the name of its operators. For **I**(**I**(**I**)) = **I**, all occurrences of the name **I** for the identity operator are identical. Now, we learn, that this constellation is a very special case for iter/alter-ability in the modus of sameness. The identical signs are the same without intrinsic differences.

The same is different. $\mathbf{I}^i(\mathbf{I}^j(\mathbf{I}^k))) \neq \mathbf{I}$ for $i \neq j \neq k$

Signs, terms, are realized at locations, they occur at semiotic places, they have an index of their occurrence. Thus, signs or marks are not anymore abstract objects, written down, by accident, on paper, living in the mind or logosphere of the thinker.

8.2.2 Variants of K and S

For classical combinatory logic the identificator operator **I** seems to be quite superfluous. For transclassic combinatory logic the multitude of different identificators $\mathbf{I}^i$ are basic. Variants of identificators opens up variant definitions of the main operators **S** and **K**. Because each operator is identical with itself **I**(**K**)=**K** and **I**(**S**)=**S**, different kinds of operators **K** and **S** can be defined depending on different identificators:

$\mathbf{I}^i(\mathbf{S}^{(m)}) = \mathbf{S}^i$. This operation is self-applicable: $\mathbf{I}^i(\mathbf{I}^{(m)}) = \mathbf{I}^i$.

$$\left[\begin{array}{l} \textit{thematize CL } (\mathbf{SKI})^{(3)} \\ \left[\begin{array}{l} \textit{contextures}^{(3)} \\ \left[\begin{array}{l}\textit{identify } CL^1\\ \left[\begin{array}{l}\textit{operators}\\ \left[\textit{terms}\right]\end{array}\right]\end{array}\right] \left[\begin{array}{l}\textit{identify } CL^2\\ \left[\begin{array}{l}\textit{operators}\\ \left[\textit{terms}\right]\end{array}\right]\end{array}\right] \left[\begin{array}{l}\textit{identify } CL^3\\ \left[\begin{array}{l}\textit{operators}\\ \left[\textit{terms}\right]\end{array}\right]\end{array}\right] \end{array}\right]\end{array}\right]$$

This kind of specification is an election of a contexture out of a compound contextures.In other words, also classic formulas are "bound" by the operation *"identify"*. Because there is only one identity and one way to identify in classic systems this operation can be omitted. Transclassic systems with many options of identification, that is thematizations, have to identify their contextures and formal systems explicitly.

8.2.3 Thematizations in Diamonds

Thematizations in Diamonds

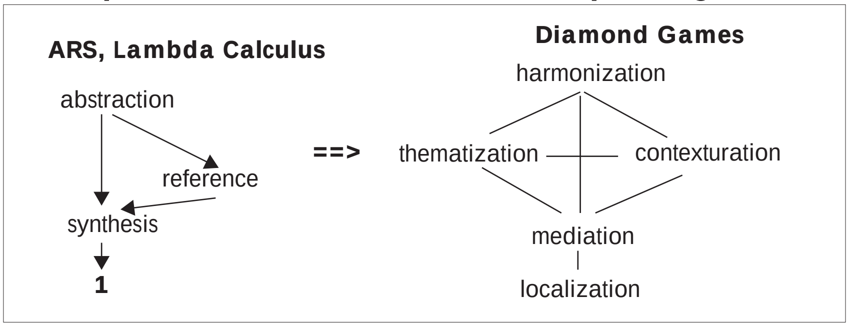
$$\left[\begin{array}{l} \mathbf{thematize}\ \textit{diamond} \\ \left[\begin{array}{l} \mathbf{identify}\ \textit{contexture} \\ \left[\begin{array}{l} \mathbf{separate}\ \textit{acc} \mid \textit{rej}-\textit{domain} \\ \left[\begin{array}{l} \mathbf{2\text{-}define} < \left(2-\textit{Name of } \left(\textit{Abstraction} \mid \overline{\textit{Abstraction}}\right)\right) > \\ \left(\begin{array}{l} \mathbf{2\text{-}lambda} < 2-\textit{List of } \left(\textit{Parameters} \mid \overline{\textit{Parameters}}\right) > \\ \qquad \left\{\begin{array}{lcl} <\textit{Statement}_1> & \mid & \overline{<\textit{Statement}_1>} \\ <\textit{Statement}_2> & \mid & \overline{<\textit{Statement}_2>} \\ \ldots\ldots & & \overline{\ldots\ldots} \\ <\textit{Statement}_n> & \mid & <\textit{Statement}_n> \end{array}\right\} \end{array}\right) \end{array}\right] \\ \mathbf{elect}\ \textit{acc} \mid \textit{rej}-\textit{domain} \end{array}\right] \end{array}\right] \end{array}\right]$$

Diamond systems are mainly systems of *complementarity*. Thus, all concepts have to be doubled in a complementary sense. Abstractions, reference, synthesis as main concepts of formal systems, say lambda calculus or combinatorial logic, are *double-faced*. This holds even before any dissemination of the systems over contextures happens.

Towards a Diamond programming paradigm

Towards a Diamond programming paradigm

1 From operational to diamondizational paradigms



The lambda calculus is based on the formal scheme of *application* with (operator, operand, operation). This is in fact the *Arabic* part of Western mathematics and programming. The invention of algebraic abstractions as a strict triadic construct based on (omitted) uniqueness is the leading decision of Western mathematics. Diamonds are symbolizing a first departure from this algebraic and algorithmic paradigm of programming. First as a *dissemination* and *localization* of the triadic conception to a polycontextural multitude of triads. Second by the *diamondization* of the basic presumption of triadizity. An "Arabic" operation, now, has to consider its "Chinese" counter-part as the otherness of operativity. Called, for now, *segregation*. Segregation is the counter-part of synthesis (operation). It might also be called "harmony".

Therefore, a transition from the *nice* operational scheme of operativity with [operator, operand, operation] to the *beautiful* pattern of diamondization with [segregation, "operator", "operand", "operation", position] has to be organized.

Shift in terminology

Harmonization in diamond calculi is a mediation of complex abstractions, i.e., a mediation of abstraction and, complementary, generalization. Mediation means, that diamond objects, represented by core systems, are always double: (naming / evocation).

Contexturation is a complexion of references, i.e. a complementary to thematization. Contexturation is complex identification as a result of a description of "states", objects. It corresponds to algebraic equivalence.

Thematization is complementary to contexturation. Thematization is observation as complex interpretations of "streams". It corresponds observational bisimulation.

Mediation is complex synthesis, thus complementary to harmonization.

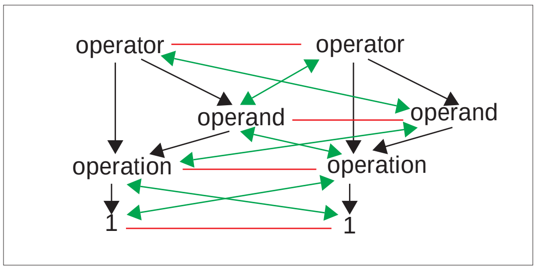
Localization is complex positioning in respect to mediation based in the kenomic grid.

Other wordings

To put wordings in a less dramatic form we just could say that the fourth category of the diamond structure of operationality is representing the *context* or *environment* of an operation. But this happens as a constitutive part of the operativity as such and not as a secondary prothetic adjustment. This is reasonable only in a constellation with a multitude of different, i.e., dis-contextural operational systems. Thus, the operativity of the diamond has a context of its own, separating it from diamonds of other contextures, and is positioned into the pre-logical field of kenogrammatics (kenomic grid).

1.1 Complementarity of Diamonds and Proemiality

Proemial dissemination of triads



Until now, the diamond structure was involved only in the game of dissemination of contextures, here, the contexture of operationality in its triadic conception.

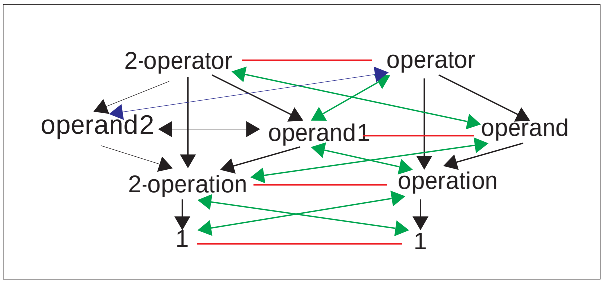
Firstly, diamonds are incorporating a tetradic structure which can be mapped onto the tetradic structure of proemiality.

Secondly, dissemination of diamonds is realized in the same sense as the dissemination of triads by the application of proemiality.

Thus, thirdly, contextural programming is based on diamonds of diamonds.

Diamond situations of dissemination

There are 4 basic situations for the dissemination of diamonds:



1. Diamond to Diamond,
2. Diamond to Lambda,
3. Lambda to Diamond,
4. Lambda to Lambda.

In a diamond setting a *contexture* consists of a chiasm of acceptional and rejectional domains.

$$PR^{(m)} = \chi^{(m)}(rator, rand, op, pos)$$

$$DIAM^{(m)} = \chi^{(m)}(cat, salt, pos)$$

Chains of linear compositions are reflected by their acceptional and reflectional products. In other words, acceptional and reflectional domain are founding the chain of core systems.

Types of abstractions

"Abstraction moves our thinking, programming, and computing to a higher and more appropriate level." (Stark) *Classic* abstractions, like *data* and *procedure* abstractions, are forms of is-abstractions. *Polycontextural* abstractions of different kinds are as-abstractions. *Diamond* abstractions are a new kind of as-abstractions. They are system abstractions, identifying categories as acceptional and saltatories as rejectional aspects of a programming framework (system).

1.2 To program is to compose

Diamond Composition

$$(g \diamond f) = \chi \left\langle \begin{matrix} g\ o\ f : sameness \\ \overleftarrow{k} : differentness \end{matrix} \right\rangle$$

of relatedness.

$$(h \diamond g \diamond f) := \chi \left\langle \begin{matrix} h\ o\ g\ o\ f \\ \overleftarrow{k} \parallel \overleftarrow{l} \end{matrix} \right\rangle$$

The classic paradigm of programming as (abstraction, reference, synthesis) is establishing composition as *synthesis* of its operands and operators, i.e., reference and abstraction.

How are diamond calculi disseminated?

Polycontextural lambda calculi are disseminated classic lambda calculi.

Polycontextural diamond calculi are disseminated diamond calculi, i.e., polycontextural lambda calculi are disseminating 1-objects, polycontextural diamond calculi are disseminating 2-objects as their basic elements.

What is programming in the framework of diamonds?

$$\textbf{Diamond - Calculus :=} \left(\left\langle \textbf{Lambda}_{\textbf{acc}} \right\rangle \parallel \left\langle \textbf{Lambda}_{\textbf{rej}} \right\rangle \right)$$

$$\begin{array}{ll}
[architectonics] \;||\; [dissemination] \;||\; [interactionality] \;||\; [reflectionality] & \\
[architectonics] & := (\langle complexity \rangle \langle structuration \rangle) \\
[dissemination] & := (\langle distribution \rangle \langle mediation \rangle \langle diamond\ calculus \rangle) \\
[interactionality] & := (\langle super-operators \rangle \langle \delta\ term \rangle) \\
[reflectionality] & := (\langle super-operators \rangle \langle \delta\ term \rangle) \\
[diamond\ calculus] & := \langle \delta\ term \rangle \\
[\delta\ term] & := (\langle \lambda\ acc-term \rangle \parallel \langle \lambda\ rej-term \rangle)
\end{array}$$

Basic structure of the mono-contextural diamond calculus

$$\left[\begin{array}{l}
thematize\ diamond \\
\left[\begin{array}{l}
identify\ contexture \\
\left[\begin{array}{l}
separate\ acc-domain \\
\left[\begin{array}{l}
define\ (Name\ of\ \ Abstraction) \\
\left(\begin{array}{l}
lambda < List\ of\ \ Parameters > \\
\qquad \left\{ \begin{array}{l} < Statement_1 > \\ < Statement_2 > \\ \quad \cdots\cdots \\ < Statement_n > \end{array} \right\}
\end{array} \right)
\end{array} \right] \\
elect\ rej-domain
\end{array} \right]
\left[\begin{array}{l}
separate\ rej-domain \\
\left[\begin{array}{l}
define\ (\overline{Name\ of\ \ Abstraction}) \\
\left(\begin{array}{l}
lambda < \overline{List\ of\ \ Parameters} > \\
\qquad \left\{ \begin{array}{l} < \overline{Statement_1} > \\ < \overline{Statement_2} > \\ \quad \overline{\cdots\cdots} \\ < \overline{Statement_n} > \end{array} \right\}
\end{array} \right)
\end{array} \right] \\
elect\ acc-domain
\end{array} \right]
\end{array} \right]
\end{array} \right]$$

$$\left[\begin{array}{l} thematize\ diamond \\ \left[\begin{array}{l} identify\ contexture \\ \left[\begin{array}{l} separate\ acc\ /\ rej-domain \\ \left[\begin{array}{l} 2-define\ (2-Name\ of\ \left(Abstraction,\ \overline{Abstraction}\right)) \\ \left(\begin{array}{l} 2-lambda\ <2-List\ of\ \left(Parameters,\ \overline{Parameters}\right)> \\ \qquad \left\{\begin{array}{l} <Statement_1>,\ \overline{<Statement_1>} \\ <Statement_2>,\ \overline{<Statement_2>} \\ \quad \ldots\ldots \qquad \overline{\ldots\ldots} \\ <Statement_n>,\ \overline{<Statement_n>} \end{array}\right\} \end{array}\right) \end{array}\right] \\ elect\ acc\ /\ rej-domain \end{array}\right] \end{array}\right] \end{array}\right]$$

Diamonds are dealing with bi-objects, which are including a complementarity of acceptional and rejectional aspects, hence their naming has to be a double naming, called "2-name" of a double defining act, 2-define.

2-define = 2-name(abstraction, generalisation)

Therefore, the process of abstraction, lambda, has to be doubled, 2-lambda, i.e., 2-lambda is the complementarity and interplay of abstraction and generalisation;

2-lambda = chiasm(abstraction / generalisation)

It should be clear that the double aspect, the overcrossing of terms, is a complementarity on all tectonic levels of the calculus. Only in very restricted situations a complementarity can be regarded as a duality in a logical or categorical sense.

As a first step, the terminology of algebra / coalgebra should be applied to thematize and explicate the diamond concepts. The duality of coalgebraic concept can be radicalized to complementarity.

name as identification of an object to name as evocation of a stream, invariance

define / evocate ??

abstaction / generalisation

This is obviously different to the polycontextural approach of programming, like in ConTeXtures, where intra-contexturally for all contextures the lambda calculus (abstraction, reference, synthesis) holds.

It turns out that the slogan *"To program is to compose"* might be misleading if the jump-structure of saltatories is not given its complementary value to the successive character of categorial composition. Hence, the slogan is *"To program is to diamondize"*.

Are saltatories, with their jumps, a radicalisation of the coalgebraic, successional, structure of observations? If observations are experiments, then there is no need for a successional order of behaviors and actions as it is supposed by coalgebras. They happens, in some sense, ad hoc, by decision and not by consequence, and ordered in a linear sense like (inverse) deductions. Do invariants have to be seamlessly linked? Streams may flow but experiments have to take place, they are interventions, hence, they are not in continous or successional seamless compositional order like morphisms of a category. It seems that experiments are singular and seamless but connected by another experiment, or reflections on the experiments, realizing jump-commutativity. The principal duality between algebras and coalgebra, despite some asymmetries, is prohibiting the jumpoid character in coalgebras.

1.3 Programming between diamonds and polycontexturality

What can we program with diamonds that isn't programmable by the approach of polycontexturality?

The transition from mono- to polycontextural programming was studied in several papers, like *"ConTeXtures"*, *"From Ruby to Rudy"*. Polycontextural programming is giving new insights into distributed and mediated programming with topics like parallelism, concurrency, reflectional programming, self-referential objects, multiple-inheritance, polysemy, etc.

Diamond programming is not excluding polycontextural approaches but is offering, additionally, a new approach to topics like reflectionality and compositionality. The real advantages of diamond programming become more obvious in a polycontextural setting. Mono-contextural programming with diamonds is restricted to a few, but nevertheless, new features.

The main advantage of diamond programming, even in a mono-contextural situation, is given by the fact, that each composition of whatever kind has immanently in its environment a complementary representation of itself in a rejectional object (hetero-morphism). That is, each composition has, additionally to its composites, an environment belonging systematically to the concept and formalism of composition.

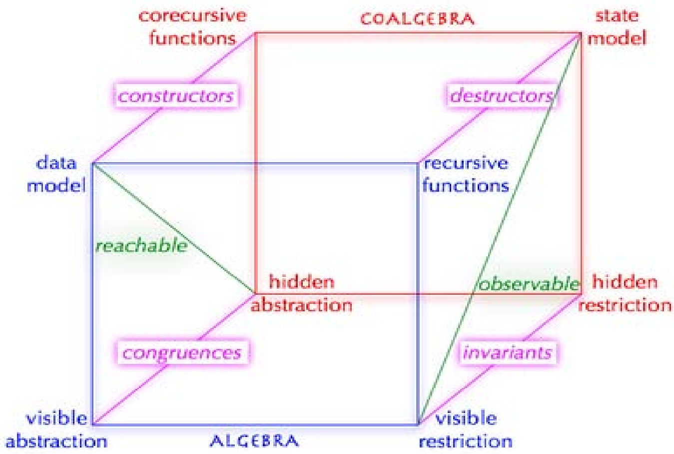
Hence, programming as composition of morphisms becomes programming as diamondization of compositions.

With that, the possibility of an intrinsic reflectional parallelism of programs is introduced into the paradigm of programming. Reflecting composition in categories is not well conceived if it is focused on morphism (or higher constructs) only. It has to be realized on the compositionality of composition, and this topic has no place in categories, but is well located in saltatories.

In other terminology, a mediation of algebraic structures and coalgebraic behaviors emerges to be a new possibility of modeling programming by the complementarity of categorical and saltatorical concepts and constructions. With that, the foundations for the modeling of structural and behavioral programming are moved one level deeper, i.e, from universal algebra based on categories to the diamond-interplay of categories and saltatories.

1.4 Padawitz' Bialgebraic modeling

Peter's new Cube



http://fldit-www.cs.uni-dortmund.de/%7Epeter/Swinging.html

Dialgebraic modeling of Swinging Types is rooted in Category Theory.

"Algebra may be understandable and applicable without knowing the basics of category theory. Coalgebra and its dual nature in comparison with algebra is *rooted in category theory*. Hence the knowledge of fundamental constructions and ways of reasoning in category theory are crucial for "getting the point" of *dialgebraic modeling*." (Padawitz)

"Swinging types (STs) provide an axiomatic specification formalism for designing and verifying software in terms of many-sorted logic and canonical models. STs are one-tiered insofar as static and dynamic, structural and behavioral aspects of a system are treated on the same syntactic and semantic level."

"Apart from pointing out certain model-theoretic dualities, previous approaches lack an integration of algebraic and coalgebraic types that is suffiently general to cope with "real-world" system models. This is achieved by *swinging types*, mainly because of their stepwise constructability that allows us to both extend an algebraic basis by coalgebraic components and, conversely, build algebraic structures on top of coalgebraic ones."
http://fldit-www.cs.uni-dortmund.de/%7Epeter/Dialg.pdf

Category Theory —> Algebra, Coalgebra —> Dialgebra of Swinging Types

"Algebra and its dual, coalgebra, are terms used to describe some classes of mathematical structures which are commonly met in mathematics and in computer science. The relationship between algebras and coalgebras appears clear only when their definition is formulated inside category theory: "Algebra" and "coalgebra" are *dual* concepts."
http://cliki.tunes.org/Algebra%20and%20coalgebra

With this hierarchy of roots given, everything is save and clean.

The stepwise constructability of algebraic and coalgebraic components remains a succession in contrast to a parallelism of simultaneity and mediation.

Modeling of LIST

Head of swinging types for the set of all finite sequences

LIST = ENTRY **then**

vissorts	$list = list(entry)$
constructs	$[] :\rightarrow list$
	$\_ : \_ : entry \times list \rightarrow list$
local preds	$\_ \in \_ : entry \times list$
	$sorted : list$
	$exists, forall : (entry \rightarrow bool) \times list$
vars	$x, y : entry \quad L, L' : list \quad g : entry \rightarrow bool$

Axioms for SP: Horn axioms (1) to (7)

$$x \in y : L \quad \Leftarrow \quad x \equiv y \vee x \in L$$
$$sorted([])$$
$$sorted(x : [])$$
$$sorted(x : y : L) \quad \Leftarrow \quad x \leq y \wedge sorted(y : L)$$
$$exists(g, x : L) \quad \Leftarrow \quad g(x) \equiv true \vee exists(g, L)$$
$$forall(g, [])$$
$$forall(g, x : L) \quad \Leftarrow \quad g(x) \equiv true \wedge forall(g, L)$$

Axioms for compl(SP)

$$x \notin y : L \quad \Rightarrow \quad x \not\equiv y \wedge x \notin L$$
$$unsorted([]) \quad \Rightarrow \quad False$$
$$unsorted(x : []) \quad \Rightarrow \quad False$$
$$unsorted(x : y : L) \quad \Rightarrow \quad x \not\leq y \vee unsorted(y : L)$$
$$notExists(g, x : L) \quad \Rightarrow \quad g(x) \not\equiv true \wedge notExists(g, L)$$
$$notForall(g, []) \quad \Rightarrow \quad False$$
$$notForall(g, x : L) \quad \Rightarrow \quad g(x) \not\equiv true \vee notForall(g, L)$$

The 3 components: Head(SP), SP, compl(SP) can be combined in at least 3 ways:

1. Swinging types of bialgebra,
2. Disseminated over 3 contextures of a polycontextural system with modifications,
3. Modeled into a Diamond system with modification into diamond logics.

It also seems that the bialgebraic version to model complementarity (completion) by logical dualism is a weak version of modeling.

What we learn from this comparison between swinging types STs and Diamonds is this: *Diamonds don't swing, they are the swing.*

1.5 Metaphor of double naming

"wave particle duality"

The history of quantum physics shows good examples of double naming. Werner Heisenberg, in his book *"Physik und Philolsophie"*, is discussing the problems of complementarity and language. As an example he mentions the double and complementary word "Wellenpaket‘‘ (waveparcel), "wave particle duality", in the context of his Uncertainity Principle.

> "The more precisely the POSITION is determined, the less precisely the MOMENTUM is known." (Heisenberg)

> "In Bohr's words, the wave and particle pictures, or the visual and causal representations, are "complementary" to each other. That is, they are mutually exclusive, yet jointly essential for a complete description of quantum events. Obviously in an experiment in the everyday world an object cannot be both a wave and a particle at the same time; it must be either one or the other, depending upon the situation."
> http://www.aip.org/history/heisenberg/p09.htm

The double term "Wellenpaket" has the contradictory meaning of wave and parcel at once; both together. But, as a rejectional term it has its complementary meaning, too: neither wave nor parcel. Both interpretations are holding simultaneously. Measure this, and measure that, then you have the complementary answer of both-at-once and neither nor, of the interpretation of the results of measuring.

Complementarity of description and interpretation

Modern approaches to complementarity are developed *in extenso* by Lars Löfgren.

> "The general principle underlying these limitations was called the *linguistic complementarity* by Loefgren. It states that in no language (i.e. a system for generating expressions with a specific meaning) can the process of interpretation of the expressions be completely described *within* the language itself. In other words, the procedure for determining the meaning of expressions must involve entities from outside the language, i.e. from what we have called the context. The reason is simply that the terms of a language are finite and changeless, whereas their possible interpretations are infinite and changing." (Heylighen)
> http://pespmc1.vub.ac.be/Papers/Making_Thoughts_Explicit.pdf

> "Programs are written in a language and have a proposed meaning; semantics. The main idea is that *description* and *interpretation* are complementary in a language; they cannot be fragmented *within* a language." (Ekdahl)

Algebraic: *"terms of a language are finite and changeless"*,

Coalgebraic: *"possible interpretations are infinite and changing"*.

Complementarity of complementarity

Complementarity, therefore, has itself, principally, a double meaning: *complementarity of contextures* and *complementarity in diamonds*.

Complementarity of contextures is covered by polycontextural logic as a dissemination of categorical systems. Each disseminated category has its own logic, which is structurally similar to the logic of other contextures.

Complementarity in diamonds is realized by diamond theory as an interplay of categories and saltatories. The logics of categories and the "logics" of saltatatories are structurally different.

Thus, a new contribution has to be developed to contrast diamond and contextural approaches with the deep analysis of complementarity given by the work of Lars Löfgren. From a polycontextural point of view their was a discussion and correspondence with Lars Löfgren about the problem of interpreting and formalizing complementarity.

The double meaning of diamond objects is complementary and in their orientations they are not in parallelism but *antidromic* (gegenläufig, verkehrt) and *deferred* (verschoben) in respect to the complementary system.

It is not yet clear in which sense, if any, these characteristics of diamond objects of being antidromic and deferred will have a correspondence in complementarity theory of description and interpretation of languages in the sense of Lofgren.

1.6 Hetero-morphisms and morphograms

> "In mathematics, a *morphism* is an *abstraction* of a structure-preserving mapping between two mathematical structures.
>
> A *category* C is given by two pieces of data: a *class* of *objects* and a class of *morphisms*.
>
> There are two operations defined on every morphism, the *domain* (or source) and the *codomain* (or target).
>
> For every three objects X, Y, and Z, there exists a *binary operation*
> hom(X, Y) x hom(Y, Z) —> hom(X, Z) called *composition*." WiKi

The "double gesture" of inscription is not enfolded as a succession of different contextural decisions. It is given / installed at once. Hence, there are some similarity in the description of diamond objects to morphograms. Morphograms are inscribing standpoint-free complexity. But there is also another approach to morphograms.

As Heinz von Foerster proposed, morphograms can be regarded as the *inverse* function of a logical function. Hetero-morphisms are inverse to morphisms. Hence, there is a possible connection between hetero-morphisms of a composition and morphograms of such a composition. In this sense, morphograms can be seen as the inscription of the inversion of morphisms, i.e., of rejectional morphisms. But hetero-morphisms as inverse morphisms are not simply dual to morphisms, they are not only "morphisms" with an inverse arrow to acceptional morphisms, they are on a different level of *abstraction*, too. Because morphisms are mappings between objects, and hetero-morphisms are abstractions from the operator of composition, their conceptual status is principally different. Morphisms are mappings as mappings; hetero-morphisms are abstractions from the interaction of morphisms. Hence, the new couple in diamonds is: *morphism / morphogram*.

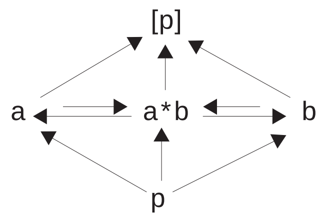
Objects in diamond systems are based on as-abstractions. The core system is abstracted by its acceptional and / or rejectional aspect. There is no neutral object in diamonds like in the lambda calculus. Reference in the lambda calculus is an identification of an object as an identity. This identity can be simple or complex (composed) but its naming and reference is realized by a simple operation of identification, establishing the identity of the object.

Thus, the fundamental properties of hetero-morphisms before questions of identity / diversity and commutativity, associativity properties are studied, are:

1. *inverse morphism* property
2. *actional abstraction* property

These two properties are defining the rejectional status and the saltatory structure of jumpoids.

An accessible, and first interpretation of the two properties of hetero-morphisms can be found in the theory of morphogrammatics. Morphograms can be regarded as inversa of compositions. They are "object-free, thus, more abstract than morphisms. But as morphograms of compositions they are connected to compositions of morphisms. They may be seen as generalizations of compositions of abstract morphisms.



The categorical product "a*b" is founded in p. The categorical product is based on the inverse product, the thematization of the compositor, as a morphogram [p]. The core elements of the diagram, a, b, a*b, have a double meaning. They belong to categories and to saltatories. Insofar, they define the structure of the morphogram [p].

As an example, we can think of a logical disjunction "a v b", which is based on its constituents "a" and "b" as core elements. These together can be inverted to the hetero-morphism [p], which defines the morphogram of the binary disjunction as the operativity of the operator "v", but concretized in its complication, as a binary action, by the constituents "a" and "b".

Because morphograms can be conceived as inversa of compositions, and are generating a generalization of the composition of morphisms, they are representing a permutation-invariant class of compositions. In the example, the morphogram [p] is representing the disjunction "avb" as well as all negations of it "¬(avb)". Hence, again, morphograms are negation-invariant patterns.

If a product composition is called a *process* (Baez) then the complement of the process is the form or structure of the process, hence inscribed as the morphogram of the process.

Graphematic metaphor for bi-objects

A graphematic metaphor for bi-objects may be the Chinese characters. They are, at once, inscribing, at least, two different grammatological systems, the *phonetic* and the *pictographic* aspects of the writing system, together in one complex inscription, i.e., character. The composition laws of phonology are different from the composition laws of pictography. Because in Chinese script, characters with their double aspects, are composed as wholes and not by their separated aspects, composition laws of Chinese script is involved into a complexion of two different structural systems.

It can be speculated that the phonological aspect is categorical, with its composition laws of identity, commutativity and associativity, while the composition laws of the pictographic aspect is different, and may be covered, not by categories but by saltatories. At least, there is no need to map the laws of composition for Chinese characters into a homogenous calculus of formal linguistics based, say on combinatory logic.

The Western writing system is based on its phonetic system.

> "*Pictophonetic compounds* (å`„flėö/å`êʃéö, Xíngsh?ngzì)
>
> Also called *semantic-phonetic* compounds, or phono-semantic compounds, this category represents the largest group of characters in modern Chinese.
>
> Characters of this sort are composed of two parts: a *pictograph*, which suggests the general meaning of the character, and a *phonetic* part, which is derived from a character pronounced in the same way as the word the new character represents."
>
> http://en.wikipedia.org/wiki/Chinese_character#Formation_of_characters

1.6.1 Ontology of objects

Diamond objects are bi-objects

The complexity of diamond objects as bi-objects is realized inside of a contexture. It is defining a new kind of contexturality not included in Gunther's definition of contextures and their polycontexturality. Also diamond objects are in a new sense mono-contextural but they are not belonging to an identity ontology like intra-contextural objects of polycontextural systems.

Polycontextural objects are m-objects

The objectionality of polycontextural objects is realized by the mediation of the objectionality of different contextures. Polycontexturality is depending on different points of view, each containing its full ontology and logic of identity. Hence, ontological, logical and computational complexity of objects is produced as a mediation of distributed identity systems, like the lambda calculus.

Polycontextural diamond objects are m-bi-objects

Polycontextural bi-objects are disseminated over different contextures of polycontextural systems, hence they are m-contextural bi-objects, short m-bi-objects.

OPPOSITIONS AND PARADOXES IN MATHEMATICS AND PHILOSOPHY
John L. Bell
http://publish.uwo.ca/~jbell/Oppositions%20and%20Paradoxes%20in%20Mathematics2.pdf

2 Polycontextural diamond programming paradigm

From as-abstraction in polycontextural systems to simul-abstraction in diamond systems.

$$\textit{General Scheme for } A{+}{+} \textit{ in poly} - A{+}{+}$$

$$\begin{pmatrix} define < (Name\ of\ Abstraction)_i\ AS\ (Name\ of\ Abstraction)_j > \\ \begin{pmatrix} lambda < List\ of\ Parameters > \\ \begin{Bmatrix} < Statement_1 > \\ < Statement_2 > \\ \cdots\cdots \\ < Statement_n > \end{Bmatrix} \end{pmatrix} \begin{pmatrix} lambda < List\ of\ Parameters > \\ \begin{Bmatrix} < Statement_1 > \\ < Statement_2 > \\ \cdots\cdots \\ < Statement_n > \end{Bmatrix} \end{pmatrix} \end{pmatrix}$$

$$\textbf{General Scheme for A + + in diamond - A + +}$$

$$\begin{bmatrix} thematize\ diamond \\ \begin{bmatrix} identify\ contexture \\ \begin{bmatrix} separate\ acc\ /\ rej - domain \\ \begin{bmatrix} 2 - define < (2 - Name\ of\ \left(Abstraction \parallel \overline{Abstraction}\right)) > \\ \begin{pmatrix} 2 - lambda < 2 - List\ of\ \left(Parameters \parallel \overline{Parameters}\right) > \\ \begin{Bmatrix} < Statement_1 > \parallel \overline{< Statement_1 >} \\ < Statement_2 > \parallel \overline{< Statement_2 >} \\ \cdots\cdots \quad \cdots\cdots \\ < Statement_n > \parallel \overline{< Statement_n >} \end{Bmatrix} \end{pmatrix} \end{bmatrix} \\ elect\ acc\ /\ rej - domain \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

And; its many faces

In classic logic, two propositions are composed by *junctions*, e.g., conjunction. Such a conjunction is transformed into *mediation* in polycontextural logics, and into complementary *simultaneity* in diamond logics.

Morphisms are abstractions, hetero-morphisms are a new kind of complementyary abstractions; and the difference between both is introducing a different abstraction, too.

2.1 Operator-terminology for diamond-systems

ARS-syntax
Operator-terminology for diamond-systems

<expression> ::=
<abstraction> |<reference> | <synthesis>

linguistic ARS-**contexture** ::=
<operator> | <operand> | <operation>

<abstraction> ::=
'(' define <variable> <expression> ')' |
'(lambda (' {<variable>}')' |
<expression> { <expressions> }')'

<operator> ::=
operator of operator (operator as operator)
operator of operand (operator as operand)
operator of operation (operator as operation)

<reference> ::= <variable>
<variable> ::= <symbol>

<operand> ::= programming operand
<operand> ::= lingustic operand

<synthesis> :: =
'(' <expression> { <expression> }')'

<operation> ::=
operator (operation)

ARS-syntax
Operator-terminology for diamond-systems

<diamond-texture> ::=
<harmonization> |<contexturation> | <thematization> | <mediation>

<harmonization> ::=
'(' define <variable> <expression> ')' |
'(lambda (' {<variable>}')' |
<expression> { <expressions> }')'

<contexturation> ::= <variable>
<variable> ::= <symbol>

<operand> ::= programming operand
<operand> ::= lingustic operand

<thematization> ::= <variable>
<variable> ::= <symbol>

<operand> ::= programming operand
<operand> ::= lingustic operand

<mediation> :: =
'(' <expression> { <expression> }')'

<operation> ::=
operator (operation)

<election> :: =
'(' <accept-expression> { <reject-expression> }')'
'(' <reject-expression> { <accept-expression> }')'

<diamond-contexture> ::=
<diamondization>
<contexturation>|| <thematization>
<mediation>

2.2 From ConTeXtures: Thematization

Hermeneutics and in radicalizing it, deconstructivism, tried to surpass this restriction and to focus more on texts, intertextuality, interpretability, iterability and ambiguity in contrast to well-formed single isolated sentences and propositions. In this sense poly-A++ can be considered as a further extension of the lambda calculus not from the inside but by distribution of the very idea and apparatus of the lambda calculus over different loci, empty places. Surely not in changing at all anything of the lambda calculus itself, but in disseminating it over the loci of the graphematic matrix.

Every programming language must somehow provide a `name giving' mechanism. Thus, every polycontextural programming language-system must somehow provide a general '*thematizing*' mechanism as a general feature allowing disseminated *'name giving' mechanisms* which each of them *allows to call procedures or functions and have the possibility to refer to variable*s inside the 'name giving' systems and between different 'name giving' systems.

A '*name giving*' procedure is also an *identifier*. To be able to identify something it has to be separated from its environment, but something can be separated from others only if it can be identified. We don't want to go into this paradoxical situation which is nevertheless the beginning of all formalism at all. But it should be mentioned that to identify something is including also a semiotic-ontological principle of identity: the named has not to be changed in the process of its naming. To name is to identify and not to change. But this is true only for the very special class of identical beings. It doesn't apply for living systems and even quantum physics is running into some troubles with this identity principle.

Said all that, it seems to be obvious, that the "references" of ConTeXtures are not symbols, variables and the data like for the intra-contextural ARS systems but the processes of interaction and reflection between ARS systems itself as it is realized in the texturality/textuality of texts, that is contextures. In this sense, ConTeXtures are abstracting from the process of abstraction as it is realized in the Lambda Calculus. The reference is the processuality of the abstraction and not its topics.

Abstraction, again

> "The idea of *naming* something is a process of *abstraction*.
> When we calculate 2+1, 3+1, 5+1, 16+1 we detect a pattern and feel that it might be useful to calculate x+1 for any x – or at any rate for a numeral x. This concept is of course central to mathematics and to computing where it is of the essence that we should try to develop programs not just to do one job but to be as general as possible. The replacing of a whole class of objects by a *name representative* of an element of the class is roughly what we mean by *abstraction* and it allows us to approach functions naturally."
> A J T Davie, An Introduction to Functional Programming Systems using HASKELL, pp. 79/80

Diamondization: Thematization plus Contexturation

The contextural explanation of the inter-textuality of thematization is not yet focusing directly on its possible antidromic and deferred movements as it happens with heteromorphisms of rejectional systems. The thematization of the phenomenon is not excluded but conceived as distributed over different mediated contextures with complementary properties. Diamond theory is dealing with complementary antidromic and deferred systems directly, the polycontextural approach is realizing it indirectly.

Double-naming is bi-abstraction. Abstracting something at once as this and as that.

ConTeXtures

- *sketch* - ***horizon***$^{(m,n)}$
  - { *complexity*, *complication*, { *over -*, *under -*, *balanced* } }
  - *build* - ***architectonics***
    - { *linear*, *tabular*, *circular* }
    - *thematize* - ***scenarios***
      - { *reflectional*, *interactional*, *interventional*, *interlocutional* }
      - *choose* – ***styles***
        - { *functional*, *imperative*, *object*, log *ical*, *contextural* }
        - *select* – ***topics***
          - { *Boolean*, *numeric*, *symbolic*, *class*, *relational*, *reflectional*, *actional* }
          - *identify* - ***contextures***
            - (*define* - ***operations***)
              - (*abstract* - ***functions***)
                - { *propose* - ***statements*** }

3 Categories and Programming Languages

The follwing approach of modeling functional programming laguage concepts into categories is in some way more explicite than the highly abstract ARS approach with its only 3 basic terms: abstraction, reference and sysnthesis.

3.1 The category corresponding to a functional programming language

"2.2.2 A functional programming language has:
FPL–1 Primitive data types, given in the language.
FPL–2 Constants of each type.
FPL–3 Operations, which are functions between the types.
FPL–4 Constructors, which can be applied to data types and operations to produce derived data types and operations of the language."

2.2.4 *Under those conditions, a functional programming language L has a category structure C(L) for which:*
FPC–1 The types of L are the *objects* of C(L).
FPC–2 The operations (primitive and derived) of L are the *arrows* of C(L).
FPC–3 The *source* and *target* of an arrow are the input and output types of the corresponding operation.
FPC–4 *Composition* is given by the composition constructor, written in the reverse order.
FPC–5 The *identity* arrows are the do-nothing operations."

Observe that C(L) is a *model* of the language, not the language itself."
Michael Barr and Charles Wells, 1999

programming	*category*
types	*objects*
operations	*arrows*
input	*source*
output	*target*
constructor	*composition*
do – nothing	*identity*

Obviously, *abstractions* are operations, *references* are objects, input/output data, *synthesis* is the constructor of composition and the do-nothing operation.

3.2 What is the diamond correspondance?

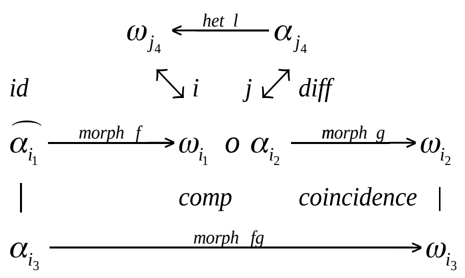
The diamond correspondance to the direct modeling of the basic concepts of functional programming are considered.

diamond - programming

$= \chi\left(category,\ saltatory\right):$

programing	category	saltatory
types	*objects*	*objects*
operations	*arrows*	*arrows*
input	*source*	*source*
output	*target*	*target*
constructor	*composition*	*jump*
do – nothing	*identity*	*identity*
shift	*– – –*	*difference*
elect domain	*accept*	*reject*

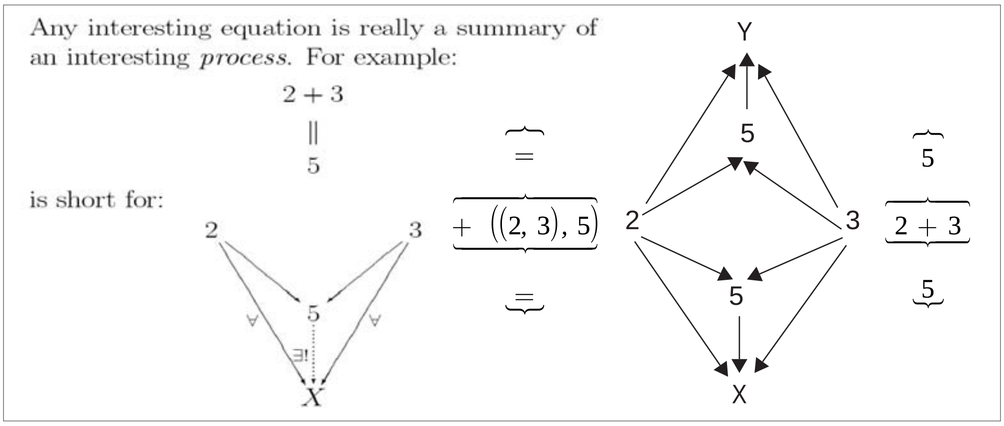
Diamond programming is defined over bi-objects as an interplay of saltatory and category objects. Additional to the direct counter-parts of categorical programming, i.e., the saltatory concepts of diamond programming, operators for the complementary interplay between both have to be included into the full framework of diamond based programming.



Terms

morph / het
coinc / diff
id / div
o / ||
dual / compl
accept / reject

4 Example of a simple arithmetical diamond operation



How is the diamond operation, 2+2=5, to read? The first diagram gives an explanation of the processes involved into the addition. That is, for all numbers 2 of X and all numbers 3 of X there is exactly one number 5 of X representing the addition 2+3. This is the classic operational or categorial approach to addition (Baez).

The second diagram shows the diamond representation of the addition 2+3. The wordings are the same, one for X, and one for Y. The equation is *stable* in respect of the acceptional addition and the rejectional addition iff X=Y. That is, iff the numbers and the operations belong to isomorphic arithmetical systems, then they are equivalent. If X would be a totally different arithmetical system to Y then some disturbance of the harmony between both would happen. Nevertheless, because of their rejectional direction, numbers of Y might "run" in reverse order to X and coincide at the point of X=Y.

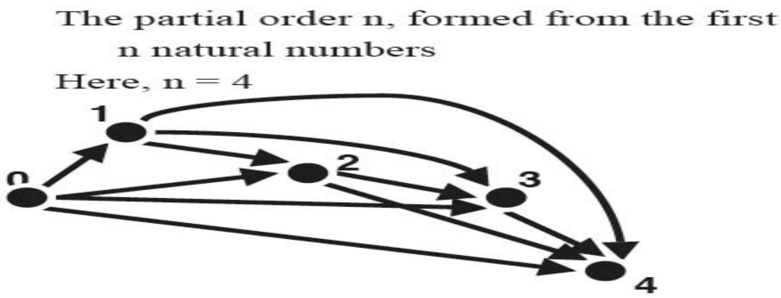
The meaning of a sign is defined by its use. Thus, the numeral "5" belonging to the system X, has not exactly the same meaning as the numeral "5" belonging to the system Y. They may be isomorphic, hetero-morphic, equivalent, but they are not equal. Equality is given intra-contextually for terms of X only, or for terms of Y only. But not for terms between X and Y. In other words, the equation is realized as an equivalence only if it has a model in the rejectional, i.e., in the environmental or context system. Otherwise, that is, without the environmental system, the arithmetical system of the acceptance system, here X, has to be accepted as unique, fundamental and pre-given.

This, obviously, is an extremely simple example, but it could explain, in a first step, the mechanism of diamond operations.

Things are getting easier to understand, if we assume that X belongs to an object-language and Y to a meta-language of the arithmetical system. Then the diamond is mediating at the very base of conceptualization between object- and meta-language constructions. From the point of view of the object language, the meta-language appears as an environment or a context taking place, positively, at the locus of rejection. Thus, a kind of an opposition between X and Y systems seems to be established. The other part of the diamond, the duality between proposition and opposition, necessarily to establish a diamond structure, is not yet very clear. We could re-write the constellation in Polish notation to get an easier result: =(+(2, 3), 5). Thus, the distinction between operator and operand is introduced and we simply have to re-design the diagram.

Again, this is a conceptual approach. In practice, the meta-language consideration might be omitted. They are believed to be correct or are in the mind of a consciousness actor but are not inscribed into the notational system.

Iterative categorical iterabitlity of order n=4



Morphograms in Diamonds

Hetero-morphisms and morphograms

"In mathematics, a *morphism* is an *abstraction* of a structure-preserving mapping between two mathematical structures.

A *category* C is given by two pieces of data: a *class* of *objects* and a class of *morphisms*.

There are two operations defined on every morphism, the *domain* (or source) and the *codomain* (or target).

For every three objects X, Y, and Z, there exists a *binary operation*
hom(X, Y) x hom(Y, Z) —> hom(X, Z) called *composition*." WiKi

The "double gesture" of inscription is not enfolded as a succession of different contextural decisions. It is given / installed at once. Hence, there are some similarity in the description of diamond objects to morphograms. Morphograms are inscribing standpoint-free complexity. But there is also another approach to morphograms.

Morphograms as inverse logical functions

As Heinz von Foerster proposed, morphograms can be regarded as the *inverse* function of a logical function. Hetero-morphisms are inverse to morphisms. Hence, there is a possible connection between hetero-morphisms of a composition and morphograms of such a composition. In this sense, morphograms can be seen as the inscription of the inversion of morphisms, i.e., of rejectional morphisms. But hetero-morphisms as inverse morphisms are not simply dual to morphisms, they are not only "morphisms" with an inverse arrow to acceptional morphisms, they are on a different level of *abstraction*, too. Because morphisms are mapping between objects, and hetero-morphisms are abstractions from the operator of composition, their conceptual status is principally different. Morphisms are mappings as mappings; hetero-morphisms are abstractions from the interaction of morphisms. Hence, the new couple in diamonds is: *morphism / morphogram*.

Objects in diamond systems are based on as-abstractions. The core system is abstracted by its acceptional and / or rejectional aspect. There is no neutral object in diamonds like in the lambda calculus. Reference in the lambda calculus is an identification of an object as an identity. This identity can be simple or complex (composed) but its naming and reference is realized by a simple operation of identification, establishing the identity of the object.

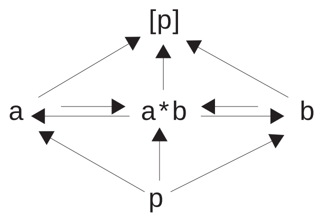
Thus, the fundamental properties of hetero-morphisms before questions of identity / diversity and commutativity, associativity properties are studied, are:

1. inverse morphism property
2. actional abstraction property

These two properties are defining the rejectional status and the saltatory structure of jumpoids.

An accessible, and first interpretation of the two properties of hetero-morphisms can be found in the theory of morphogrammatics. Morphograms can be regarded as inversa of compositions. They are "object-free, thus, more abstract than morphisms. But as morphograms of compositions they are connected to compositions of morphisms. They may be seen as generalizations of compositions of abstract morphisms.

Morphograms as abstractions



The categorical product "a*b" is founded in p. The categorical product is based on the inverse product, the thematization of the compositor, as a morphogram [p]. The core elements of the diagram, a, b, a*b, have a double meaning. They belong to categories and to saltatories. Insofar, they define the structure of the morphogram [p].

As an example, we can think of a logical disjunction "a v b", which is based on its constituents "a" and "b" as core elements. These together can be inverted to the hetero-morphism [p], which defines the morphogram of the binary disjunction as the operativity of the operator "v", but concretized in its complication, as a binary action, by the constituents "a" and "b".

Because morphograms can be conceived as inversa of compositions, and are generating a generalization of the composition of morphisms, they are representing a permutation-invariant class of compositions. In the example, the morphogram [p] is representing the disjunction "avb" as well as all negations of it "¬(avb)". Hence, again, morphograms are negation-invariant patterns.

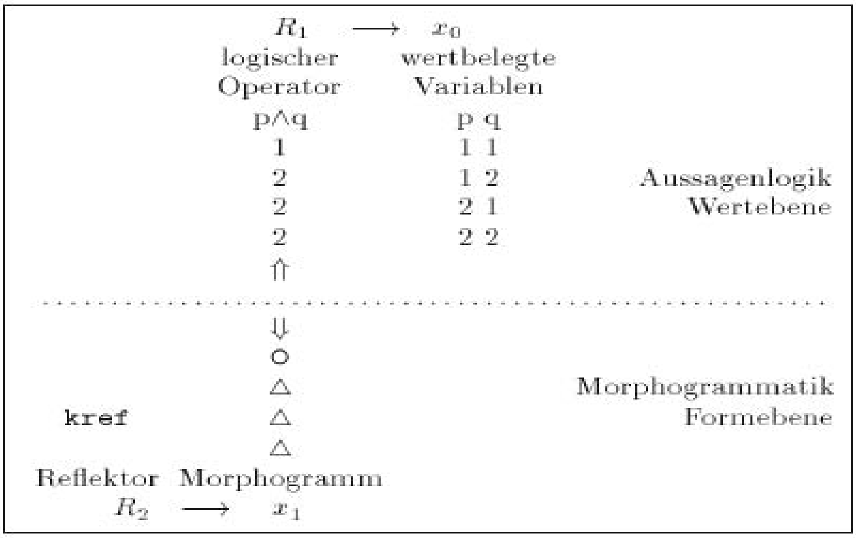
$$morph\left(\begin{bmatrix} S_4 \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix}\right) = \begin{bmatrix} \langle S_4 \rangle \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix}$$

$$\begin{bmatrix} id_4 \\ non_1 id_2 \\ id_3 \end{bmatrix} : \begin{bmatrix} S_4 \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix} \xrightarrow{perm1} \begin{bmatrix} \langle \overline{S_4} \rangle \\ \overline{S}1 \mid S_{3.} \\ S_2 \end{bmatrix}$$

Hetero-morphisms can be considered as morphograms of acceptional composition operators.

As morphograms, hetero-morphisms are defined in an object-free way. They are structurally coupled but not in a set or information setting.

Chiastic introduction of morphograms



The introduction of morphograms as abstraction from logical operations always happened as a chiasm between the involved constituents, hence, it is more than natural to implement this chiastic construction into diamonds.

Diamonds as double-calculi

Diamonds can be involved into logification, delivering diamond-contextural logical systems.

It is also possible to logify acceptional systems only and to interpret rejectional systems morphogrammatically. Hence, a double calculus of logic and morphogrammatics emerges. As a first step, logical operators can be the common polycontextural operators, like negation, conjunction and transjunctions, and the morphogrammatic operator, corresponding to the logical negation, can be realized by reflectors of different kind.

Diamond with negation and reflection only.

$DIAM_{LOG/MG}$=[D, neg, refl]

$$X^{(3)} \begin{bmatrix} \langle \wedge \rangle \\ \vee <> \\ \vee \end{bmatrix} Y^{(3)}$$ [variables, junctors/transjunctors, functions, morphograms]

Diamond Applications

1 Composition and security

If programming means to compose (synthesis of abstraction and reference) then hetero-morphisms are controlling, i.e., enabling the conditions of the possibility of compositions. That is, they are testing the legitimacy of the composition. Compositions are legitimate if they match the matching conditions for composed morphisms.

Until now, the matching conditions for morphisms are defined outside of the actual compositions of morphisms, only. That is, in the axiomatics of the category.

That is, two morphisms f and g are conceived as composed *"if and only if the domain of f is the codomain of g"*. Any mismatch of the "if and only if the domain of f is the codomain of g" condition is destroying the category of compositions definitively.

If the concrete definition of the matching conditions has to be changed during time, they have to be re-implemented into the matching conditions for compositions, again. Hence, matching conditions are *static* and not dynamic, unable to realize learning procedures. Hence, compositions can be disturbed by "unfriendly" (informational) morphisms fulfilling the abstract and external conditions of matching.

Controlling happens in categorical systems as a *meta-program*, dealing with the object-program to be controlled. But meta-programs are themselves of the same systemic and conceptual structure as their object-systems. The problem simply is moved to another level of uncontrolled systems. This meta-level programming paradigm is iterating itself ad infinitum. Hence, unable for real-world control.

A *first* solution to "stop" this circularity of infinite meta-levels of control was introduced by a *polycontextural* modeling of the interactionality and reflectionality of programming systems. The main mechanism of this interplay is the *chiasm* between two interacting systems and their object- and meta-level architecture.

A *second* solution seems to be possible on the base of the reflectionality of hetero-morphisms of diamond systems.

Morphisms are representing mappings between objects, seen as domains and codomains of the mapping function.

Hetero-morphisms are representing the conditions of the possibility (Bedingungen der Möglichkeit) of the composition of morphisms. That is, the conditions, expressed by the matching conditions, are reflected at the place of the hetero-morphisms. Hetero-morphisms as reflections of the matching conditions of composition are therefore second-order concepts realized "inside" the diamond system.

Morphisms and their composition are first-order concepts, which have to match the matching conditions defined by the axiomatics of the categorical composition of morphisms. But these matching conditions are not explicit in the composition of morphism but implicit, defined "outside" of the compositional system.

Hence, in diamonds, the matching conditions of categories are explicit, and moved from the "outside" to the inside of the system.

In this sense, the rejectional system of hetero-morphisms is a reflectional system, reflecting the interactions of the compositions of the acceptional system. Hetero-morphisms are, thus, the "morphisms" of the matching conditions for morphisms.

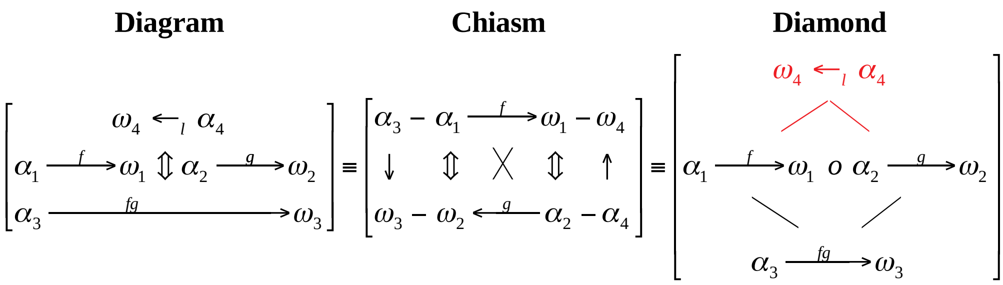
There is no informational connection between morphisms as the structure of the computing system and hetero-morphisms as part of the reflectional system, both are interacting *structurally* in a diamond system of reflectional / interactional programming.

Thus, "control" in diamond systems is realized as an interplay inside of a diamond between computational (acceptional) and reflectional (rejectional) systems.

In contrast to the common view of computation as categorical (category theory), diamond computation is an interplay between categories (morphisms) and "saltatories" (hetero-morphisms), surpassing structurally the narrowness of the categorical approach.

A *third* solution is given by the fact that diamond systems, too, can be disseminated, i.e., distributed and mediated, in polycontextural programming systems.

Different aspects of the same



Learning and hetero-abstraction

Hetero-morphisms are installed by the hetero-abstraction of morphism composition. This abstraction is based on the difference-relations between codomain of the first and domain of the second morphism. As conditions of the possibility of compositions, hetero-morphisms are ruling the kind of compositionality. *Concrete* compositions are based on concrete matching conditions fulfilling the abstract conditions of matching. In a classic setting, the matching conditions can not be changed in the process of matching, i.e., the realization of composition.

Because of the difference between composition and hetero-morphism, interactions between both are possible. The concrete conditions of the composition can be changed while interacting and composing. This is opening up the possibility of adapting the composition rules to changed environments.

Hetero-morphisms are controlling the concrete conditions of compositions. They have, as parts of the reflectional system, an image of the concrete conditions. If a situation happens in which those concrete conditions are changed, they can stop the action of composition or they can correct the matching conditions of composition.

Hence, if there is a disturbance on the data-level of composition, i.e., in the data of domains and codomains of composable functions, the hetero-morphisms can trigger control actions. This can be called *concrete immediate self-control mechanism* of diamond composition.

1.1 Kohout's Protection structures in diamonds

As a metaphor we can think of a living system. If two actions have to be composed, their matching conditions can be observed by the reflectional part of the living system.

A composition can happen only if the conditions are balanced.

Kohout, Composition of actions, writes: "*...global properties of reachability: 'can any of these processes access this information?', 'is this process contained in this domain?'. Such questions are naturally ones of closure and best treated within a topological framework.*" Kohout, p. 65 (*intrusion detection*)

Kohout's Action Rules **Diamond Action Rules**

$$\frac{\left(x_i \xrightarrow{\alpha} x_j\right) o \left(x_j \xrightarrow{\beta} x_k\right)}{\left(x_i \xrightarrow{\gamma} x_k\right)} \qquad \frac{\left(x_i \xrightarrow{\alpha} x_j\right) o \left(x_j \xrightarrow{\beta} x_k\right)}{\left(x_i \xrightarrow{\gamma} x_k\right) \parallel \left(x_l \xleftarrow{\mu} x_m\right)}$$

$$\frac{\left(x_i \xrightarrow{\alpha} x_j\right) o \left(x_j \xrightarrow{\beta} x_k\right)}{\left(x_i \xrightarrow{\alpha} x_j\right) \vee \left(x_j \xrightarrow{\beta} x_k\right)} \qquad \frac{\left(x_i \xrightarrow{\alpha} x_j\right) o \left(x_j \xrightarrow{\beta} x_k\right)}{\left(x_i \xrightarrow{\alpha} x_j\right) \vee \left(x_j \xrightarrow{\beta} x_k\right) \parallel \left(x_l \xleftarrow{\mu} x_m\right)}$$

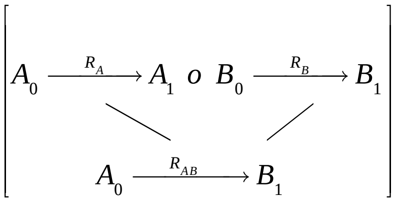
Transitivity and intransitivity of actions in diamonds.

Neither alpha- nor beta-action, i.e., a composition of actions can result in nil actions. This may by paradox, because the alpha and beta-actions as parts exists. But as a composition the can produce a non-action, maybe a deadlock as nil-action.

1.2 Diamond composition of relations

Composition of Relations

A relation from set A_0 *to a set* A_1 *is a triple* (A_0, R, A_1) *with* $R \subseteq A_0 \ x \ A_1$,
its composition with (B_0, R, B_1)
is defined iff $A_1 = B_0$.



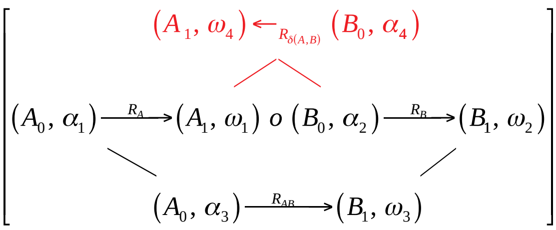
Diamond Composition of Relations

A relation from tupel (A_o^1, A_o^2) *to a tupel* (A_1^1, A_1^2) *is a* $2-$*triple*
$((A_o^1, A_o^2), R^{1.2}, (A_1^1, A_1^2))$ *with* $R^{1.2} \subseteq (A_o^1, A_o^2) \ xx \ (A_1^1, A_1^2)$,
its composition with $((B_o^1, B_o^2), R^{1.2}, (B_1^1, B_1^2))$

$$\text{is diamond-defined iff} \begin{bmatrix} \begin{bmatrix} \delta(A_1^2) \doteq \delta(B_1^2) \\ \delta(\alpha_2) \doteq \alpha_4 \\ \delta(\omega_1) \doteq \omega_4 \end{bmatrix}_{DIAM} \\ \begin{bmatrix} \omega_1 \simeq \alpha_2 \\ A_1^1 \triangleq B_o^1 \end{bmatrix}_{REL} \end{bmatrix}$$

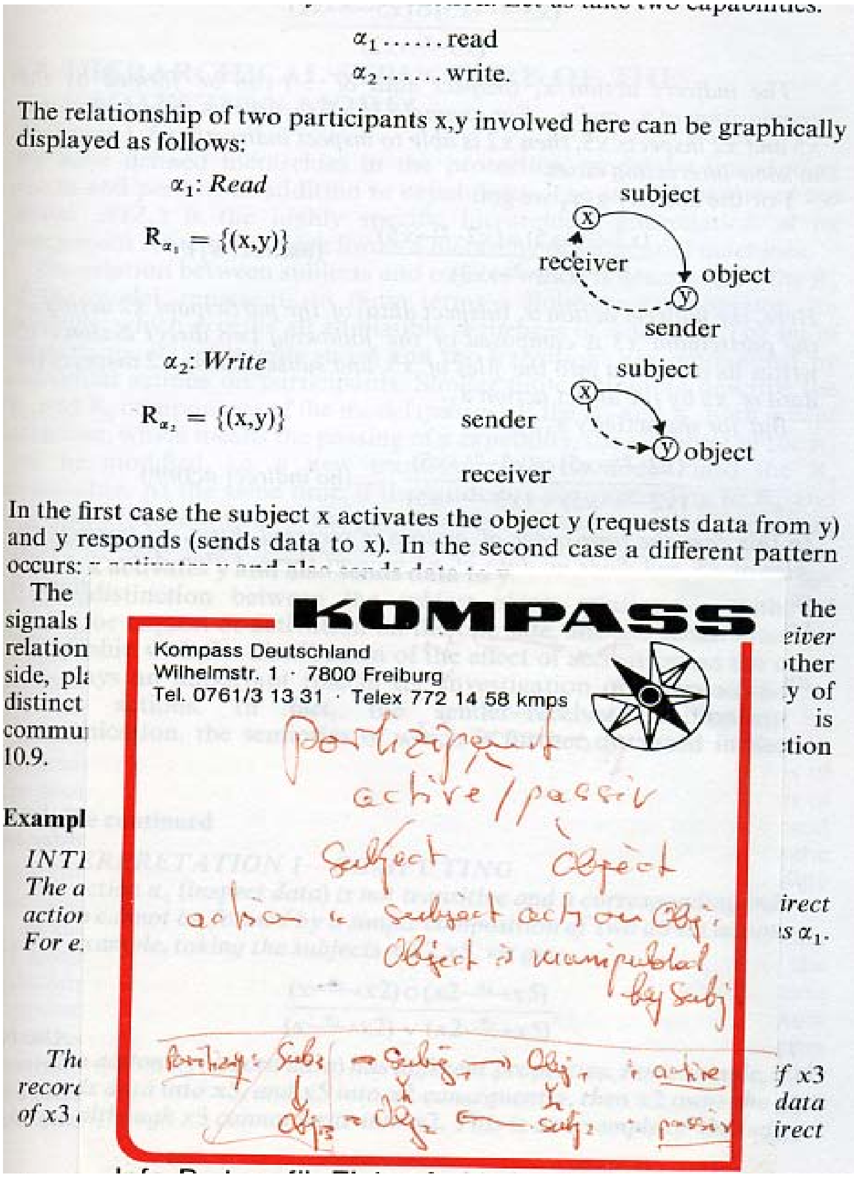
$((A_o^1, \alpha_1), R^{1.2}, (A_1^1, \omega_1))$ *with* $R^{1.2} \subseteq (A_o^1, \alpha_2) \ xx \ (A_1^1, \omega_2)$,

$$\text{its composition with} \begin{bmatrix} ((B_o^1, \alpha_3), R^{1.2}, (B_1^1, \omega_3)) \\ ((B_o^1, \alpha_4), \overline{R^{1.2}}, (A_1^1, \omega_4)) \end{bmatrix}$$



1.3 Chiastic modeling of participant systems

From communication circles to chiastic interactions between sender and receiver as subjects and objects.



... let us take two capabilities:

α_1...... read

α_2...... write.

The relationship of two participants x,y involved here can be graphically displayed as follows:

α_1: *Read*

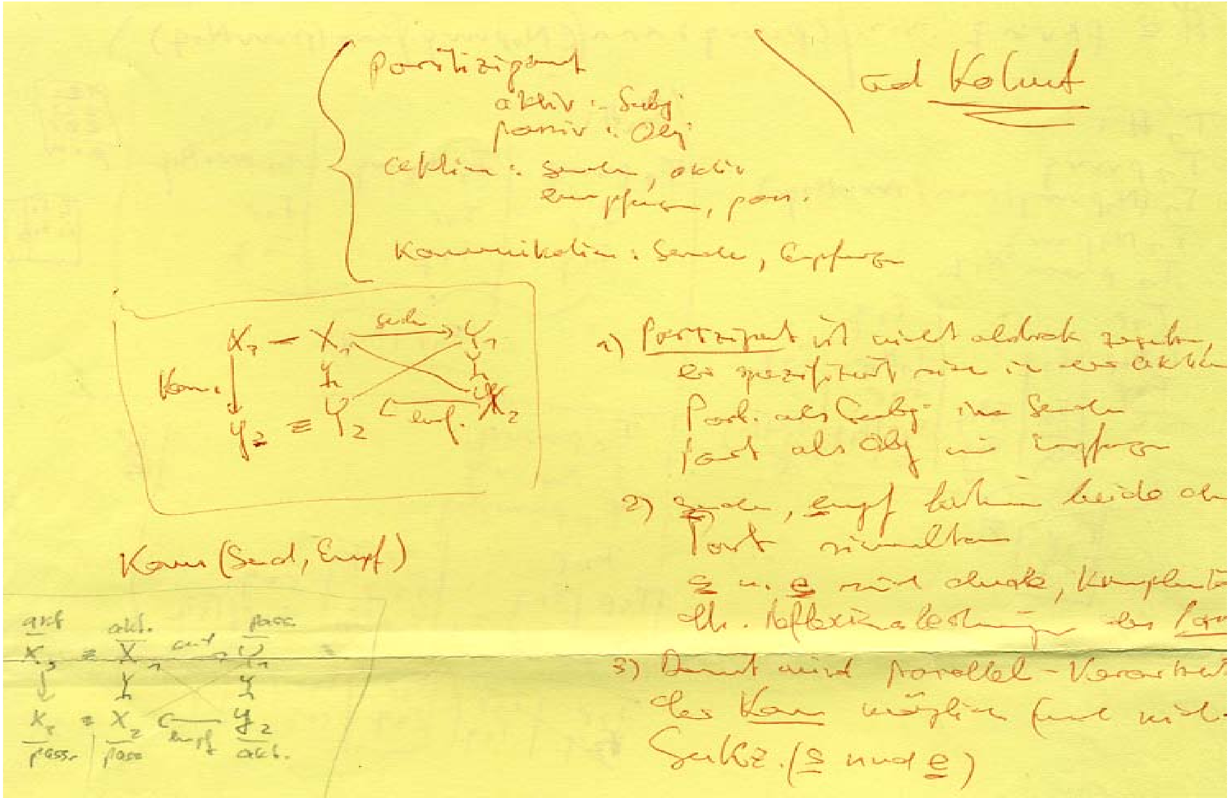
$R_{\alpha_1} = \{(x,y)\}$

α_2: *Write*

$R_{\alpha_2} = \{(x,y)\}$

In the first case the subject x activates the object y (requests data from y) and y responds (sends data to x). In the second case a different pattern occurs: x activates y and also sends data to y.

Kohout in the Yellow Pages



Repeating my old slogan: *"Nicht alle Kreise gehen rund."* (Not all circles are running round.), a transition from the circular to a chiastic modeling of communication is proposed.

In diamonds, *compositions* of actions are in focus. Single actions, like morphisms or functions, are not completed. Only compositions of actions are completing an actional system. Hence, not to each action there is a counter-action is the point, but to each composition of actions there is a complementary counter-action (hetero-mor[phism).

1.4 Diamond modeling of participant systems

Despite the attempt to model protection systems in analogy to organisms, there is no mechanism implemented in Kohout's algebraic modeling, which could realize such an attempt at a basic conceptual level.

If we remember the old model of communication, drawn by Claude Shannon, there always was a channel with disturbance (noise) added to the brave sender and receiver actions. Hence, the informational communication scheme was

```
COM = [information, sender, receiver, disturbance].
```

This translates obviously into the diamond scheme of [Me, You, Our, Others] of information exchange. Information are codified signals.

Our information, exchanged between You and Me, disturbed by Others.

The information channel contains both: information (Our) and noise (Others).

Diamonds are naturally implementing the otherness of disturbance into their communicational model as the necessity of possible disturbance or surprise.

Today, such insights are trivial. We all have our governmental and criminal guests in our communicational systems. For that reason, we should not deny their access but deliver them with a massive and ever growing amount of information. At the beginning of civilization it always was the first step to build buildings, today, in the age of digitalism, with its decentralized and world-open distribution of information, there is no difference, we have to build a massive amount of new, digitally correct, prisons.

2 Mullin’s Mutants

1. A. A. Mullin: *Properties of mutants.*

Let $(A, *)$ denote a nonempty set A together with a closed binary composition law "$*$" defined on A. By a *mutant* of $(A, *)$ is meant a subset M of A that satisfies the condition that $M * M \subseteq \overline{M}$, where $M * M = \{a * b : a \in M \text{ and } b \in M\}$ and $\overline{M}$ is the set of all of the elements of A not in M. If all of the elements of A are idempotent with respect to "$*$" let the empty set be the only mutant of $(A, *)$.

http://www.ams.org/bull/1961-67-01/S0002-9904-1961-10499-0/S0002-9904-1961-10499-0.pdf

3 A transition scheme for production systems

$$\begin{array}{l} S^1 : P[E] \rightarrow P[E'] \\ S^2 : \qquad\qquad P[E] \rightarrow P[E'] \\ S^3 : P[E] \longrightarrow P[E'] \end{array} \quad \textbf{==>} \quad \begin{bmatrix} S^4 \\ S^1S^2 \\ S^3 \end{bmatrix} : \begin{bmatrix} P[E'] \leftarrow P[E] \\ P[E] \rightarrow P[E'] \Updownarrow P[E] \rightarrow P[E'] \\ P[E] \longrightarrow P[E'] \end{bmatrix}$$

Obviously we have to rewrite our polycontextural rewriting systems, again.

> "Reduction consists of replacing a part P of E by another expression P’ according to the given rewrite rules. In schematic notation **E[P] –> E[P’]**, provided that P –> P’ is according to the rules." Barendregt, p.8

The 3-contextural constellation of mediated production schemes has a "natural" extension in the 4-contextural diamond realization.

4 Transition scheme from mediation to diamondization

Mediating (M, σ)

$$\begin{array}{l} M^1 \longrightarrow \sigma^1 \Updownarrow M^2 \longrightarrow \sigma^2 \\ \triangleq \qquad\qquad\qquad\qquad \triangleq \\ M^3 \longrightarrow \sigma^3 \end{array}$$

==>

Diamond (M, σ)

$$\begin{array}{l} \qquad \sigma^4 \leftarrow M^4 \\ \qquad \triangleq \quad \triangleq \\ M^1 \longrightarrow \sigma^1 \Updownarrow M^2 \longrightarrow \sigma^2 \\ \triangleq \qquad\qquad\qquad\qquad \triangleq \\ M^3 \longrightarrow \sigma^3 \end{array}$$

After having developed some experience with the diamond way of thinking an extension of the existing polycontextural formalizations shouldn’t be a great deal.

Double Chiasm in a Diamond

$$\left[\begin{array}{l} thematize\ diamond\_chiasm(M,\sigma)^{(4)} \\ \left[\begin{array}{l} harmonize\ diamond^{(4)} \\ \left[\begin{array}{l} contexturate\ contextures^{(4)} \\ \left[\begin{array}{l} chiastify\ (M,\sigma) \\ \left[\begin{array}{l} identify\ LC^1 \\ \left[\begin{array}{l} M \\ \left[\begin{array}{l} \sigma \\ \left[elect\ M^2\right] \end{array}\right] \end{array}\right] \end{array}\right] \left[\begin{array}{l} identify\ LC^2 \\ \left[\begin{array}{l} M \\ \left[\begin{array}{l} \sigma \\ \left[elect\ \sigma^1\right] \end{array}\right] \end{array}\right] \end{array}\right] \left[\begin{array}{l} identify\ LC^3 \\ \left[\begin{array}{l} M \\ \left[\begin{array}{l} \sigma \\ \left[elect\ M^4\right] \end{array}\right] \end{array}\right] \end{array}\right] \left[\begin{array}{l} identify\ LC^4 \\ \left[\begin{array}{l} M \\ \left[\begin{array}{l} \sigma \\ \left[elect\ \sigma^3\right] \end{array}\right] \end{array}\right] \end{array}\right] \end{array}\right] \end{array}\right] \end{array}\right] \end{array}\right]$$

This formula shows a constellation of 2 chiasm between terms and types of different languages, existing simultaneously in the diamond:

1. A chiasm between the 2 core systems LC^1 and LC^2, and
2. A chiasm between the acceptional and the rejectional systems LC^3 and LC^4.

Until now, chiasms had been possible only between core systems or, in more complex systems, between different acceptional systems. Simply because there was no rejectional systems involved.

Some transition schemes are proposed to realize diamondization in programming.

4.1 Algebra, Co-Algebra and Diamonds

"First we approach modal logic with the methodology of algebraic logic, a discipline which aims at studying all kinds of logics using tools and techniques from universal algebra — in fact, much of the theory of universal algebra was developed in tandem with that of algebraic logic.

The idea is to associate, with any logic L, a class Alg(L) of algebras, in such a way that (natural) logical properties of L correspond to (natural) algebraic properties of Alg(L). Carrying out this program for modal logic, we find that normal modal logics have algebraic counterparts in varieties of Boolean algebras with operators (baos). In the simplest case of monomodal logics, the algebras that we are dealing with are simply modal algebras, that is, expansions of Boolean algebras with a single, unary operation that preserves finite joins (disjunctions).

One advantage of the algebraic semantics over the relational one is that it allows a general completeness result, but the algebraic approach may also serve to prove many significant results concerning properties of modal logics such as completeness, canonicity, and interpolation. As we will see, a crucial observation in the algebraic theory of modal logic is that standard algebraic constructions correspond to well-known operations on Kripke frames. These correspondences can be made precise in the form of categorical dualities, which may serve to explain much of the interaction between modal logic and universal algebra. Our discussion of the algebraic approach towards modal logics takes up the sections 3 to 8.

The coalgebraic perspective on modal logic is much more recent (see section 9 for references).

Coalgebras are simple but fundamental mathematical structures that capture the essence of dynamic or evolving systems. The theory of universal coalgebra seeks to provide a general framework for the study of notions related to (possibly infinite) behavior such as invariance, and observational indistinguishability.

When it comes to modal logic, an important difference with the algebraic perspective is that coalgebras generalize rather than dualize the model theory of modal logic.

Many familiar notions and constructions, such as bisimulations and bounded morphisms, have analogues in other fields, and find their natural place at the level of coalgebra.

Perhaps even more important is the realization that one may generalize the concept of modal logic from Kripke frames to arbitrary coalgebras. In fact, the link between (these generalizations of) modal logic and coalgebra is so tight, that one may even claim that modal logic is the natural logic for coalgebras — just like equational logic is that for algebra."

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Read before you fart and bark! (Swiss ecological proverb)

Re: [agi] PolyContextural Logics vs. General Logic

Fundamental Research Lab
Tue, 05 Jun 2007 09:28:24 -0700

On cze 5, 2007, at 00:18, Lukasz Stafiniak wrote:
Speaking of logical approaches to AGI... :-)
http://www.thinkartlab.com/pkl/

Luk ... I didn't find any interesting in PCL
It's well know that logician research the common features of a wide variety of logics for many years: from classical Lindenbaum's extension lemma and Tarski's approaches (logic as a consequence operator or model theory which was developed via the kind of universal algebra to Suszko's abstract logic and now >>> Beziau's logica universalis
http://springerlink.com/content/t22665107512/?p=220ac5182a5840c696be8bc68369d81d&pi=0

We are focus on the general logic in the sense of the study of common structures of logics. You can find very interesting techniques in this field: *translations, embeddings, fibring, combining logics.*
Robert B. Lisek
http://www.mail-archive.com/agi@v2.listbox.com/msg06912.html
===
Kaehr's Remarks to:
http://www.mail-archive.com/agi@v2.listbox.com/msg06912.html
===
Luk ... I didn't find any interesting in PCL

Why PCL is not one of Tarski's game:
A conservative approach to PCL, using fiber bundle theory/index categories to construct fibered logics, is well developed by Jochen Pfalzgraf since 1988/1991.
It should be accessible to people who are familiar with the work of the third generation of these topics.
In the 90s Jochen Pfalzgraf and his group in Linz and Salzburg, Austria was one of the very first researcher of: translations, embeddings, fibring, combining logics.
Dov Gabbay was highly excited about his work (which is based on Kaehr's work (1988 cooperation with Jochen) on PCL).
For people who like some fun, there is a collage/montage/sabotage about Universal Logic and PCL which may enlighten some spirits:
Sushi's Universal Logic Catalogue – The Ultimate Lambda Pow(d)ers
http://www.thinkartlab.com/pkl/media/SUSHIS_LOGICS.pdf

Some of Pfalzgraf's work to PCL
http://racefyn.insde.es/Publicaciones/racsam/indices/vol98_1.htm
http://racefyn.insde.es/Publicaciones/racsam/art%C3%ADculos/racsam%2098_1/2004-pfalzgraf.pdf
http://www.rac.es/ficheros/doc/00158.pdf
Logical fiberings and polycontextural systems. In Ph.Jorrand and J.Kelemen (eds.): Fundamentals of Artificial Intelligence Research FAIR'91. Proceedings, Springer LNCS 535, Subseries Lecture Notes in AI (1991).
http://www.cosy.sbg.ac.at/~jpfalz/publications.html

Proto-Structure of Diamond Strategies

„Everything is true: not everything is true; both, everything is true, and
not everything is true; or, neither everything is true nor is everything not true.
This is the teaching of the Buddha.“ Madhyamika Karika

Summary

The question arises: *Is there any rational structure beyond name- and sentence-oriented thinking?* Or: *Is there a rational operativity beyond alphabetic sign systems?*

In an idealized form, both, name- and sentence-based thinking, are depending structurally on trees. Well known as binary trees of diaeresis or Porphyrian trees. Today as XML trees. The same holds for generalized sign systems, i.e., semiotics. But today, the trees model of organizing knowledge is producing more problems in complex computing than it is able to solve.

Post-modernism has hallucinated the metaphor of net or rhizomatic writing, but didn't provide any operativity to be useful for real world problems, like programming. Media theorists are fantasizing about the structure of the Web as decentralized, open, complex, heterarchic and not hierarchic at all. They are lost in the chaos of surface-structures, not being able to recognize the strong and strict mathematical centralism and hierarchic organizational order of the Web's deep-structure.

The acceptance is slowly growing that pre-modern thinking of Pythagoras in the West and Ancient Chinese is neither name nor sentence guided, hence not to be organized by any tree structure. How could such a structure look like? The simplest structuration of Ancient thinking can be supposed as a pre-semiotic *proto-structure*, realized in history by a triangle model, i.e., a commutative graph, by the Ancient (Pythagoras, Yang Hui, later Blaise Pascal). Each knot of a triangle model is over-determined and therefore logically contradictory. This structure was re-discovered by the Western thinker Gotthard Gunther for the purpose of mediating *number* and *notion* as well as t*hought* and *will* and exposed in his theory of polycontexturality and kenogrammatics. The proto-structure is offering a devise to distribute and mediate a multitude of binary trees and studying their interactivity and reflectionality in an operative and computable way. A similarity between such a distribution of binary trees over the proto-structure and on the other side, the multitude of spoken Chinese languages and their common scriptural system is proposed.

It is my experience that there are strong existential and emotional *defence strategies and barriers* which are preventing people from learning about such ways of pre-semiotic thinking. Thus I introduce a format to deal with such anxieties: *The Diamond Strategies*. Surprisingly, the Diamond Strategies are in a good correspondence and harmony with Ancient Indian and Chinese formats of t*hinking and acting* as well with Gunther's concept of proto-structure.

Of the many practical applications possible, only the question is proposed, re-opening a new round of thinking the *Chinese Challenge*: *Can the Chinese Centralism be the same as the European?*

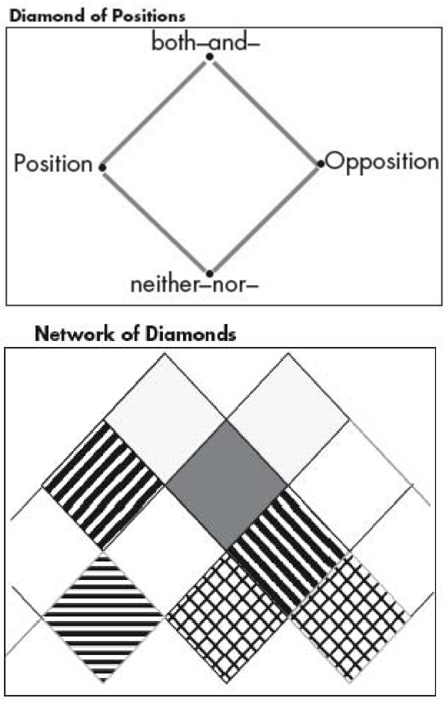
1 Proto-structural Diamond Strategies

Without getting lost into the deepness of philosophical and grammatological studies we can apply the mechanism of proto-structure, i.e., the activity of *tetraktomai*, on a more common arena of emotive-cognitive organization in communicational situations. The *Diamond Strategies* are obviously operating beyond notions and statements, thus, if applied in therapeutic situations, they are not primarily a *"talking cure"* (Freud).

Our orientation in the world is mainly guided by sentence / notion based thematizations. To diamondize, like to tetraktomize, is to abstract and to subverse this semantic level of thematization in favor of its dynamic patterns, i.e., the morphograms of interaction / reflection of communication. The process of morphic abstraction is pushed by questioning the existence (ek-sistenz, Heidegger) of the communicand (client). The existence is what can be abstracted from the historic and local stories of the person involved. But such an existence is not identical with an identical kernel of a self or ego of a person(a) (mask).

In Ancient time of Pythagoras and the Chinese thinker, this procedure was not an abstraction but the genuine way of approaching reality. There are many existential and emotional strategies to defend ones established attitudes against a new way of thinking and thematizing the world. To overcome such barriers, the *Diamond Strategies* always had been of great help.

Proto-Structure of the Diamond Strategies



Also *deconstruction* is not simply a method, Derrida gives us some general strategies of deconstruction:

"In a traditional philosophical opposition we have not a peaceful coexistence of facing terms but a violent hierarchy. One of the terms dominates the other (axiologically, logically, etc.), occupies the commanding position. To deconstruct the opposition is above all, at a particular moment, to reverse the hierarchy." (Derrida, Positions, 56-57).

The double gesture *displacements*:

"Deconstruction must through a double gesture, a double science, a double writing, put into practice a reversal of the classical opposition and a general displacement of the system. It is that condition alone that deconstruction will provide the means of intervening in the field of oppositions it criticize and which is also a field of non-discursive forces." (Derrida, Marges, 392)

Interestingly, the *DiamondStrategies* are incorporation both Ancient attitudes: 1. The tetralemmatic and tetractic way of conceiving truth (Buddha, Pythagoras), and 2. the pragmatic or praxeological apraoch by Chinese thinkers to the relevancy of statements as opening futures instead of claiming eternal truth .

http: / / www.thinkartlab.com / pkl / nlp-work / Deconstruction&DiamondStrategies.pdf
http: / / www.thinkartlab.com / pkl / media / DiamondStrategies-KAE99.pdf
http: / / www.thinkartlab.com / pkl / nlp-work / Deconstruction&DiamondStrategies.html

2 Let us play the game of the DiamondStrategies

From the frozen habitudes of our hierarchical thinking and feelings to the endless flow of inventing and co-creating our futures in the open chiasm of systems of multiple opposites.

2.1 Step one: Position (Problem, Conflict)

Describe your state or situation of the moment with a good, short but precise statement. It´s your statement of position, affirmation, it´s your starting point of the game.

Question1: **What is the situation/constellation you want to explore/resolve?**

Go with your personal starting statement as deep as possible into your emotional and/or cognitive state. Ask yourself about your state formulated in your first starting statement. Elaborate the semantical and emotional context of this statement. Take your last/best sentence of your exploration of your feelings and thinking of your situation and write it down.

2.2 Step two: Opposition (Subversion, Solution)

Create the opposite of your state, of your belief statement, of the sentence which describes your situation most concrete.

Question2: **What is the opposite of your starting position?**

Our language gives us a lot of possibilities to build opposites: logic, grammar, semantics, word games, phonetics, writing, gestures etc. It´s not only negation, you also have inversion of all sorts of order in a sentence or between sentences, dualities, reflections, mirroring and many other methods of translating a statement into it´s opposites.

Example

Position: *Nobody loves me.*

first opposite: *Everybody* loves me.

second opposite: Everybody *hates* me.

third opposite: Everybody loves *you*.

I would like this one as a nice opposite of "Nobody loves me." :: *I love anybody."*

What are the connections between the position and the opposites? You are discovering a Semantic Field of statements between position and its oppositions.

2.3 Third step: (neither-nor-): sovereignity

Change between your two states (position vs. opposition). Take position and all feelings for the one, and then take all feelings and surely also all thoughts for the other one.

Question3: **What's your neither-nor of position/opposition?**

Change and feel what happens when you are changing from position to the opposite. Play this transition game as often until you feel and think that both are equivalent (like light/shadow). Then you will feel immediately that you are free from both: you are not the one and not the other.

You as a subject, as a person you are neither this nor that. This insight and this feeling, that you are not identified with one of the sides of the opposite is your third position. Here you are free, you have the most possible distance to all of the world. Then, how do you see the two other positions, how do you feel them? Go back to the first and to the second. Which do you like most? Play the game until you feel all three positions as equally relevant. All three belongs to you.

2.4 Forth step: all of that at once - pure richness

But this is not all we can do. We can also have the opposite of this distance and sovereignty of the 'neither-nor'. It is the forth position of 'both-at-once'.

Now you have often changed your positions and you had have very strong feelings and insights in this three positions and transitions. You will discover that all this belongs to you. And not only one after the other but all at once. You are all this at once. You are both position and opposition.

Question4: **What is your both-at-once of position/opposition"?**

2.5 Re-Solution

Then you make the complete trip: you go around the 4 positions in at least 6 primary steps, you have 24 permutations of your primary steps- that's your universe of experience(s) at this very first step within the *Diamond Strategies*.

2.6 Exploration

Each station of the Diamond elaborated serves as a new starting point (Position) for further diamondized explorations of your complex emotional/cognitive space.

With the game of the *DiamondStrategies* you have deliberated yourself from your fixation on one point of view in describing, reflecting, feeling, deciding, organizing etc. your life, your future of your organization or company.

3 Opening existential futures: Enabling vs. disabling

All of the four positions of the first Diamond Strategies can be asked about the future possibilities, about their perspectives, about their horizon of new behaviours, etc.

You can ask: What enables me this, which are the new possibilities for me, what new chances are opened up by this state, position etc. for me.

First Step: Enabling vs. disabling

Take one of the 4 positions of the Diamond, then ask one of the questions about enabling/disabling.

1. What is the position enabling/disabling,
2. What is the opposition enabling/disabling,
3. The neither–nor– of enabling and disabling,
„What neither enables nor disables me A?“
4. The both–and– of enabling and disabling,
„What both at once enables and disables me A?“

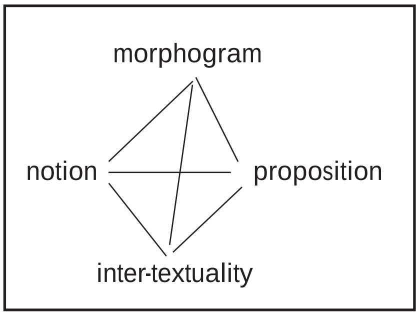
Second Step: Iterations

5. You can also freely repeat and alternate your questions about enabling and disabling, thus producing a grid of enabling/diasabling positions.

4 Diamond Strategies of thematizations

After the more existential application of the Diamond Strategies we are applying them onto the linguistic and grammatotlogical situation of notion / name.

4.1 Designing the Diamond



A possible Diamond of notion / sentence can be established as:

Notion: name-based conceptualization

Proposition:

Morphogram: neither name nor sentence.

Inter-textuality: both at once, name and sentence

Iteration of the Diamond

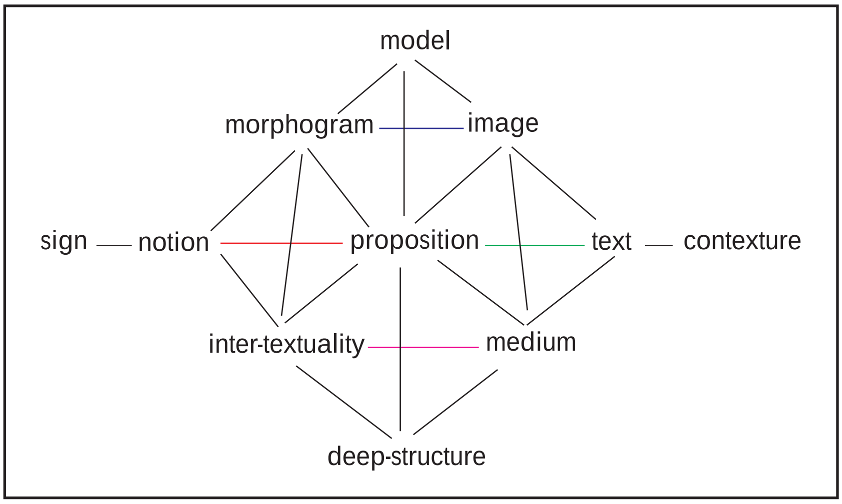
—>notion—>proposition—>notion—>

Accretion of the Diamond

proposition as position, new opposition could be *text*.

morphogram as position, new opposition could be *image*.

inter-textuality as position, new opposition could be *medium.*



The diagram shows a *possible* accretion of the first diamond. There is no strict necessity to develop the diamond this way, other decisions for an interpretation of the knots can enter the game, producing other interpretations of diamonds.

It is of importance to understand that such an accretion is not building a subordinating order, like a diaeresis, thus, it is not a pattern founding deduction, syllogism and linear or tree-like conceptualization. The knots of this diamond, understood as a proto-structure, can be themselves starting points, origins, for binary trees. Hence they are neither notions nor sentences but contextures. Trees are graphic representations of the notional entailment relation which is at the base of logical thinking, not Aristotelian syllogism only.

Because of its commutative structure, the the graph of the proto-structure is a grid and has neither an origin nor an end. It might be slightly misleading to write the proto-structure with a beginning (1:1) as it is presented in Gunther's papers.

4.2 Opening up futures

22. What is the notion-position enabling?

Identification and separation.

The name giving process is identifying its object and installing the laws of identity, thus these name givers are also called "identifiers".

23. What is the notion-position disabling?

Interaction and (self)reflection

Self-reflection is possible only as a paradoxial form producing logical problems.

> *"Developing Levina's thought at this point, he [Derrida] argues that the act of naming is not creation but classification, it is a suspension of any absolute appeal to the interlocutor, an overriding of absolute singularity, which cannot be both spoken and respected because language immediately makes it common property."*
>
> Marian Hobson, Jaques Derrida, openning lines, 1998, p.30

24. What is the sentence-position enabling?

Modal logic

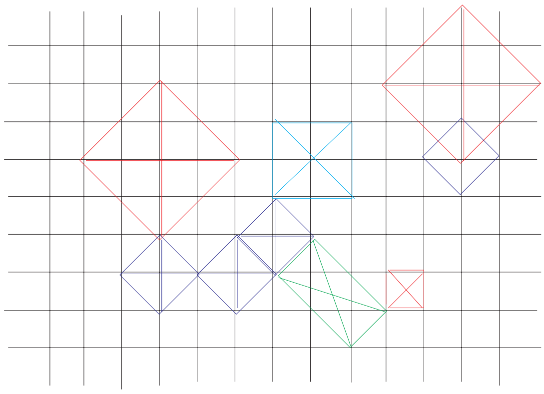
Tugendhat's approach to analytic philosophy, esp. self-consciousness

25. What is the sentence-position disabling?

Interaction, reflectionality, co-creation

4.3 Diamonds, Square, Rectangles onto proto-structure

Until now, the question of different ranks of diamonds was not a topic. But obviously it enters the play if we focus on different proto-structural distances between terms in a diamond. In practice, clients often demands different distances between their opposites. They feel a kind of tensions of different degrees between the positions. Similar situations are also appearing in contexts which are mainly cognitive or conceptual.



Connected and disconnected patterns of different proto-structural rank.

Cognitive approach

A classic logical relation between proposition and opposition is ruled by negation. Ideally, the double negation is affirming the position, again. Thus, the distance between position and opposition can be measured by the complexity of negations involved. In other words, the length of the negation circles are the measure of the distances between positions and oppositions. The rank as the distance between diagonals, hence, is half the negation cycle involved.

Volitive approach

The negational approach is based on a logification of the position / opposition-differences. The proto-structural grid itself is not involved in logic, semantics and meontics, but in kenogrammatics which is located beneath meaning. To move in the prot-structure the akeno-arithmetic operators of iteration and accretion are in play. Each square is defined by the equal number of iterations and accretions.

Inside and between diamonds

Inside a Diamond

The opposite of truth is false and the opposite of false is truth.

Between Diamonds

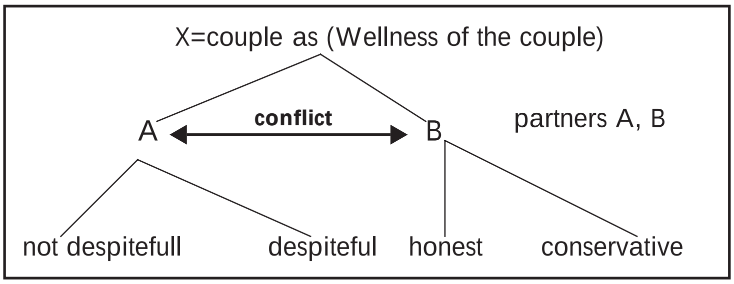
The opposite of truth is false and the opposite of false is the truth as false.

The opposite of a problem is its solution and the opposite of the solution is the solution as a new problem and the opposite of the new problem is a new solution, etc.

5 Further existential training into proto-structural experiences

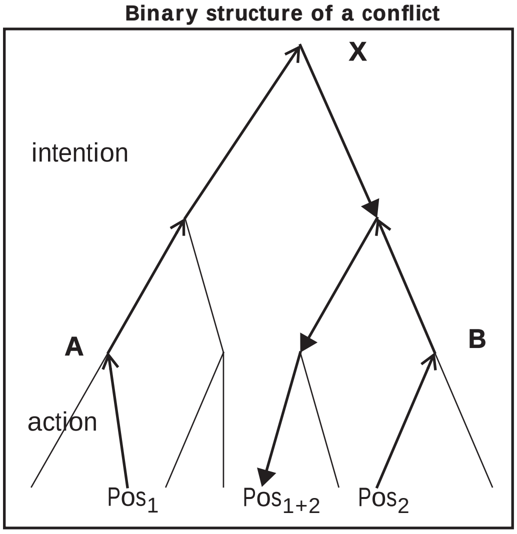
A classic example for an existential conflict situation is a conflict between action and intention between two persons, e.g., a married couple. Such a conflict system (action, intention, $person_1$, $person_2$) can be modeled classically as a conflict in a hierarchic tree, or trans-classically as a conflict between autonomous trees based on a common proto-structural grid.

5.1 Binary conflict model



Standard conflict between couples A and B. The *action* of A ($position_1$) is interpreted by B ($position_2$) as *despiteful*. From the $position_1$ the rejection of this action of A is interpreted as *conservative* of $position_2$ and he, A, is interpreting his own action as open-minded and *honest*. A insists that his *intention* is not in conflict with the intention of B, that is the *wellbeing* of the couple. How to solve the conflict?

Binary structure of a conflict



In this hierarchic model of a conflict between Pos_1 and Pos_2 only 3 resolutions are possible:

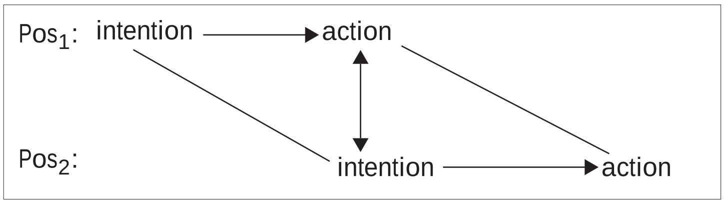
1. Position Pos_1 is giving up his/her position in favor to Position Pos_2.
2. Position Pos_2 is giving up his/her position in favor to Position Pos_1.
3. $Position_1$ and $Position_2$ are finding common third way, i.e., a $Position_3$ which is subsuming both positions into Position Pos_{1+2}.

In other words, in all 3 solutions, the different reasons with their own rationality, have to be sacrificed to the common *intention*, say to stay together as a married couple with the result to change behavior (action).

5.2 Proto-structural conflict model

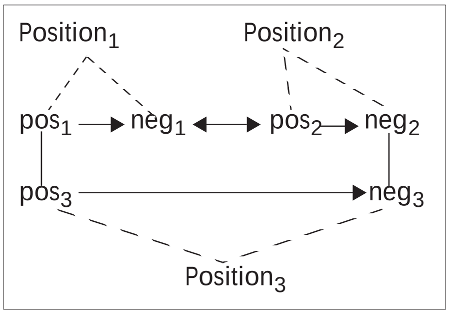
The hierarchic model is presupposing a unique hierarchic order between intentions and actions, in dependent of the positions from which an action is acted and an intention intended. The proto-structural model is opting for a heterarchic, i.e., a chiastic order between action / intention and the positions of the actors.

Intention / action as chiasm

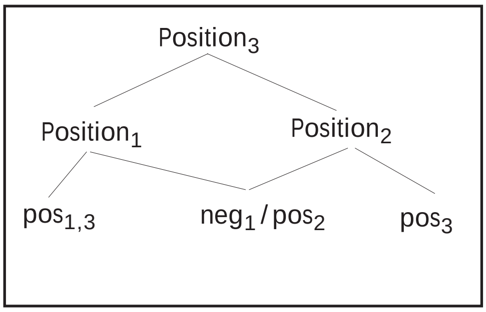


Hence, the distinction of intention / action is not absolute but depending on the position from which the distinction is drawn. Intentions can be perceived as actions and actions may be declared as intentions, always depending on the simultaneous positions of the complexion.

Distributed positions



Proto-structure of the distribution



Valuation of the actions as positive (pos) or negative (neg) in respect to their position.

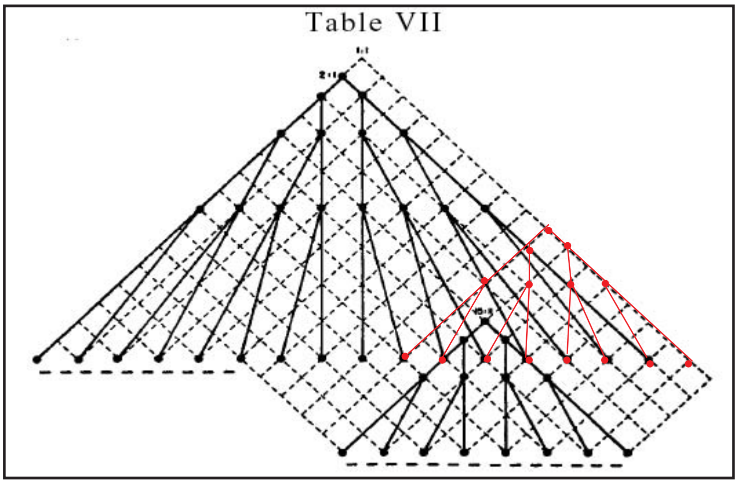
$Position_3$ is offering a possibility which is not subsuming $Position_1$ and $Position_2$ under each other but mediating them into a new $Position_3$ which is not denying the reasons of the original conflict in respect of its positioning. Thus, $Position_3$ is product of a negotiation which both partners are agreeing and accepting but which is nevertheless not demanding for a subordination but a new design for future intentions / actions.

Here too there is a sacrifice to be accepted. There is no such thing as a total unification in a sublime order of mutual understanding and knowledge. The myth of a common ground has to be sacrificed to the autonomy of interacting and reflecting partners in a co-creative togetherness which is involved and generating a dynamic open future.

5.3 The same is different

To model the conflict between the partners A and B and their distribution on the grid we can use the diagram of overlapping trees on the base of a common proto-structure.

Distribution of binary trees onto proto-structure



In this constellation, Table VII, there are, for the red tree, 7 overlapping situations and 8 non-overlappings of the total of 15 possibilities of the red tree. The black tree, with its different origin has a longer "history". With its 31 situations, only 7 are overlapping together with the red tree. Thus, the *harmony* of coincidence is not balanced. The red tree has only 8 "free" positions, while the black tree has 24, thus, having a more complex "history". Interestingly, the overlapping of the red tree with the black tree at the 7 situations is based on a "history" of nil common situations. What is common to both is their being distributed over the proto-structural grid and their meeting at 7 common situations. A next step of development of the black and the red tree is dissolving the harmony at the overlapping locations. The story goes on in separation.

This is the *global* analysis. A focus on the *local* constellations/situations has to consider the equality of the common positions in their locality. That is, both arrived at those locations and from a local point of view it doesn't matter *how* they arrived and from where. Not enough, there is even another binary tree in the game. Its origin is located at another position. Both, the red and the black tree, are involved in proto-structural overlappings with this second (black) tree. Obviously, the game has not to stop here, more trees can be involved. A tree has not necessarily be connected to another person. It can represent another conceptual orientation of a person involved already.

With only a one-step move of the root of the red tree, a fully harmonic overlapping results, with a base, again, of nil common positions. This kind of overlapping is locally suggesting full harmony; globally, it is maximally under-balanced producing the possibility of highest mismatch. Because there is no common "history" realized by the different trees, what seems to be harmonic coincidence can turn out to be a mismatch.

The first, hierarchic, analysis of the partner-conflict was modeling both partners A and B onto the same binary tree. Both trees had been overlapping themselves, thus, denying any difference between them. Also blind for their position in a proto-structural grid. The only difference had been the different paths in the common binary tree. We can call this kind of overlapping a *Double Blind Spot*. And this may apply to conflicts between nations and cultures, too.

Positioning of Diamonds

1 The proto-structure as the grid of actions of diamondization

9. The proto-structure is created by the process of *diamondization* (tetraktomai). Diamondization starts somewhere with the setting (Setzung), i.e., the decision, of a proposition (affirmation) and the creation of its opposition (negation, dualization, reversion, subversion) in one dimension. The second dimension of the diamond is produced by the both-at-once (*acceptance*) and neither-nor (*rejection*) of the involved duality of proposition and opposition. Diamondization is not happening as an absolute and neutral abstract construction of a commutative grid but as a creation of distributed contextures understood as evoking meaning beyond the noun / sentence distinction. The design of the opposite position to the proposition is not reducible to a deduction, say a logical dualization. Depending on the understanding of the proposition, different kinds of oppositions are reasonably possible. A decision in favor to a specific opposition is the result of negotiation with the agent himself or within a group of actors involved.

10. Each distributed contexture developed by the process of diamondization is entailing its own logic. This immanent logic of a contexture is symbolized by its tree. The logic has, in principle, a binary tree structure. This holds for the syntactic as well the semantic and deductional structures of logic.

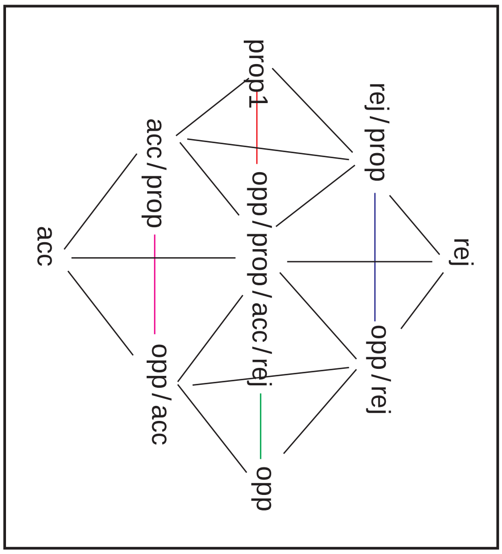
11. Also the diamond is giving place to the distributed contextures and determining their possible interactional meaning, it is not yet establishing an interactional and reflectional mediation between the contextures and their trees. This is realized by the *proemial relationship* between the basic structure of the trees. The basic structure of a binary tree is its conceptual triad. The full tree is an iterative application of the basic conceptual triad of the binary tree.

12. Distribution and mediation of trees is constituting together the *dissemination* of trees. Dissemination of trees may involve different strength of mediation.

13. On the base of the established dissemination of trees further operations have to be introduced. First, the accretive *interactivity* between trees and second, the action of *reflectionality* between trees. Further more, *intervention* and *interlocution* (anticipation).

14. After this introduction of reflectional and interactional disseminated trees, all the apparatus of the so-called *super-operators* have to be involved. The super-operators are the actions or morphisms between trees like *identification*, *permutation*, *reduction*, *replication* and *bifurcation*. To do this properly we have to move to a more mathematical presentation, leaving the grid and its trees as an introductory step behind us.

15. After the grid has been constructed by diamondization the strict formal pattern of the grid, without its contextural thematizations, can be abstracted from the process of diamondization to a the strict formal structure of diamondization. This then, is the proto-structure of kenogrammatics as a skeleton without contextural flesh. Some flesh is given by an arithmetization of the proto-structure by mapping pairs natural numbers (i:j) onto it.



16. An inter-mediate step of abstraction can be considered as the formal, but not arithmetical application of the Diamond Strategies reduced to the set of the basic terms {proposition, opposition, acceptance, rejection}.

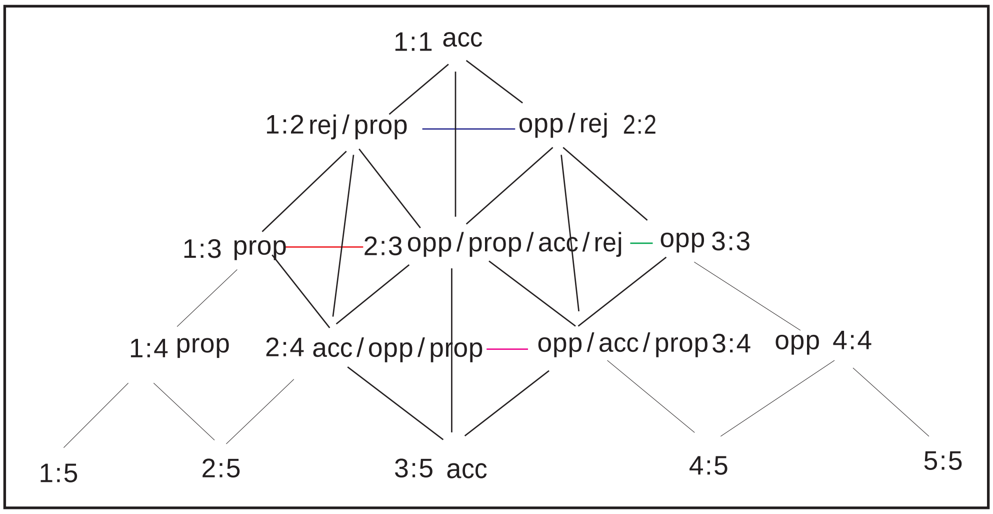
Each knot has a quadruple determination as being at once all basic terms {prop, opp, acc, rej}.

Thus to keep some economy we have to numerate the positions, like $prop_{i:j}$ —> $opp_{i:j+1}$ /

$prop_{i+1:j}$ —> $opp_{i+1:j+2}$

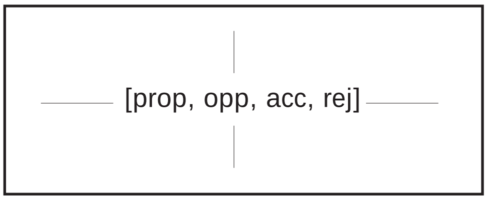
If we abstract from the basic terms and keep the nummeration only, we have constructed the numerical interpretation of the proto-structure (i:j).

DM	O_1	O_2	O_3
M_1	$Prop_1$	Rej_1 / $Prop_4$	Rej_4
M_2	Acc_1 / $Prop_3$	Opp_1 / $Prop_2$ / Rej_3 / Acc_4	Rej_2 / Opp_4
M_3	Acc_3	Acc_2 / Opp_3	Opp_2



It doesen't matter how the pragmatic starting point (1:1) is interpreted, as rejection (rej), as acceptance (acc), as proposition (prop) or as opposition (opp).

General structure of a knot



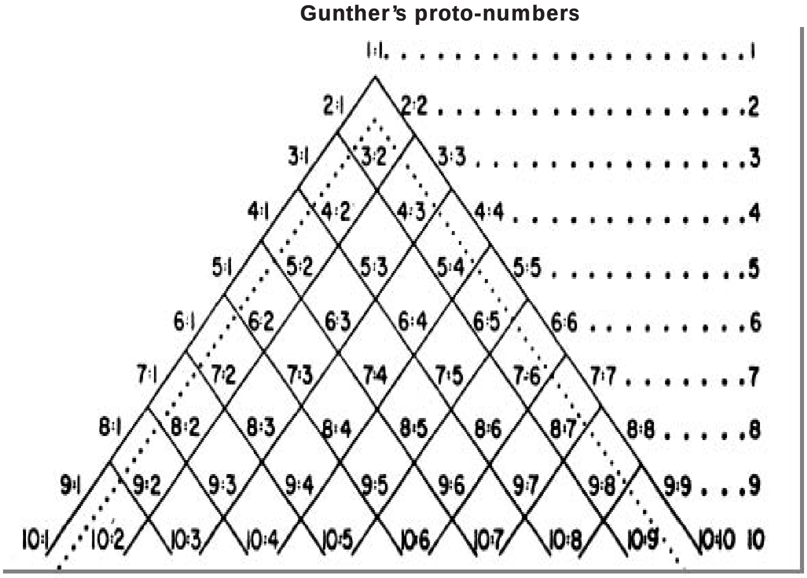
The number (1:1) is not an absolute origin like the number 1 in the arithmetics of natural numbers. There, only one number 1 exists. The proto-structural number (1:1) is relative and for notational reasons only. Inn fact it should be written as $(i_1:j_1)$ to emphasize its relativity.

2 Numbers onto the proto-structure

In contrast to the binary tree which has a single interpretation for each knot only, the proto-structure of the Diamond has a four-fold interpretation for each knot. The diamond based progression of proto-numbers is not to confuse with the application of Gunther's successor operators "iteration" and "accretion".

It was said by Gunther and Schadach that the proto-arithmetical structure of commutativity is rather trivial.

Gunther's proto-numbers



Number of direct paths from (1:1) to (n : m)

$$\binom{n}{m} = \frac{n!}{(n-m)!m!}$$

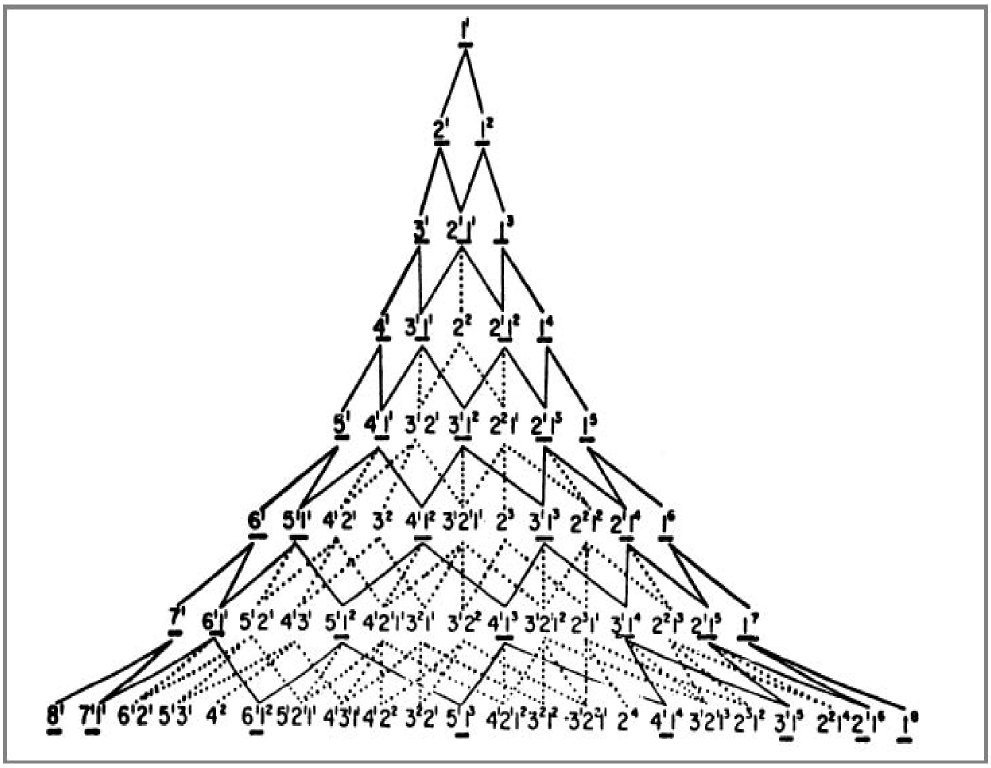
```
From (1:1) to (10:1) or to (10:10) there is only one path up and down.
From (1:1) to (10:5) there are 126 paths.
From (1:1) to (20:11) there are  184756 path. (Gunther 1973)
```

2.1 Diamonds in deutero mode

Because deutero-structures are offering a differentiation of proto-structures, i.e., introducing a kind of a *differentia specifica* into proto-structures, diamonds can be quite naturally mapped onto deutero-structures. The result is equally a differentiation into the distribution of diamonds. Such a differentiation enters the game only with the complexity of 4. That is, 3-contextural systems have a proto-structural differentiation but no deutero-structural differentiation for the distribution of diamonds. With the complexity 4, new and independent distributions of diamonds are introduced.

In other words, with the deutero-structure, the way of doing the tetraktys gets a differentiation in respect of the positioning of the diamonds.

Gunther's deutero-numbers



The first inter-median diamonds starting with [2, 1] are localized by the deutero-numbers

([2,1], [3, 1], [2, 2], [3, 2]) and

([2,1], [2, 2], [2,1,1], [2, 2,1]).

Such inter-median diamonds are accessible only with the complexity of m≥5.

With m≥6, fully inter-median diamonds are accessible.

([2,2], [3, 2], [2, 2, 1], [3, 2,1])

Proto-abstraction of trito-diamonds:

<([2,1], [3, 1], [2, 2], [3, 2]), ([2,1], [2, 2], [2,1,1], [2, 2,1])> $==>_{proto}$

([2, 1], [3, 1], [2, 2], [3, 2)], that is: ([3:2], [4:2], [5:3]).

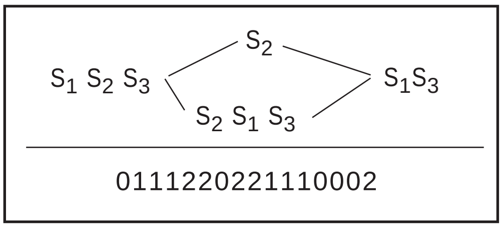
2.2 Diamonds in trito mode

As dyads can be disseminated in trito-systems, diamonds are realizing another possibility of such a kind of an individualized distribution and mediation.

Kenogrammatic patterns of the trito-structures are abstract individual realizations of morphograms. The interconnection between the morphograms, patterns, of the trito-structure, short, the trito-grams, are not directly connected like the proto- and deutero-grams. That is, their accretion and iteration operators are not producing a commutative structure and thus, no commutative graph between different trito-grams. Hence, as individual patterns they have to offer space for diamonds onto their own individual pattern.

Interpretation of the trito-gram (0111220221110002) by different dyadic systems.

Dyadic sub-systems of the trito-gram

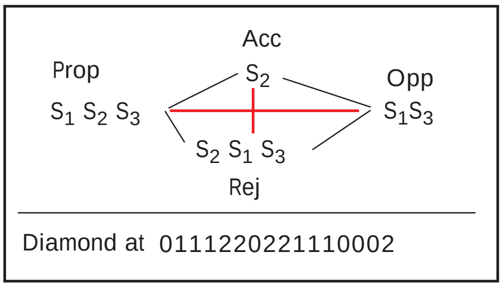


S1 = (0111) ==
S2 = (12) ==
S3 = (2022) ==
S2 = (2111) :: S2=(211), S1=(110), S3=(00)
S1 = (1000) =≠
S3 = (02) ==

The possibility to interpret a sequence in different ways enables an asymmetry between the construction and the destruction of the sequence. The way down has not to be the way up. Asymmetric inversions are possible. And obviously, a separation and reunion of the path of the sequence is accessible, too.

This simple fact of a "dyadic" interpretation of trito-structures is introducing the formal pattern of commutativity and thus is giving place for a trito-structural distribution of diamonds. Diamonds are disseminated onto trito-structures as individual morphogrammatic patterns. Therefore, they are placed "inside" of an individual trito-gram and not between different trito-grams.

A trito-gram can be interpreted in different ways, thus enabling the placement of different diamonds. The individual structure or the structure of kenomic individuation is giving place for a distribution of diamonds as individual patterns.



A possible diamondization of the trito-gram (0111220221110002) is given by the mapping of the diamond onto the sub-systems ($S_1S_2S_3$), ($S_2S_1S_3$), (S_1S_3) and (S_2) of the trito-gram interpreted as a mediation of "dyadic" sub-systems.

3 Different ways of constructing the proto-structural grid

Gunther's approach to the proto-structure is *presupposing* a multitude of contextures in the world and introduces a method of supposing an order on them. The simplest way to order contextures is to put them into an increasing sequence of the same or different contextures. The same and the different are formalized as the process of *iteration* and *accretion*. This appears at a first glance as a radicalisation of the semiotic procedure of concatenation. But in detail, the situation is highly different to semiotic systems.

3.1 Life as Polycontexturality

"In Part I we introduced the distinction between *sameness* and *identity*. The two-valuedness in each contexture is the same as the two-valuedness in any other contexture. But this does not mean that – let us say – the positive value in contexture A is identical with the positive value in contexture B. But as the identity of the "same" value changes with reference to different contextures, we may – although we insist that our Universe displays in each contexture a strictly two-valued structure – introduce a system of many-valuedness with regard to the identity problem.

Hegel´s logic further shows that if a *plurality of contextures* is introduced one cannot stop with three. In fact, one has to postulate a potential infinity of them. If one believes Hegel and there are most convincing arguments that one should – then each world datum in the contexturality of Being should be considered an intersection of an unlimited number of contextures.

There is no doubt that this Universe we live in displays an *enormous amount* of contextures in a bewildering arrangement.

On the other hand, if we speak about the Universe as a whole, the very term universe suggest that all contexturalities somehow form a unit, the unit of contextural existence and coexistence. We shall call such a unit a *compound-contexturality*.
In other words: the confusing lines of Table II must form, in their relations to each other, an *order* which constitutes a unity. Part II of our analysis shall show how such an order or unity can be *detected*.

It will be our next task to *construct* the most elementary form of such a *grid*. We *must start*, of course, with a *one-valued* system and there is little to say about it because it can only be represented by a single symbol and no operator is as yet available to manipulate it.

When we developed a *pyramid of proto-structure* we did so by adding with every step down one new place for value occupancy. This was done in a twofold way: we either repeated the original symbol or we *added* a new symbol. We shall from now on call the first method of increase "*iteration*" and the second "*accretion*."
http://www.vordenker.de/ggphilosophy/gg_life_as_polycontexturality.pdf

Summary

After all, the mechanism of Gunther's construction of the proto-structural grid can be summarized as follows:

Start with a single contexture and then add iteratively or accretively a further contexture to the existing compound-contexture. Then postulate that the universe has an infinity of contextures to legitimize the reasonability of the previous construction. Because of the commutativity of the accretion and iteration operators and the kenogrammatic definition of the proto-objects, the proto-structural grid evolves automatically.

There is no mechanism given which allows to develop the grid as a grid explicitely and there is also no mechanism given by Gunther how to map contextures onto it.

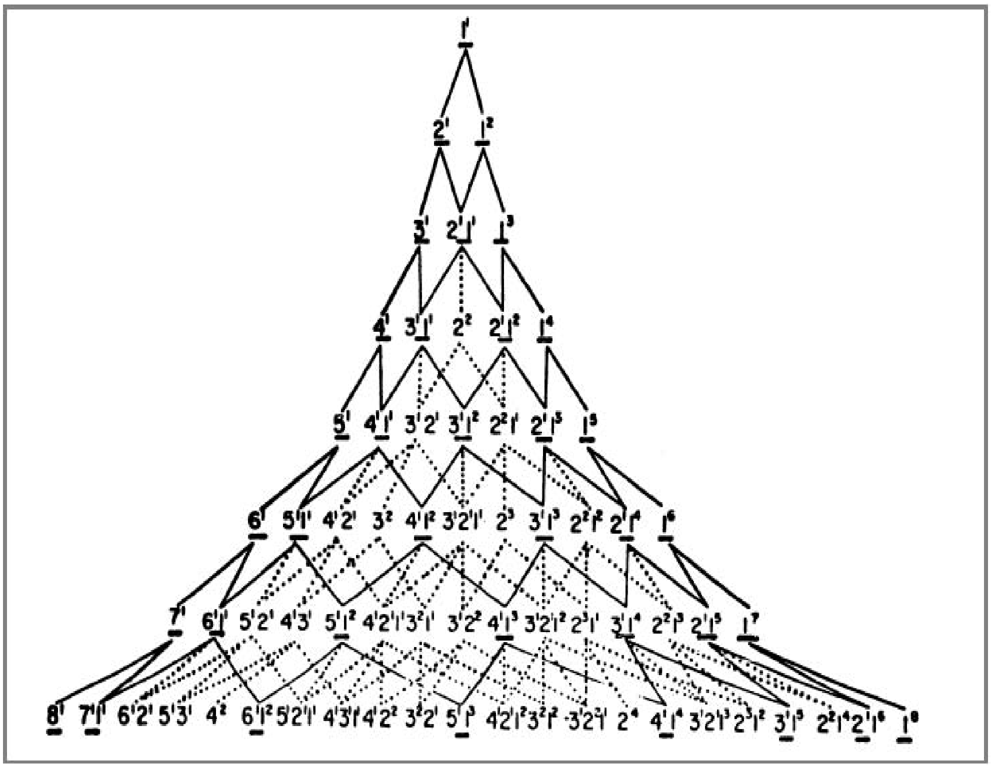
3.2 Diamond Strategies in deutero- and trito-kenogrammatic systems

Diamond Strategies are fitting confortably into proto-structures, simply because their graph has a commutative structure corresponding to the diamond structure. But the diamond can as well be distributed over deutero- and trito-structure of kenogrammmatic systems. Also diamonds can start everywhere, a mapping onto an *arithmetic structure* to produce an better overview may be a reasonable approach.

3.2.1 Diamonds in deutero mode

Because deutero-structures are offering a differentiation of proto-structures, i.e., introducing a kind of a *differentia specifica* into proto-structures, diamonds can be quite naturally mapped onto deutero-structures. The result is equally a differentiation into the distribution of diamonds. Such a differentiation enters the game only with the complexity of 4. That is, 3-contextural systems have a proto-structural differentiation but no deutero-structural differentiation for the distribution of diamonds. With the complexity 4, new and independent distributions of diamonds are introduced.

Gunther's deutero-numbers



The first inter-median diamonds starting with [2, 1] are localized by the deutero-numbers

([2,1], [3, 1], [2, 2], [3, 2]) and

([2,1], [2, 2], [2,1,1], [2, 2,1]).

Such inter-median diamonds are accessible only with the complexity of m≥5.

Proto-abstraction of trito-diamonds:

<([2,1], [3, 1], [2, 2], [3, 2]), ([2,1], [2, 2], [2,1,1], [2, 2,1])> $==>_{proto}$

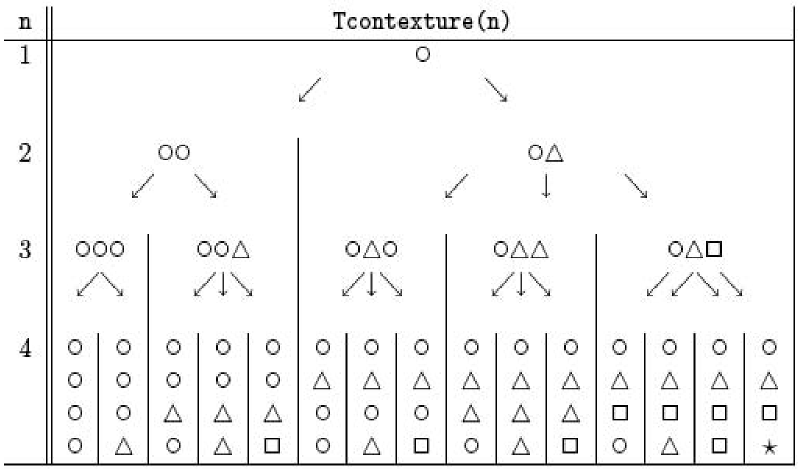
([2, 1], [3, 1], [2, 2], [3, 2)], that is: ([3:2], [4:2], [5:3]).

3.2.2 Diamonds in trito mode

Because of the individuation of structures in trito-structural systems the graph is not presenting an obvious grid for the distribution of diamonds.

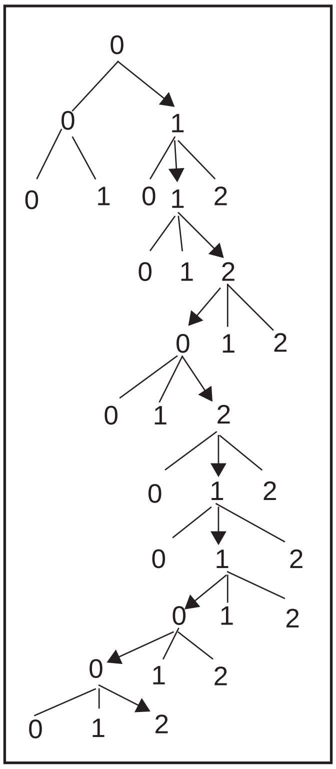
This problem of a commutative structure on the trito-level wasn't solved for quite a longtime. It would have been necessary for a full non-hierarchic, i.e., heterarchic interpretation of kenogrammatics. Finally it was solved in 1992 and presented in my paper "Skizze-0.9.5" on a descriptional but not on a mathematical level. These ideas can help to distribute diamonds over trito-grams.

Distributions of dyads into trito-systems had been introduced in my paper *"The Abacus of Universal Logics"*.



3.3 Strategies of positioning diamonds

TZ= (01120211002)-tree



The chain of events interpreted as a tissue of 3 binary systems S_1, S_2 and S_3 with 3 elements {0, 1, 2}. Each 2 elements are defining a binary system.

TZ=(01120211002)

this chain is having at least 2 numeric interpretations:

a) [011/12/202/211/100/02]
with the chain of sub-systems: $S_1S_2S_3S_2S_1S_3$
and
b) [011/112/202/211/1100/002]
with the chain of sub-systems: $S_1S_2S_3S_2S_1S_3$

In this case the chain of syb-systems of a) and b) are equal but the resolutions are of different length.

As in binary systems each number has a well defined position. In binary systems the possible positions of numbers are calculated by 2^n, trito-numbers in kenomic systems are calculated by their Bell numbers, based on the Stirling numbers of the second kind. The unspecified graphic representation of the number TZ as a tree is specified by the following presentation. Again, only an abbreviation can be given because of their complexity. The scheme is sketching the Stirling development. The indices of the trito-numbers in focus, in red, are indicated and marked by their place-number.

The path is globally unique in the trito-system, but the local interpretation of the steps can differ.

The pure kenogrammatic trito-system, without any interpretation, is defined simply by its iteration and accretion operators. But things are not as simple as in a semiotic system and its word arithmetic. Semiotic operators are predefined and not changing during the application. Trito-operators are depending in their operativity from their operands. That is, between operators and operands an intrinsic co-creation happens. Because of this flexibility different interpretations are possible.

Operations are abstractions. Semiotic operations and morphism are defined in the mode of *is-abstrations*. A concatenation is defined as a concatenation independently of its application, i.e., of its operands.

Kenomic operations are in the mode of *as-abstractions*. A kenomic concatenation is a concatenation defined as the concatenation of its operands, and nothing else.

The individual place of a trito-gram in the trito-system is given by its location number.

TZ= (01120211002)-sequence *f*

$$T^{(3)} - number\ \ sequence\ (01120211002)$$

$$\begin{pmatrix}
1: & (0)_1 \\
2: & ((0), (1)_2) \\
3: & (((0), (1)), ((0), (1)_4, (2))) \\
4: & (((0), (1)), ((0), (1), (2)), ((0), (1), (2)), ((0), (1), (2)_{11}), ((0), (1), (2))) \\
5: & (((0), (1)), ((0), (1), (2)), ((0), (1), (2)), ..., ((0)_{32}, (1), (2)), ..., ((0), (1), (2))) \\
6: & (((0), (1)), ((0), (1), (2)), ((0), (1), (2)), ..., ((0), (1), ((2))_{95})), ..., ((0), (1), (2)) \\
7: & (((0), (1)), ((0), (1), (2)), ((0), (1), (2)), ..., ((0), (1)_{284}, (2))), ..., ((0), (1), (2)) \\
8: & (((0), (1)), ((0), (1), (2)), ((0), (1), (2)), ..., ((0), (1)_{851}, (2))), ..., ((0), (1), (2)) \\
9: & (((0), (1)), ((0), (1), (2)), ((0), (1), (2)), ..., ((0)_{2552}, (1), (2))), ..., ((0), (1), (2)) \\
10: & (((0), (1)), ((0), (1), (2)), ((0), (1), (2)), ..., ((0)_{7655}, (1), (2))), ..., ((0), (1), (2)) \\
11: & (((0), (1)), ((0), (1), (2)), ((0), (1), (2)), ..., ((0), (1), (2)_{23988})), ..., ((0), (1), (2))
\end{pmatrix}$$

The index numbers, indicating the place of the trito-gram in the trito-system, are the Bell Numbers B_n.

TZ= (01120211002)-decompositions

$$dec(01120211002)$$

$$\begin{bmatrix}
(011)_{1.2.4} \\
\quad (12)_{4.11} \\
\quad\quad (202)_{11.32.93} \\
\quad\quad\quad (211)_{93.284.851} \\
\quad\quad\quad\quad (100)_{851.2552.7655} \\
\quad\quad\quad\quad\quad (02)_{7655.23988}
\end{bmatrix}
\begin{bmatrix}
(011)_{1.2.4} \\
\quad (112)_{2.4.11} \\
\quad\quad (202)_{11.32.93} \\
\quad\quad\quad (211)_{93.284.851} \\
\quad\quad\quad\quad (1100)_{284.851.2552.7655} \\
\quad\quad\quad\quad\quad (002)_{2552.7655.23988}
\end{bmatrix}$$

$T^{(3)}$ *– number sequence*

(0112000211002)

$$\begin{pmatrix} (0) \\ ((0), (1)) \\ (((0), (1)), ((0), (1), (2))) \\ (..., ((0), (1), (2)), ...) \\ (..., ((0), (1), (2)), ...) \\ (..., ((0), (1), (2)), ...) \\ (..., ((0), (1), (2)), ...) \\ (..., ((0), (1), (2)), ...) \\ (..., ((0), (1), (2)), ...) \\ (..., ((0), (1), (2)),...) \\ (..., ((0), (1), (2)), ...) \\ (..., ((0), (1), (2)), ...) \\ (..., ((0), (1), (2)), ...) \end{pmatrix}$$

Another example

This trito-number TZ= (0112000211002) has interpretations with different chains of sub-systems and different length of resolutions. The length of the chains of sub-systems c) is l=8 and the length of d) is l=6. The 4. resolutions of c) and d) are of different length, c) is 3 with (000) and d) is 6 with (200002).

c) [01/12/20/000/02/211/100/02] with

$S_1S_2S_3S_1S_3S_2S_1S_3$, l=8, r4=3

d) [01/12/200002/211/100/02] with

$S_1S_2S_3S_2S_1S_3$, l=6, r4=6

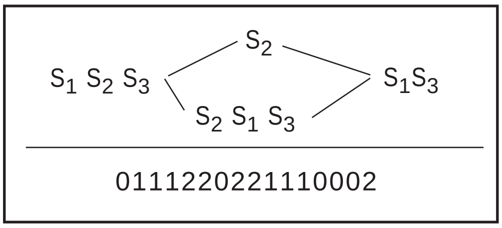
Distribution inside trito-grams

As dyads can be disseminated in trito-systems, diamonds are realizing another possibility of such a kind of an individual distribution and mediation.

Kenogrammatic patterns of the trito-structures are abstract individual realizations of morphograms. The interconnection between the morphograms, patterns, of the trito-structure, short, the trito-grams, are not directly connected like the proto- and deutero-grams. That is, there accretion and iteration operators are not producing a commutative structure and thus, no commutative graph between different trito-grams. Hence, as individual patterns they have to offer space for diamonds onto their own individual pattern.

Interpretation of the trito-gram (0111220221110002) by different dyadic systems.

Dyadic sub-systems of the trito-gram

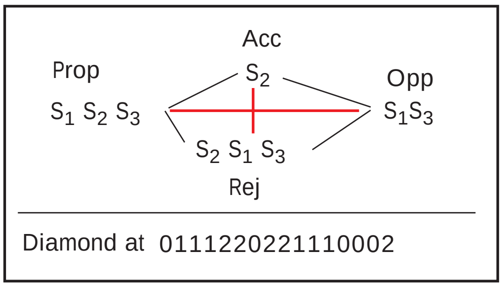


S1 = (0111) ==
S2 = (12) ==
S3 = (2022) ==
S2 = (2111) :: S2=(211), S1=(110), S3=(00)
S1 = (1000) =≠
S3 = (02) ==

The possibility to interpret a sequence in different ways enables an asymmetry between the construction and the destruction of the sequence. The way down has not to be the way up. Asymmetric inversions are possible. And obviously, a separation and reunion of the path of the sequence is accessible, too.

This simple fact of a "dyadic" interpretation of trito-structures is introducing the formal pattern of commutativity and thus is giving place for a trito-structural distribution of diamonds. Diamonds are disseminated onto trito-structures as individual morphogrammatic patterns. Therefore, they are placed "inside" of an individual trito-gram and not between different trito-grams.

A trito-gram can be interpreted in different ways, thus enabling the placement of different diamonds. The individual structure or the structure of kenomic individuation is give place for a distribution of diamonds as individual patterns.



A possible diamondization of the trito-gram (0111220221110002) is given by the mapping of the diamond onto the sub-systems ($S_1S_2S_3$), ($S_2S_1S_3$), (S_1S_3) and (S_2) of the trito-gram interpreted as a mediation of "dyadic" sub-systems.

3.4 Levels of situatedness of diamonds

Summary

17. Diamonds in proto-mode: Distribution of Diamonds onto the proto-structure,

18. Diamonds in deutero-mode: Distribution of Diamonds onto the deutero-structure,

19. Diamonds in trito-mode: Distribution of Diamonds onto the trito-structure,

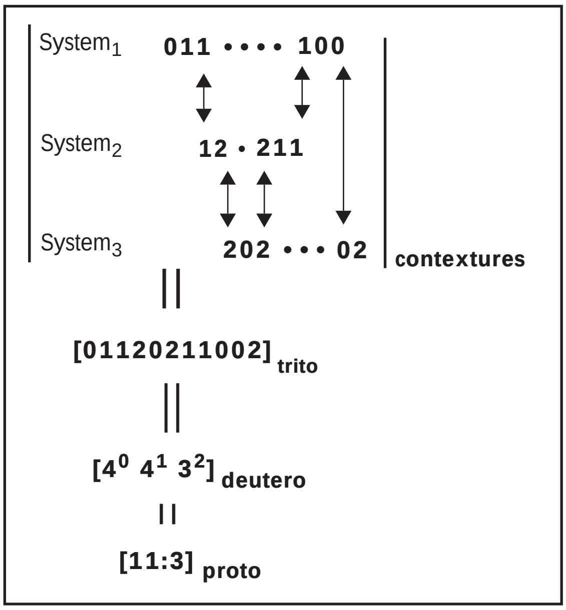
20. Diamonds in logic-mode: Distribution of Diamonds onto polylogical-structure,

21. Diamond-structure of the modi of distribution [proto, deutero, trito, logic].

Diamonds are directly produced by the operations of iteration and accretion in proto- and deutero-structures and their commutativity. The case is more intricate for trito-structures. The proposed solution is locating, at first, diamonds inside of trito-grams and not between trito-grams of different complexity as for proto- and deutero-grams. Thus it is introducing iteration and accretion inside of the trito-gram and not between trito-grams of different complexity. More correctly, the path producing the tritogram can be interpreted in different ways, thus enabling commutativity. To discover a commutativity between different trito-grams for trito-arithmetic iteration and accretion is another question.

Abstractions

The aim of this endeavour is to develop a mechanism to give the diamonds a concrete position, a *structural place*, before / beyond classical logical systems. Such a placement of diamonds can be succeed on different levels of pre-logical structures, i.e., the kenogrammatic structures of proto-, deutero- and trito-differentiation. Beyond logic, i.e., beyond mono-contexturality, a distribution of diamonds in poly-contextural situations is proposed. The diamond strategies, short the diamonds, are explanations of the metaphor of tetraktomai, i.e., of doing the tetraktys, and its translation into the strategy of diamondization.



Abstractions and concretizations between the levels may help to gain a better understanding of the strategy.

Each mediative proto- and deutero-number is product of a diamond strategy.
Diamonds are mediative patterns.
How does it work for trito-numbers?

Gunther: trans-contextural transition produced by both, iteration and accretion

Semiotics of Diamonds/Diamonds of Semiotics

Semiotics beyond linguistics

1 Dyadic Semiotics

Saussure

2 Triadic Semiotics

Peirce, Bense, Morris
Toth

3 Diamond Semiotics

Tetradic semiotics

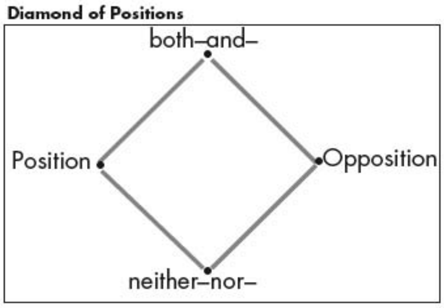
Tetradic semiotics is structurally proemial but its operations are not yet diamondized.

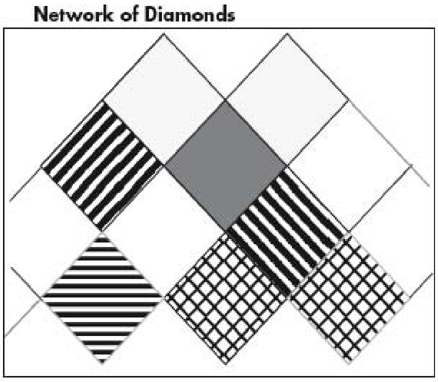
Diamond semiotics

Diamond semiotics is tetradic and its operations are diamondized.

4 Diamonds

4.1 Diamond Strategies





Also *deconstruction* is not simply a method, Derrida gives us some general strategies of deconstruction:

"In a traditional philosophical opposition we have not a peaceful coexistence of facing terms but a violent hierarchy. One of the terms dominates the other (axiologically, logically, etc.), occupies the commanding position. To deconstruct the opposition is above all, at a particular moment, to reverse the hierarchy." (Derrida, Positions, 56-57).

The double gesture *displacements*:

"Deconstruction must through a double gesture, a double science, a double writing, put into practice a reversal of the classical opposition and a general displacement of the system. It is that condition alone that deconstruction will provide the means of intervening in the field of oppositions it criticize and which is also a field of non-discursive forces." (Derrida, Marges, 392)

Interestingly, the *DiamondStrategies* are incorporating both Ancient attitudes: 1. The tetralemmatic and tetractic way of conceiving truth (Buddha, Pythagoras), and 2. the pragmatic or praxeological apraoch by Chinese thinkers to the relevancy of statements as opening futures instead of claiming eternal truth. Diamond Strategies are formalizing the practice of tetraktomai, i.e., doing the tetraktys and to diamondize it towards a practical device and tool for explorations.

Steps of departures

1. Radicalisation of the Indian concept of *positionality* and *zero* towards a tabular kenomic position system.

2. Radicalization of the Arabic concept of *operationality* with the triadic distinctions of operator / operand / operation towards a diamondization of operationality.

3. Radicalisation of the Hegelian / Guntherian concept of *mediation* towards a mechanism to save established Western mono-contextural formalism into a general theory of polycontexturality.

4. Radicalization of disseminated classical logics and formal systems towards a *diamond logic* and arithmetic.

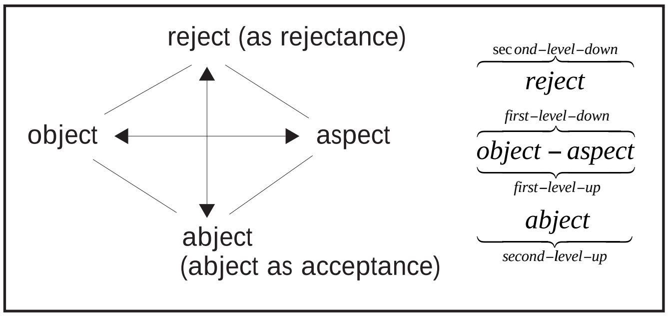
5. Formalization and operationalization of the Pythagorean idea of Tetraktys towards a theory of *diamondization*.

6. Radicalisation of polycontexturality towards *reflectionality* and *interactionality* with the help of the polycontextural matrix.

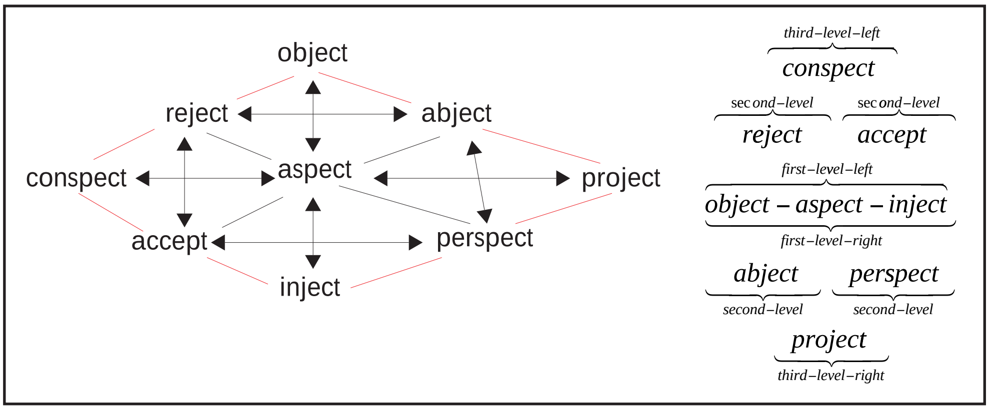
7. Radicalisation of basic polycontextural concepts towards a *complementarity* of diamondization and proemiality.

4.2 Diamonds as modi of thematizations

Diamond of object and aspect



Additionally to the presentation given in *"From Ruby to Rudy"* , § 10, the full Diamond of the terms involved, i.e., the full direct diamondization of [object, aspect, inject] is considered in the following modeling with the help of additional dummies *reject*, *accept*, and *conspect*, configuring the red Diamond. Thus the whole conceptual analysis has to be augmented by the antidromic part of the conceptual graph.



5 Dyads – Triads – Diamonds

5.1 Conceptual Dyads

In classical modeling approaches conceptual dyads are treated, in fact, as monads.

dyad	*object*	*aspect*
object	*OO*	*OA*
aspect	*AO*	*AA*

$$\underbrace{object - aspect}_{first-level}$$

$$\begin{array}{c} abstract\ class \\ \swarrow \ \searrow \\ object\ \ aspect \end{array}$$

Because this paradigm of dyads is not offering or accepting any kind of mediation, the only principle of organizing concepts is to put them into a hierarchic order. To realize that, it needs a new term, a general object as an abstract class. Because the concept "object" was historically earlier than the concept "aspect" a dominance has to be introduced: first object, then aspect. In practise, aspects are simply special objects. And objects are instances of the abstract class.

5.2 Conceptual Triads

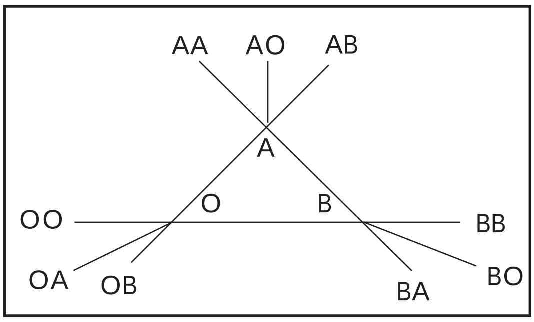
AA: Aspects as aspects, or Aspectivity of aspects,
AO: Aspects as objects, or Aspectivity of objects,
AB: Aspects as abjects, or Aspectivity of abjects
OA: Objects as aspects, or Objectionality of aspects,
OO: Objects as objects, or Objectionality of objects,
OB: Objects as abjects, or Objectionality of abjects,
BO: Abjects as objects, or Abjectivity of objects,
BA: Abjects as aspects, or Abjectivity of aspects,
BB: Abjects as abjects, or Abjectivity of abjects.

	object	*aspect*	*abjects*
object	*OO*	*OA*	*OB*
aspect	*AO*	*AA*	*AB*
abjects	*BO*	*BA*	*BB*

$$\underbrace{object - aspect}_{first-level}$$
$$\underbrace{abject}_{second-level}$$

An object in general, object$^{(3)}$, thus is a complexion of the components object, aspect, abject. The same for aspects$^{(3)}$, and abjects$^{(3)}$.

The new topic under computational consideration is a complexion mediating the categories *object*, *aspect* and *abject* together. Semiotically it is a triadic-trichotomic sign-complexion in the sense of Charles Sanders Peirce.

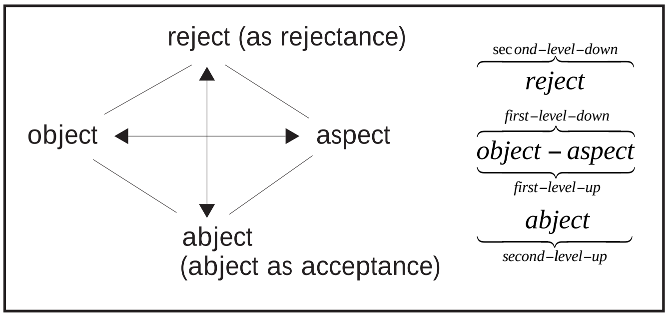


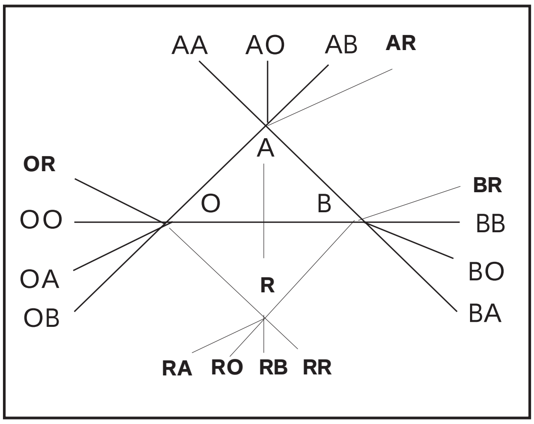
Objects$^{(3)}$:
O-objects, A-objects, B-objects
Aspects$^{(3)}$:
O-aspects, A-aspects, B-aspects,
Abjects$^{(3)}$:
O-abjects, A-abjects, B-abjects.

Collecting the components.

5.3 Conceptual Tetrads (diamonds)

Under the perspective of diamond logics, the triangle conceptualization turns out to be not more, but not less, than the half of the game.





Diamond of Semiotics

Category of lists, Cat(list), is well studied. Especially in computer science and mathematical linguistics.

Thus, what could a diamond of lists be of interest?

Concatenation of strings is obviously a composition relation or in other terms a composition operation.

So, what we get are texts and simultaneous counter-texts.

As an application, I could imagine a musical composition with a double temporality developing "forwards" and at once "backwards", interplaying together. It would be the piece and a reflection on it accompanying the piece of music in musical terms.

Category and time vs. spatiality and diamonds

The category way of thinking is well connected with the functional paradigm of programming. This fact, is supporting the thesis, that category, also it is conceived as a highly structural discipline, is fundamentally connected or even determined by the concept of linear time. This is obvious, with the fundamental operation of category theory, the operation of composition and its laws. They are, in some sense, aim-oriented.

The laws of composition are developed strait forwards: *associativity*. Associativity is constructed step by step for all morphisms involved. The focus, thus, is on the successivity of the application of compositions.

There is no space left in the very definition of categories for something to happen like simultaneous counter-morphisms, directed into the opposite direction of category morphisms. This counter-movements are coming into awareness if the structure is conceived, not primarily in time, but in space. This, without doubt, has to be understood as a mathematical and not as a physical space. Spatiality or tabularity of diamonds are opening up the possibility to conceive the new, ambiguous and complementary structures to the categories: the laws of diamondization. Objects in diamonds are complex and ambiguous, belonging at once to categories as to parallaxes (jumpoids).

It is said, that Ancient Chinese thinking is not time but space oriented. It is not oriented to problem-solving in time but by eluding spaces in which solutions can be found.

Diamonds have to be read like drawings and not as commands or procedures. That is, the interplay between categories and jumpoids (parallaxies, saltatories) happens in a tabular scenario, building together the realization of diamonds.

Therefore, diamonds could help to interpret and understand at least some formal aspects of Ancient Chinese thinking. Now, transformed into a trans-classic operativity.

Classic operativity of Western thinking is "*aufgehoben*" by the diamond approach. There is no need for a total denial of Western thinking to realize trans-classic patterns of diamond thinking nor is there any need to time-travel into past and highly unreachable epochs.

History of Diamonds

1 Thought, will and numbers

Name / proposition / contexture or sign vs. kenogram

Before the digitalists have overtaken Western ideology, the philosophical trend of the *"linguistic turn"* was dominating the theory of science as "analytic" philosophy. Sentence, statement, proposition, etc. based thinking was confronted to noun / name / notion-based thinking. Their conclusion was, the one who is not opting for propositions is poised to be stuck in the archaic name-oriented approach.

Gödel and Gunther didn't decide for the linguistic turn. Nor had they been lost in the past of name-oriented disorientation.

Now, it is said, that Ancient Chinese thinking is not sentence-based, thus it has to be noun-based; TND. *"Chinese linguistic thought focused on names not sentences."* Contextures and even more, kenograms, are not involved into this logocentric game of names and sentences. Not even in texts and contexts, and their inter-textuality as it was introduced and studied mainly by the French structuralists and deconstructivists.

Kenograms and morphograms are understood as patterns of actions. In Günther's words, they are the general *"Codex für Handlungsvollzüge"*.

Ancient pragmatic advise: Tetraktys as a device

Like Chinese thinking, Pythagorean thinking was *action-oriented* and not concerned with the eternal truth (of axiomatic systems). Action-orientation is not simply the pragmatic dimension of logocentric sign systems, i.e., semiotics.

The Pythagorean tetraktys was not primarily a concept but a *device*: to do the tetraktys, i.e., to *tetraktomai*. To *tetraktomai* is to produce the grid of the proto-structure. The tetraktys doesn't stop with the number 4, it starts with it. But in ancient time, there was no theory of action but material advices for a better life, only. Learnable in secret schools from teachers or Guru's. Today, advices have to become programs to compute new chances in a changing world.

Hierarchy and heterarchy of thinking and action

Occidental philosophy is mainly thought-orientated. Thoughts are represented in statements and statements are represented in written sentences. Then, on the base of sentences, action can happen. Thus, scripturality is secondary. In other words, thoughts in established Western philosophy are first, will comes second. But Western technology is on the way to turn this hierarchic order into an action-based paradigm. Until now, this inversion happens proposition-based, i.e., the logic of action and programming is still the logic of propositions. This happens in different forms, sometimes hiding its logocentric origin, like with the lambda calculus.

There is no reason to belief that a simple inversion of the hierarchic order is of any real help. Both systems are more or less isomorphic and are building a symmetric dualism. There is not much research to observe which would intend to change this situation of semiotic based hierarchy.

Chinese thought, it was said, is action-based. But as we have shown often enough, this paradigm of action is not based on the same world-model as the Western sentence-based. The crucial asymmetry between the Chinese writing system and its linguistics are building the deep-structure of its action based paradigm. Hence it would be a serious mismatch to identify both concepts, the Chinese and the Western concept of action. But Chinese thinking has not yet considered to formalize the heterarchic operative structure of its writing system. We can say, the West achieved to formalize its patterns of thinking to the highest possible perfection. The results are now propagated globally as the ultimate ratio and universal truth. But at the same time this approach is reaching its principle limits.

As a first step to escape the hierarchy of thinking and will, a chiasm between both has to be established. That is, a distribution and mediation of the thought/will relationship has to be installed. This, as a second step, is possible only on the base of non-propositional, non-semiotic deep-structures which are offering a grid to place the thought/will relationship over different loci. The tree-structure of diaeresis corresponds to the rational thinking, the placement of the tree in the proto-structure is not itself a cognition but a volitional decision.

Again, will and thought, like intention/action or cognition/volition, has to be distributed onto a proto-structural grid not accessible by semiotics or mathematics. And the interactions between the distributed will/thought-relationships has to be realized by the chiasm of mediation.

> "Demnach ist die nach–schriftliche Schreibweise nicht etwas völlig Neues, sondern ein komplexer Prozeß mit den 4 simultanen Tendenzen:
> 1) Distribution, Dissemination, Vermassung und Vermittlung des Alphabetismus als der höchsten Abstraktionsform der Schrift, die keine weiteren Abstraktionen mehr zuläßt;
> 2) der sukzessiven Wiederannahme der verdrängten Schichten der Schrift, also der Pikto– und Ideographie bei
> 3) einer gleichzeitigen Inversion der Reihenfolge der historischen Schichten bei der Wiederannahme, was einer Reflexion und Transformation ihrer Rationalität von einer natürlich gegebenen in eine künstliche und maschinell unterstützte involviert und
> 4) die Entdeckung und Erschließung der vor–schriftlichen Schreibweisen." (Kaehr 1981)

2 To contrast approaches

2.1 Friedrich Kittler, Number and Numeral

Theory, Culture & Society, Vol. 23, No. 7-8, 51-61 (2006)
DOI: 10.1177/0263276406069882

'In the Greek alphabet our senses were present - and thanks to Turing they are so once again.'

This is part of a much larger project, the aim of which is to think about technology, history and culture anew by considering the ways in which 'letters, numbers, images and tones' have been differentiated and re-integrated by developing notation systems and media technologies. In this present essay, Kittler is concerned specifically with the question of *number*. His argument is that numbers and numerals have not always stood apart. In Old Hebrew and even nursery rhymes, for example, numbers are in fact words. This might seem like a banal observation, but for Kittler it is crucial as historically, mathematics proper only developed *'in cultures in which numbers are present as numerals'*, a development which entailed the transformation of numbers from signifiers ('a matter of hearing') into signifieds ('a matter of reading and writing') and which rested on the emergence of storage and transmission media that Kittler calls 'the media of mathematics'.

Kittler is fascinated by the inscription technologies that make mathematics possible, and which at the same time structure cultural forms as well as our bodily experience of them. As he puts it in a programmatic aside, 'media studies only make sense' if they focus on how 'media make senses.' Hence his focus on the Greek phonetic alphabet: for Kittler, its superiority has less to do with its ability to reproduce the spoken words of any language, than with the fact that at one point it was used to handle language, music, and mathematics - that is, one and the same set of signs was used to encode letters, tones and numbers. This, however, was not an abstract undertaking but developed in constant feedback with specific instruments or media, especially the lyre and the bow. It was here that fundamental concepts such as logoi were first developed that were subsequently distorted, misunderstood and deprived of their musico-technical origins by philosophers such as Aristotle. Kittler's essay is thus also part of a larger cultural project, indebted in particular to Martin Heidegger, whose aim it is to ferret out the different, as yet unrevealed beginning of occidental culture. Moreover, while it was necessary for the evolution of modern mathematics that numbers receive a notation system of their own that will allow for ratios and decimals, among others, it is obvious that Kittler sees the computer (as first envisaged in Alan Turing's mathematical modelling) as a return of universal alphabet that operates in constant feedback with a medium that shapes our senses: 'In the Greek alphabet our senses were present - and thanks to Turing they are so once again.'

http://tcs.sagepub.com/cgi/content/refs/23/7-8/51

2.2 Marcel GRANET — La pensée chinoise

Le langage vise, avant tout, à agir. Il prétend moins à informer clairement qu'à diriger la conduite.

Le mot, de même qu'il ne correspond pas à un concept, n'est pas non plus un simple signe. Ce n'est pas un signe abstrait auquel on ne donne vie qu'à l'aide d'artifices grammaticaux ou syntactiques. Dans sa forme immuable de monosyllabe, dans son aspect neutre, il retient toute l'énergie impérative de l'acte dont il est le correspondant vocal, dont il est l'emblème.

Le mot, en chinois, est bien autre chose qu'un signe servant à noter un concept. Il ne correspond pas à une notion dont on tient à fixer, de façon aussi définie que possible, le degré d'abstraction et de généralité. Il évoque, en faisant d'abord apparaître la plus active d'entre elles, un complexe indéfini d'images particulières.

Leibniz a écrit (40) : *« S'il y avait (dans l'écriture chinoise)... un certain nombre de caractères fondamentaux dont les autres ne fussent que les combinaisons »*, cette écriture *« aurait quelque analogie avec l'analyse des pensées »*. Il suffit de savoir que la plupart des caractères sont considérés comme des complexes phoniques, pour sentir combien est fausse l'idée que les Chinois auraient procédé à l'invention de leur écriture comme à celle d'une *algèbre en combinant des signes* choisis pour représenter les notions essentielles.

Les mérites de l'écriture chinoise sont d'un ordre tout autre : *pratique et non pas intellectuel*. Cette écriture peut être utilisée par des populations parlant des dialectes — ou même des idiomes — différents, le lecteur lisant à sa manière ce que l'écrivain a écrit en pensant à des mots de même sens, mais qu'il pouvait prononcer de façon toute différente. Indépendante des changements de la prononciation au cours des temps, cette écriture est un admirable organe de culture traditionnelle. Indépendante des prononciations locales qu'elle tolère, elle a pour principal avantage d'être ce qu'on pourrait appeler une *écriture de civilisation*." (Granet), [emph. kae]

"Rien, chez aucun Sage de l'Ancienne Chine, ne laisse entrevoir qu'il ait jamais éprouvé le besoin de faire appel à des notions comparables à nos *idées abstraites de nombre, de temps, d'espace, de cause*... C'est, en revanche, à l'aide d'un couple de symboles concrets (le Yin et le Yang) que les Sages de toutes les « Écoles » cherchent à traduire un sentiment du *Rythme* qui leur permet de concevoir les rapports des Temps, des Espaces et des Nombres en les envisageant comme *un ensemble de jeux concertés*." (Granet), p. 53

http://classiques.uqac.ca/classiques/granet_marcel/A12_la_pensee_chinoise/la_pensee_chinoise.pdf

Action direct?

It is often repeated that the Chinese language and philosophy is action oriented.

"Le langage vise, avant tout, à agir. Il prétend moins à informer clairement qu'à diriger la conduite."

Thus, what is the structure of this action-orientedness? How does it work? How can the mechanism of an action-oriented scriptural system be inscribed?

3 Approaching Ancient Chinese Thinking

Because of a lack of understanding directly Chinese thinking, I have to make a risky detour. I parallize a specific understanding of the Pythagorean way of thinking, i.e. Heidegger's, Derrida's and Lohmann's understanding, with the Ancient Chinese way of thinking as far as it is reconstructed by some Western and modern Chinese thinkers.

The result is found in the *action of tetraktomai*, i.e., the use of the tetraktys by the Pythagoreans, formalized by my own attempts with the figure of the *Diamond* and the activity of the *Diamond Strategies*. A further formalization is supported by Gunther's studies of the *proto-/deutero-/trito-structure of kenogrammatics* as an explication of pre-logical thinking, i.e., an understanding of the world before the use of nouns, concepts, numbers and sentences. The aim surely is to motivated and understand the new way of thinking opened up by what I call *Graphematics*, the mathematics before and beyond alphabetism.

The detour to some Ancient Greek ideas is also mixed with risks because even the European sources of Western thinking aren't well understood.

The rediscovery of Ancient Chinese thinking goes together with the re-awakening of modern China. If this will not end in a repetition of the western way of life it has to be re-bound to its own sources. And this are, first at all, to be found in the structures and strategies of Chinese writing.

To diamondize and to proemialize are two complementary activities.

> Während der Westen rational-technisch, zeitfixiert, perspektivisch organisiert und auf das Individuum bezogen ist, hat im Osten das *sinnlich-emotionale, das zeitfreie, das aperspektivische Denken* seinen Sinn behalten, zudem steht das *Kollektive* im Vordergrund.
>
> Was bedeutet, dass das gleiche Raumbild in Ost und West nicht die selbe Bedeutung hat.
>
> Robert Kaltenbrunner, Wessen Traum kann es sein?
> http://www.fr-online.de/in_und_ausland/kultur_und_medien/feuilleton/

It is said, that Chinese thinking is non-temporal and a-perspectivic. To understand the counter-movements in the composition operation of diamonds, a temporal and perspectivic view of composition would remain blind for such dynamics. Counter-movements, like hetero-morphisms, are conceivable only in a spatial, i.e., tabular organization of thinking.

It wouldn't make any sense in a system dominated by a uni-linear type of organization.

4 A Schematic Calendar of Epochs

(published on Chinese Challenge)

One of the big successes of Western globalization is the globalization of its understanding of human nature. There is one and only one such understanding. And this is the Western concept of human nature. Other understandings of human nature are simply not yet matured to the Western model. This judgement, obviously, is applied to the Islamic world and it is thought that the new Chinese awakening will soon follow the Western model of humanity with all its noble achievements.

The idea of different ways of realizing humanity, different types of human self-definition, is taboo. It is accepted only backwards to distinguish high civilizations from Primitive cultures. A projection into the futures is damaged by the well known attempts of the German Uebermensch ideology. Thus, to stay clean, we have to believe in Americanism and its ideology of humanity and human rights.

This is not in conflict with the American dream of TransHumanism. TransHumanism is not questioning the very idea of human beings but tries to augment pragmatically its very realization. Funny enough, one of the Grand fathers of TransHumanism is Gotthard Gunther with his cybernetic studies from the 50s.

As a philosopher of history, Gunther proposed another model of anthropology and civilizations which is open to futures and able to understand the past. Because of its structural conceptuality it is as neutral to ideologies as possible.

Gotthard Gunther proposed a theory of a connection between historical epochs and the structural complexity of their logics used in practice and reflected in science. The complexity of a logical formation was, at this time, considered as the many-valuedness of a logical system.

– The epoch of *Animism* is considered as the epoch of 1-valuedness.

– The modern *Occidental*, esp. European epoch is connected with 2-valuedness.

– The post-modern *US-American* epoch is proposed as 3-valuedness.

– It seems that the post-Occidental epoch of *Chinese* thinking is linked with 4-valuedness which is opening up the pre-semiotic patterns of morphogrammatics and general m-valuedness.

It has to be mentioned, that Gunther's concept of many-valuedness is poly-contextural and thus principally different from the multiple-valuedness of Lukasievicz, Post and others. Their multiple-valuedness is strictly mono-contextural.

The first 3 epochs are dominated by their *Double Blind Spot*, that is, the lack of self-reflectionality and awareness of being positioned into history. Technically, their morphogrammatics are not accessible and are in the hidden. The 3-valued epoch is opening up a certain relativism of 2-valuedness, discovering a first Blind Spot, but remains in the negativity of denial (of roots, etc.). Such a relativism has no means to reflect itself and to produce a "positive" self-definition. This ability of self-reflection is given within the 4-valued model, but this model is realizable only with the simultaneous acceptance of its morphogrammatics. That is, with the acceptance of the distinction between general valuedness and value-free kenogrammatics.

The first three epochs had been linked with the semantic and meontic (semantics of negativity) function of valuedness. The fourth epoch is rejecting the dominance of valuedness in favor of the activity of diamondization as an activity of kenogrammatics. Valuedness is strongly connected with names, notions and sentences. Multi-valuedness can be considered as a classic interpretation of the semantics of inter-textuality.

"Totem and Tabu" may correspond to an ancient *name*-based understanding of the world. *Notion*-based thinking is opening up a scientific-narrative approach to the world in the sense of the first world model (Lambda Abstraction). A reflective, relational and relativistic word-view is based on *sentences* (Modal logics).

With the new distinction of *valuedness* (semantics, meontics) and *morphogrammatics* (kenogrammatics) a full reflectional and interactional system is possible.

Differentiations in the transitions

According to Gunther's theory of history the transition from the 1-valued to the 2-valued world-view happened in a differentiation of two decisions producing a structural difference between the Oriental and the Occidental existence (psyche).

Formally, the semantics of a two-valued system has a positive and a negative value. The function of the values is to designate or to non-designate. With the choice for a coincidences between the positive values and its designative function a strict symmetry between positivity and negativity is guaranteed. This is the Occidental decision. The Oriental decision is the opposite: The negative value has a designative function. With that, a indefinite asymmetry is established. In epistemological term, the symmetric 2-valued world-view is based on a egological ground, founding subjectivity, spirituality and temporality, the asymmetric concept is founding spaciality, objectivity. The grammatological coincidences are obvious: The Occidental world-view is based on alphabetical sign systems, i.e., logocentrism. The Oriental world-view is based on a planar system of characters. Technologically, the western model was accessible to formalization, producing formal systems, incorporating the Arabian algebraic and algorithmic concepts and procedures and exploiting the power of the Indian concept of zero..

A similar formalization of the structure of the Chinese writing system has not yet been attempted or considered as a necessary task.

Further on, more open questions are occuring. What are the differentiations in the transition from the 2-valued to the 3-valued system? And, what are the corresponding transitions from the 3-valued to the 4-valued world-view?

A 3-valued system is at first enabling circular structures, i.e., negation cycles. Thus, the characterization of the values as designative or non-designative is relative. The hegemony of strict dualism of the 2-valued approach is dissolved. Such a negation cycle is the smallest possible real cycle next to the 2-valued self-cycle. This may be a hint to understand in a positive way the US-American relativism and its realization in pragmatism. (Peirce, Dewy, Royce) But also its structural Double Blindness.

Additional to this "value-oriented" structural approach of Gunther, considerations about the differentiation of alphabetic and hieroglyphic writing systems had been involved into his theory of history. The thesis of a weakness of alphabetism in contrast to a specific identity strength of Chinese writing had been explored.

> "That is, in holding to the ideograms, lies an unconscious insight of a massive asymmetry between spoken and written language. It is the written language, on which a main culture rests. It possesses an identity strength, which stands out clearly against the identity weakness of the spoken word." Gunther

Media theoreticians, like Alfred Kittler, have studied in recent time the connection between alphabetism and culture and computer technology, but they are not aware that mathematics, programming paradigms, formal systems are depending on the linearity and atomicity of alphabetism. This blindness of alphabetism and its late ideological defence by media scientists is just what has to be surpassed if we want to stop the self-destruction of Western culture.

Gotthard Günther, DETAILED STATEMENT OF THE PROJECT, 1953

"But the proof of a new logic is found in its application. I have therefore - after developing the basic categories of that new technique of thinking - applied my three-valued non-Aristotelian logic to the problem of History. If you look at American History with conceptual categories of non-Aristotelian origin this course of human events does not longer appear as a continuation of Western Civilization but as a novel departure from the general trend of history in the Old World of the Eastern Hemisphere. A new and indigenous form of historical existence is emerging in the New World of the Western Hemisphere - and with it goes a principal rejection (or technical secularization) of the metaphysical premises of Old World History. This is indicated in Thomas Jefferson's amazing criticism of Plato's "Republic" and his repudiation of the historical concepts implied in Plato' s philosophy.

"My interpretation of American History is based an the following trend of thought: Generally speaking the history of Man has so far developed on two very different historical levels. The first is that of the so-called Primitive Culture with the concomitant metaphysical world-conception of animism. The animistic interpretation of Reality is the product of a mind which works with a one-valued logic. Here the subject is completely identified with the object, namely the world that surrounds it.

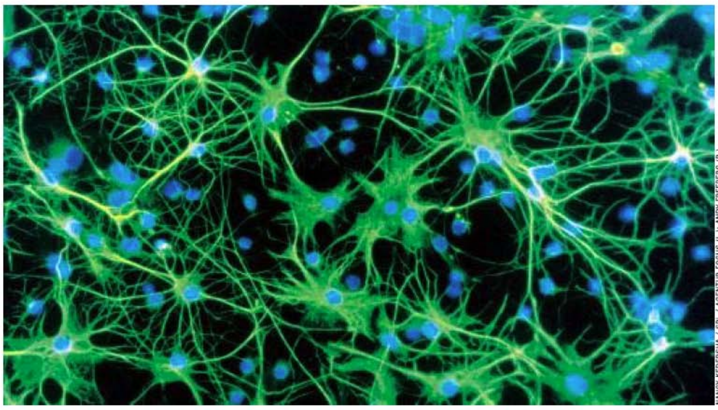
"The following, second level of the history of Man is that of the so-called regional High Civilizations (Egypt, India, China, Greek/Roman and Western Civilization of northern Europe). In this second form of historical existence Man develops concepts of life based on a two-valued pattern of consciousness. It is significant that Aristotle's logic of duality was discovered in this era. Traditionally American History is regarded as belonging to that epoch. It is tacitly assumed that since the advent of Columbus America should be regarded as an extension of Western Civilization. It is my contention, on the other hand, that American History does not anymore belong to this second level which is characterized by the appearance of regionally limited High Civilization!

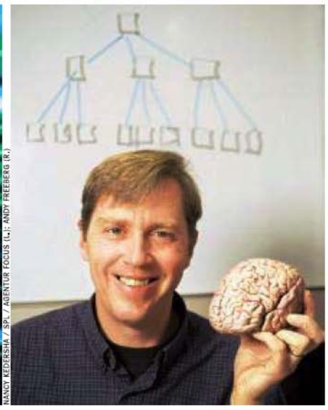
"On the American continent a novel form of History is coming into existence, constituting a third level of World-History.

"The structure of the human consciousness is changing and with it the spiritual aims of the race. Not the knowledge of natural objects but the science of Man himself will be the central core of all intellectual efforts. This, however, presupposes a new logic in which an exact theory of the subject as different from the mere object is developed. For this purpose a three-valued logic is absolutely necessary. The American mind is potentially non-Aristotelian ... or let us say: post-Aristotelian. The primitive mind is pro-Aristotelian, and the epoch of regional High Civilizations is dualistic. Only this dualistic mentality corresponds with the concepts of a two-valued logic."

http://www.thinkartlab.com/pkl/archive/GUNTHER-GODEL/GUNTHER-GODEL.htm

There is no doubt, the structure of the brain is a ternary tree!





"One of the reasons that HTMs are efficient in discovering causes and performing inference is that the structure of the world is hierarchical." (Jeff Hawkins)
http://www.numenta.com/Numenta_HTM_Concepts.pdf

5 Is Chinese centralism the same as the European?

"*Modern society is a polycentric, polycontextural system.* (…) Consequently there must be transjunctional operations, which make it possible to go from one contexturality into another, still marking which differentiation is accepted or rejected for specific operations." (Luhmann 1996). http://www.qvortrup.info/lq/pdf-misc/Hypercomplex.pdf

The multitude of Chinese spoken languages can be seen as a distribution over the uniqueness of the Chinese writing system. This is not only a multitude of different interpretations of a character in the sense of a polysemy of meanings. Because the different interpretations which are offered by the hieroglyphs are opening up the space spoken languages can be be distributed. Thus, different languages incorporating different points of view with different cultural histories are mediated by the uniqueness of the hieroglyphic writing system. Such a scriptural system is poly-centric and polycontextural, not only in a linguistic sense but also politically, economically and culturally. With each spoken language, or with each contexture established, the speaker will follow, ideally, the logical structure of diaeresis and its principle of tertium non datur (TND). Therefore, it is reasonable to think of a distribution of different diaeretic systems mediated by their common written background or hieroglyphic deep-structure of the writing system.

"Polycentrism characterizes a society that cannot observe itself or its environment from a single observational position–or, rather, from within a single observational perspective or "optics"–but has to employ a large number of positions of observation, each using its own individual observational code to manage its own social complexity. This implies that no universal point of observation can be found. Furthermore, this means that a large portion of these observations are observations of observations:[...]." ibd.

It is obvious, that a similar mediation of different spoken languages, like in the Chinese case, is not accessible for Europeans. If a Norwegian and a Catalan person or administration want to communicate, they don't have, despite their common general European culture, a common system of linguistic or semiotic reference.

Today, this problem of communication is basic for the development of a *Semantic*

Web (Web 3.0). The hope for a solution is found in a common general ontology/taxonomy which is denying all the historic and cultural differences between the different European languages and their regional ontologies. Such Semantic Web activities are in favor for machine-readability. It further turns out that the concept of European polycentrism is a myth proposed in a notional format, lacking any operativity; supporting in practice by necessity strict political and juridical centralism.

It is said, that we have not to be slaves of our historic writing systems. We can think against their restrictional tendencies. Yes, with which tools? Today, all sorts of narratives about complexity, interactivity, mediation, autonomy and self-organization are on the market. But to talk and write *about* a topic is not to produce an operational calculus able to master it. Modern mathematical theories are still based on very simple principles of logocentric sign systems.

Thus, after the introduction of all these grammatological differences, the question naturally arises: *Can Chinese centralism be the same as European centralism?*

> "There is a common belief that the system of sovereign territorial states and the roots of liberal democracy are unique to European civilization and alien to non-Western cultures. The view has generated popular cynicism about democracy promotion in general and China's prospect for democratization in particular.
> This book demonstrates that China in the Spring and Autumn and Warring States periods (656-221 BC) consisted of a system of sovereign territorial states similar to Europe in the early modern period. It examines why China and Europe shared similar processes but experienced opposite outcomes."
>
> Victoria Tin-bor Hui, War and State Formation in Ancient China and Early Modern Europe
> http://www.amazon.com/State-Formation-Ancient-Modern-Europe/dp/0521525764

> "Why is it that political scientists and Europeanists take for granted checks and balances in European politics, while Chinese and sinologists take for granted a coercive universal empire in China?"
>
> Victoria Tin-bor Hui argues that the assumption needs to be reexamined. She begins her case by rightly noting that China during the Spring and Autumn and Warring States periods (656–221 b.c.) was composed of states often in conflict with each other in ways that were remarkably similar to the European experience in the early modern period (a.d. 1495–1815). The question is why China ended up becoming a unified empire for so long, and why Europe did not. Her answer is to suggest a much more dynamic and fluid process of interaction than historians have hitherto been willing to acknowledge—so fluid, in fact, that at several points China could conceivably have gone in a direction more analogous to that of Europe, and Europe, by the same token, could conceivably have gone in a direction more analogous to that of China.

Phenomenology of Diamonds

1 Composition and Iter/alter-ability in Diamonds

Compositions with their associativity wouldn't be of much interest if they wouldn't be involved with repeatability. But repeatability is not a well studied concept in math neither in philosophy; despite the endless literature about feasible, potential and factual infinities. The presupposition of composition in category theory is that composition is infinitely iterable.

$$\forall m \in N,\ comp^{(m)} \in COMP :$$
$$\left(comp\left(comp^{(m)}\right) = comp^{(m+1)}\right) \in COMP$$

Composition belongs to the concept of potential infinity of repetition. That is, to each composition of morphisms a further prolongation of composition of morphisms is possible.

1.1 Antidromic repeatability

There is no direct hint in the analysis of iterability given in my paper *"Lambda Calculi in Polycontextural Situations"*, nor, as far as I remember or understand, in the work of Derrida (or Caputo, Gasché, or Badiou about infinity), that points to the simultaneous antidromic, retro-grade movement of repeatability, iterative and accretive, as it is conceived in the diamond conception of composition.

Disremption as a general concept for *iterative* and *accretive* repetition, even in the sense of Kierkegaard's *"Wiederholung des Alten"* vs. *"Wiederholung des Neuen"* or Gehlen's concept of creation as "*Wiederholung*", hasn't made explicit, any components of antidromic behaviors. In Christian theology we encounter the double-face of God as Deus absconditus and as Demiurg. Some hints to the problematics can be found in Husserl's protention/retention paradox.

> "Repetition only means iterability in the modus of identity, excluding all traits of accretive repeatability or alterating disremption. That is, iterability is restricted to the *ITER*, excluding the *ALTER* of the poly-notion *iter/alter-ability*. This decision for identical iterability guarantees strict dis-ambiguity of formal systems. The challenge to introduce the non-concept of iter/alterability is the basic decision to start computation from the very beginning with complex writing and introducing the game of ambiguous calculations."

Alterability seems still to be connected to a progression-oriented concept of disremption, insiting on the othernes, i.e., the *alter* of repetition. The *alter* of alterability is not yet connnected to the other possible meaning of *alter* as antidromic repetition.

disremption —> iter, alter,
double-disremption —> progression, retro-gression —> iter, alter.

Recursion in its recurrence is not antidromic but is re-running just ran runs.

Even in a dissemination of repeatability in polycontextural systems, the concept of a simultaneous counter-movement at the place of a contextural repetitions is not yet conceived. What is included are movements and counter-movements distributed over different contextures. But the counter-movements are not necessarily inertwind with their movements as in diamond constellations.

Intra-contextural concepts of repetition are: iterability, iteration, recursion.
Trans-contextural concepts of repetition are: accretion, co-creation.
Inter-contextural concepts of repetition are: interaction of iteration and accretion.
Diamond concepts of repetition are: simultaneity of repetition and counter-repetition.

Diamonds, with iterative and accretive compositions, are covering the full range of repeatability as it is known until now.

1.2 Steps, Gaps and Jumps

The succession of events, say arithmetical events, is essential for the unity of concsiouness.

Hence, succession, connectivity or even linearity is fundamental for the rationality of formal systems.

Phenomena, like gaps and jumps, are secondary and results of faulty successions.

For diamonds, there is no priority between jumps and steps, continuity and gaps.

1.2.1 Polycontextural modeling of "Steps and Jumps"

Schritt und Lücke

Noch wird es für irgend zwei Zahlen eine Lücke, eine Abgrund zwischen ihnen geben. Ein Kontexturwechsel ist im Spiel der Metapher des Schrittes nicht zu vollziehen. Der Schritt muss durch einen *Sprung* übersprungen werden, soll ein Kontexturwechsel möglich werden.

Kontexturwechsel werden bei Günther als *transkontexturale Übergänge* eingeführt. Danach ist ein transkontexturaler Übergang nur dann vollzogen, wenn an ihm sowohl iterative wie akkretive Schritte beteiligt sind. Ein Kontexturwechsel ist chiastisch dann, wenn er in seiner Gegenläufigkeit beschrieben wird als Weg-hin und Weg-her.

Schritt vs. Sprung

Der Schritt vollzieht sich in der Unizität des Systems. Der Sprung erspringt eine Plurizität von Kontexturen. Jede dieser Kontexturen ist in sich durch ihre je eigene Unizität geregelt und ermöglicht damit den Spielraum ihres Schrittes. Damit werden die Metaphern des Schrittes und des Sprunges miteinander verwoben.

Der neue Spruch lautet: Kein Sprung ohne Schritt; kein Schritt ohne Sprung. Beide zusammen bilden, wie könnte es anders sein, einen Chiasmus.

Schritt vs. Sprung
vs.
mono- vs. polykontextural

Der Begriff der Sukzession, des schrittweisen Vorgehens, der Schrittzahl, des Schrittes überhaupt, ist dahingehend zu dekonstruieren, dass der Schritt als chiastischer Gegensatz des *Sprunges* verstanden wird.

Erinnert sei an Heidegger: „Der Satz des Grundes ist der Grund des Satzes.“

Der Schritt hat als logischen Gegensatz den Nicht-Schritt, den Stillstand. Der lineare Schritt, wie der rekurrente Schritt schliessen den Sprung aus. Schritte leisten keinen Sprung aus dem Regelsatz des Schrittsystems. Vom Standpunkt der Idee des Sprunges ist der Schritt ein spezieller Sprung, nämlich der Sprung in sich selbst, d.h. der Sprung innerhalb seines eigenen Bereichs.

Wenn Zahlen Nachbarn haben, werden diese Nachbarn nicht durch einen Schritt, sondern einzig durch einen *Sprung* errechnet bzw. besucht.

Die Redeweise *„in endlich vielen Schritten“* etwa zur Charakterisierung von Algorithmen muss nicht nur auf die Konzeption der Endlichkeit, sondern auch auf die Schritt-Metapher hin dekonstruiert werden.

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Ein Anfang / kein Ende

Es gibt einen und nur einen Anfang und es gibt kein Ende; ein Ende ist niemals erreichbar. Kein Ende heisst Unendlichkeit. Daher die schiefe Dichotomie: Anfang / Unendlichkeit. Gäbe es ein Ende, dann wäre dieses Denken erneut konfrontiert mit seiner (mythischen) Vergangenheit von der es sich gerade losgelöst hat.

Doch was für Aritoteles und seine Jünger virulent war, muss für uns nicht notwendigerweise irgend eine Verbindlichkeit haben. Ebenso braucht man nicht ein Verehrer des Circulus Creativus zu sein, um dem ursprungsmythischen Denken zu entweichen.

War die Absage Aristoteles von Platon und Pythagoras historisch zwingend, so sind wir heute mit der, gewiss vibranten Aufgabe befasst, ein Denken nach Aristoteles, also ein zumindest non-Aristotelisches und weitergehend ein trans-Aristotelisches Denken, jenseits von Zyklus und Linie, d.h. auch von eindeutigen Figuren zu wagen.

Arithmetics and gaps

"The law which we applied was the principle of numerical induction; and although nobody has ever counted up to 10^{1000}, or ever will, we know perfectly well that it would be the height of absurdity to assume that our law will stop being valid at the quoted number and start working again at 10^{10000}.

We know this with absolute certainity because we are aware of the fact that the principle of induction is nothing but an expression of the reflective procedure our consciousness employs in order to become aware of a sequence of numbers. The breaking down of the law even for one single number out of the infinity would mean there is no numerical consciousness at all!" Gotthard Gunther, Cybernetic Ontology, p. 360

Diese Aussage wird wohl auch heute noch von der Mehrheit der Matematiker geteilt. Auch dann, wenn sie die Ankopplung an eine Reflexionstheorie nicht teilen bzw. nicht mitreflektieren. Die wenigen Ausnahmen sind die Ultra-Intuitionisten und – Günther selbst. Leider hat er die Reflexionen der Konsequenzen seines Ansatzes einer polykontexturalen Arithmetik für das Induktionsprinzip nicht publiziert.

Hirnrisse. Wer braucht die Einheit eines Bewusstseins als einheitsstiftende Funktion der Rationalität? Wer hat Angst vor Sprüngen?

Das Basisalphabet bzw. die Signatur einer polykontexturalen Arithmetik besteht somit aus drei sehr verschiedenen Kategorien von Zeichen bzw. Marken: *Zahlzeichen*, *Leerzeichen* und *Lückenzeichen* je Kontextur.

1.2.2 Diamond modeling of "Steps and Jumps"

"Der Satz aus dem Regelsatz."

Polycontextural modeling of "Steps, Gaps and Jumps" was proposed in my "Skizze-0.95" in extenso. This study developed a deconstruction of the basic action of "step-wise proceeding" in arithmetic, programming and machines. The jump-function was explained as a "transcontextural transition" from one contexture to another, strictly in the sense of Gunther's "transkontexturaler Uebergang".

With diamonds a radically new situation for the understanding of "steps, gaps and jumps" has emerged.

The amazing point is that contextures are structurally triadic. But this is, as we learned again and again, only half the story. A contextures might be per se triadic but there is no contexture per se, contextures are always involved with other contextures, they come as polycontexturality. And this is the place where the tetradic structure of the chiastic interplay and mediation between contextures occurs.

This chiastic interplay, formalized by the proemial relationship, which is a genuine 4-fold relation, was probably so much intriguing that it concealed the insight that the triadic structure of elementary contextures could be augmented to a 4-fold conception. Tetradic chiasms and proemial relations masked the possibility to see a tetradic turn for the conceptuality of contextures.

Now, we achieved to introduce the tetradic structure of contextures with the insight into their diamond nature.

Diamond based contextures are equally involved in polycontexturality, ruled by the tetratic proemial relationship. Hence, diamond polycontexturality are tetrads of tetrads, or: diamonds of diamonds.

Diamond steps are not only antidromic but full of gaps and jumps. That is, categories are dealing with succesive composition, saltatories with saltational connection bridging gaps between steps.

"Der Grund des Satzes ist der Satz des Grundes." Heidegger

Morphisms are corresponding propositions, i.e., Satz.

Saltations are corresponding jumps, i.e., Satz.

This nice paradox of Heidegger's word-game between Satz as proposition and Satz as jump was quite provoking but its queer chiastic structure didn't got much recognition.

Propositions are connected successively, jumps are needed by gaps.

Further more, diamonds are involved into the interplay between categories (succession) and saltatories (saltations), mixing both universes together into inertwining structures guided by bridging rules.

1.2.3 Polycontextural vs. diamond modeling

Antidromic and gap-structures are not intrinsic in polycontextural systems. They can easily be introduced on the base the polycontexturality of distributed and mediated contextural systems, arithmetic, semiotic, logic, etc. But polycontexturality is not necessarily forcing antidromic and parallax structures.

On the other hand, antidromic and gap structures are intrinsic for diamond systems even before they are disseminated into polycontextural interplays.

Both together as polycontextural diamonds or diamondized polycontexturality are producing a new highly unusual constellation: Gaps of gaps, Jumps of jumps, and Steps of steps.

Gunther's *Gegenläufigkeit der Zahlen*

The Logical Parallax

http://www.vordenker.de/gunther_web/gg_logical-parallax.pdf

Zizek

Sketch of positioning diamonds

1.3 Paradigm change: From "giveness" to "happenstance"

"This is the place where mathematicians can work. In other words, Chinese mathematicians' objective is to solve problems one by one in the present time -now- not to find a universal formula that can solve all the problems posed in similar situations regardless of their complexity or the time at which they might arise. The logical relations that are structured in the present time, now, involve the employment of an aesthetic order. This aesthetic order is the order that Chinese mathematicians seek."

"It is clear that you in the Nine Chapters does not hold the meaning of something that is given by mathematicians theoretically, but that it means a concrete problem that occasionally exists as a special event, in a particular time and space.

If one holds the presumption that there is a fixed order in this world and that things have their stable positions, then the notion of “given a problem” or “given a rule” can make sense in mathematical reasoning. In fact, in the Western worldview, mathematics has been understood as an effective way to represent the beauty of this order. Logical discourse, in which mathematicians are interested, aims at the discovery of Truth, which stands above us all and serves as a standard by which we are constrained. As Bertrand Russell claims:

"Mathematics is, I believe, the chief source of the belief in eternal and exact truth, as well as in a super-sensible intelligible world. The theory is developed in Euclid, and has great logical beauty. The method is purely deductive, and there is no way, within it, of testing the initial assumptions."

In Western mathematical terminology, the phrase “given [a problem]” can be a starting point for getting into the process of searching for this order. The phrase “given [a rule]” can guide one in finding out the solution of a given problem logically. These phrases are all based on the presumption that there is a fixed order for which we may search.

As I have pointed out, Chinese mathematicians made a very different presumption, which is that there is no fixed order in this world; things are changing all the time. Mathematics aims to represent the harmony of relations among particulars at the moment.

http://ccbs.ntu.edu.tw/FULLTEXT/JR-JOCP/jc106031.pdf

Western example

"Thus, given classes A and B, one may form such classes as A v B, A ^ B, and A —> B. Because of this, there is no problemin defining functions between classes, equivalence relations on classes, etc." Herrlich, p.14

124 times "given"

1.3.1 Western paradigm: Many Worlds/One Logic

Ideally: **One World/One Logic**

"Given the mathematical objects A and B, we..."

What follows is the construction of Category Theory.

What is presumed but not mentioned, is the logico-ontological paradigm of abstract objects.

1.3.2 Chinese paradigm: One World/Many Logics

"There is no fixed order in this world; things are changing all the time."

A. Everything in the world is changing.

B. The world, in which everything is changing, doesn't change.

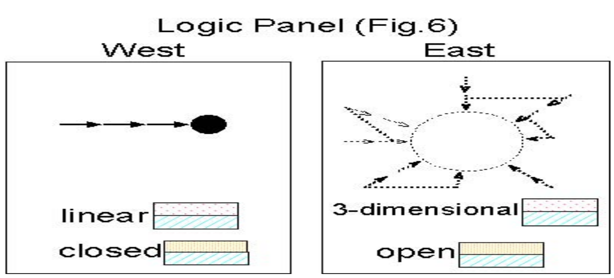
The Chinese paradigm is highly dynamic and dialectical.

But there is one and only one world and its ultimate aim is the harmony of the conflicting events in this unique world.

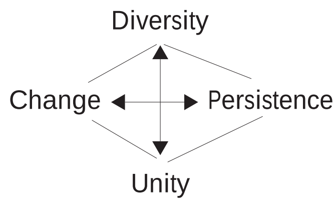
Sushi Science and Hamburger Science

"Linear logic is very effective: it illuminates one side of the fact clearly. But that's all. Japanese logic is like a net that embraces one fact, and thus it makes up a hollow, three-dimensional structure. The net is not strongly woven and, of course, the net is leaky. It is not a clear rigid logic that binds up the fact. Rather, the net creates an atmosphere that vaguely surrounds the fact. This is another example of the "one-many" difference. Westerners prefer the one fixed point of view, while Easterners prefer the multiple points of view. This can also be interpreted as an example of "I-no I" difference because one fixed point in the West is "I"." (Tatsuo Motokawa)

http://www.motokawa.bio.titech.ac.jp/sushi.html



1.3.3 Diamond paradigm: Many Worlds/Many Logics



A. There is an interplay between many worlds creating metamorphic changes of the worlds.

B. A single world of many worlds, in which everything is changing, doesn't change as such.

C. There are many interacting worlds in which everything is changing.

D. In a single world, everything is changing.

LIPSD= [locality, interactivity, properties, structures, data]

Following the onto-logical insight that everything in the world is changing in a bi-directional movement.

Construct a formalism, i.e., a formal system for the use under this presumption.

Hence, the formalism has to have an existence and has to taken place in the world.

This is asking for a place-designator.

With that, it is obvious that there are many other formal systems placed in the world of mathematical constructions.

Here, we decide to study a single formal system, only.

Even inside a FS events are interacting with each other.

There is no single event, action, movement without its bi-directional opposite action.

If there are bidirectional actions, corresponding to the assumptions of a bi-directional open/closed world, the pro-gression from one action to another has its opposite re-gression.

If a chain of actions is in a step-wise succession its opposite chain of actions is in a jump-wise connection. Realizing the opposition properties of composed actions.

To realize those properties of step-wise/jump-wise compositions of actions, the objects involved into this interplay must have a double-definition, double-characterization of being and not being identical and diverse. Hence, such objects are bi-objects.

Having decided for this open/closed world model with its explanation into its bi-objectionality, the guidelines to the constructions of its formal system are given.

Hence, the work to be done is the constructions of a diamond category theory fulfilling its open/closed world-assumption.

With that understood, a well founded motivation for the diamond constructions are introduced.

Another wording

Category theory is resumed as a pattern with Data, Structure and Properties, DSP, in this systematic order.

First step to diamond theory is to reverse this order, from DSP to PSD.

Because systems are localized they need a place-designator L.

As a consequence of localisation, each diamond system has its neighbor systems.

Diamonds are interacting and interplaying systems, hence I for interplay.

The structure is now: [LIPSD], not yet studying its dissemination.

What are we looking for?

A localized process-pattern of complementary interplays:

complementarity, duality, bridging

with properties: associativity, identity, diversity

with structures: composition, identity, saltisition, difference.

with data-objects: bi-objects.

Evocatory questions

World-views: What kind of Interactions I with P, S, D are fulfilling W1, ...,W4?

Interactionality and reflectionality: What kind of Properties P with S, D are fulfilling I?

Structurality: What kind of Structures S with D are fulfilling P?

Objectionality: What kind of Data D are fulfilling S?

Diamond as a [LIPSD]-Pluri-versal Algebra

First, diamonds are positioned, they take place and have localizations Ln in the kenomic grid.

Second, diamonds are interacting:

a) in-between diamonds as a global strategy,

b) inside of diamonds as a local interplay between categories and saltatories,

c) as meta-morphic strategies between local and global interactions.

Third, diamonds have

a) intra-structurally

Properties,

Structures,

Data

b) trans-structurally

meta-morphic chiasms ruled by diamond super-operators d-sops.

Diamond strategies

Between "given", i.e., Western, and "proposed", i.e., Chinese, beginnings of the construction of formal systems a chiastic interdependency can be discovered and described.

1.4 Husserl's parallax: retention/protention

"Presence is differentiation; it is only in its intertwining with absence." (Derrida)

Phenomenologically, concepts of iterability are connected with notions of consciousness, time-structure, protention/retention and logical paradoxes. I present some expositions of the problem, I found online. This is not the place to go into deeper details.

"The main thesis of Husserl with respect to the inner time consciousness is that every intention, far from being a mere primal impression of the givenness in its current actuality, has both a *retention* of the object as it was perceived one moment ago, and also a *protention* of the same object as it is expected to be in the forthcoming moment. Hence intentionality is not temporally punctiform, but rather a *synthesis* between three intentional horizons, one focusing on the actuality of the object, other directed backwards to the immediate past, and a third pointing forwards to the immediate future." (P. Pylkkänen)

http://www.idt.mdh.se/ECAP-2005/articles/COGNITION/PaavoPylkkanen/PaavoPylkkanen.pdf

"Husserl's main argument against this epistemological tradition is very short in essence. He argues that if we were only able of atomlike experiences, then we couldn't constitute unitary objects across different acts and appearances; a series of isolated nowpoints doesn't suffice to constitute any object at all. But we commonly have the experience that a temporal objects is unitary in despite of its multiple appareances. Therefore there must be some kind of temporally extended presence of the object whenever our consciousness is directed to it. Since we are in the transcendental perspective, the following dilemma is spurious:

(a) either the subjective act is punctiform but directed to an persisting object,

(b) or the subjective is a continuous stream focusing on discrete objects,

(c) or, most probably, both the consciousness and its object are temporally extended.

Alternative (a) says that the subjectivity of knowing is static whereas the objectivity is dynamic. Alternative (b) says the opposite. Alternative (c) concedes that both the objectivity and the subjectivity are ongoing events.

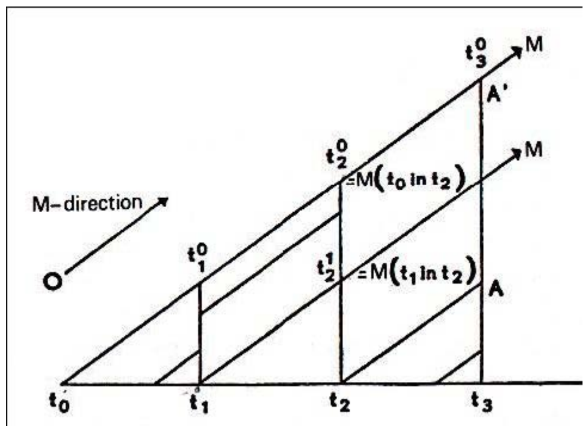
In every case, however, what is under the focus is some empirical fact; maybe the third is the most acceptable, but still it is a empirical hypothesis which in addition has to deal with the difficulty, already mentioned in the previous section, of the connexion between the time I am experiencing and the time in which I am having the experience. None of these alternatives concerns phenomenology. They all presuppose the condition we are interested in, namely the intentional structure in which objects are referred to via *retentions*, *primal impressions* and *protentions*."

"The possibility of being *surprised* is exhibited as the main argument for the existence of *protentions*. It is an observable fact, Husserl says, that we all can be at every moment suddenly surprised; now, in order one to be surprised, she must experience an unexpected event; therefore we have at every moment some expectation about the most immediate future. We *anticipate* the future whenever we are having intentional acts."

Summary

"The question Husserl tries to answer is: how is it possible that knowledge comes into being? For knowledge to occur different conditions of possibility are required, namely an object of knowledge, an act of knowledge, a non physical linkage between the act and the object, and finally a triple orientation of the act towards the past, the present and the future phases of the object. The way in which Husserl comes to this conclusion is said to be an observation of the own experiences, since the topic to be investigated is the very possibility of such experiences; however, an important dosis of theoretical sofistication is also required for dealing with the conditions of possibility which underlie the experience." (Julio Ostalé)

http://staff.science.uva.nl/~michiell/docs/Corrected%20Handout.pdf



http://cfs.ku.dk/upload/application/pdf/f51d6748/Inner%20Time-Consciousness.pdf

"Rather than being a simple, undivided unity, self-manifestation is consequently characterized by an original complexity, by a historical heritage. The present can only appear to itself as present due to the retentional modification. Presence is differentiation; it is only in its intertwining with absence (Derrida 1990, 120, 123, 127)."

One then sees quickly that the presence of the perceived present can appear as such only inasmuch as it is continuously compounded with a nonpresence and nonperception, with primary memory and expectation (retention and protention). These nonperceptions are neither added to, nor do they occasionally accompany, the actually perceived now; they are essentially and indispensably involved in its possibility (Derrida 1967, 72).

To be more precise, due to the intimate relation between primal presentation and retention, self-presence must be conceived of as an originary difference or *interlacing* between now and not-now. Consciousness is never given in a full and instantaneous self-presence, but presents itself to itself across the difference between now and not-now.

"Dans l'identité absolue du sujet avec lui-même la dialectique temporelle constitue a priori l'altérité. Le sujet s'apparaît originairement comme tension du Même et de l'Autre. Le thème d'une intersubjectivité transcendentale instaurant la transcendance au coeur de l'immanence absolue de l''ego' est déjà appelé. Le dernier fondement de l'objectivité de la conscience intentionnelle n'est pas l'intimité du 'Je' à soi-même mais le Temps ou l'Autre, ces deux formes d'une existence irréductible à une essence, étrangère au sujet théorique, toujours constituées avant lui, mais en même temps seules conditions de possibilité d'une constitution de soi et d'une apparition de soi à soi."(Derrida 1990, 126-127).

http://cfs.ku.dk/upload/application/pdf/f51d6748/Immanence%20and%20Transcendence.pdf

1.5 Identification vs. thematization

Now we may be prepared to introduce polycontextural strategies at the very beginning of our calculus, combinatory as well as lambda:

Ix=x, identity is often excluded from the calculus, because it is obvious and it can be defined by **S** and **K**. (But this is the same trick as to define the unary negation in logic with the binary Sheffer Stroke, which surely implies in itself negation.)

Because of the complexity of identification in polycontextural systems, the operator **I** deserves its own arena of presentation.

Ix means, identification of x as x, thus **I**x=x.

Therefore, identification is a special case of thematization. Identification is thematization of something as something and not as something similar or different.

Identification in poly-combinatorial systems is involved in *elective* decisions, and has to decide as what something is identified. *Elective* decisions are decisions between contextures, *selective* decisions are decisions made inside of contextures.

Identification of something as something or something else. Identification as what? A step further has to take account of the question "Identification by whom?" because polycontextural systems are societal systems, involving a multitude of acting agents. Classic calculus is "subjectless". It doesn't matter who, where, when etc. the operations are operated. Therefore, in polycontextural constellations, the operator identification **I** is realized in different modi, from the identical $\mathbf{I}^i\ x^i = x^i$ for all sub-systems S^i to the different *transversal* identificators:

$\mathbf{I}^i\ x^{(m)} = x^j$.

Thematization as interpretation and / or thematization as identification. Identification, again is, *"giving something a name"*, that is, identification is abstraction, abstracting identity, an identical property, out of complexity and diversity. Abstraction as identification is the sense of and behind the lambda calculus. To identify is to iterate the same as the identical. And this kind of identification determines the kind of iterability of the operations.

What is *abstraction* for the lambda calculus is *identification* for combinatory logic. And both are, in an abstract sense, equivalent. At least isomorphic. *Thematization* is (the working title) for polycontextural calculi or formal games in general. Another game starts with the process of *morphic* abstraction and subversion of morphogrammatics.

Thus, the meta-language identification or identificator *Ident* is realizing itself as different kinds of specific identificators $\mathbf{I}^i$.

$\mathbf{I}^i\ x^{(m)} = x^i$, means the complexion $x^{(m)}$ identified as x^i.
Or: x^i identified as a part of $x^{(m)}$.

$\mathbf{I}^{i..j}\ x^{(m)} = x^{i..j}$, means the complexion $x^{(m)}$ identified as sub-complexion $x^{i..j}$.

With involvement of the super-operators [id, perm, red, repl, bif] a more complex definition of identificators in polycontextural situations is possible.

Identification is a main operation in the programming scheme *ConTeXtures*. In polycontextural situations contextures have to be identified, thus, *identify contexture(s)* is the programming operation based on the combinatory logic *identifiers* ***I***. Identifiers plays two roles, one as an identificator of a contexture and one intra-contexturally as a local operator.

1.5.1 Iterability and differance

Iterability as repetition is based on the identity of its signs, here the name of its operators. For **I**(**I**(**I**)) = **I**, all occurrences of the name **I** for the identity operator are identical. Now, we learn, that this constellation is a very special case for iter / alter-ability in the modus of sameness. The identical signs are the same without intrinsic differences.

The same is different. $\mathbf{I}^i(\mathbf{I}^j(\mathbf{I}^k))) \neq \mathbf{I}$ for $i \neq j \neq k$

Signs, terms, are realized at locations, they occur at semiotic places, they have an index of their occurrence. Thus, signs or marks are not anymore abstract objects, written down, by accident, on paper, living in the mind or logosphere of the thinker.

1.5.2 Variants of K and S

For classical combinatory logic the identificator operator **I** seems to be quite superfluous. For transclassic combinatory logic the multitude of different identificators $\mathbf{I}^i$ are basic. Variants of identificators opens up variant definitions of the main operators **S** and **K**. Because each operator is identical with itself **I**(**K**)=**K** and **I**(**S**)=**S**, different kinds of operators **K** and **S** can be defined depending on different identificators:

$\mathbf{I}^i(\mathbf{S}^{(m)})= \mathbf{S}^i$. This operation is self-applicable: $\mathbf{I}^i(\mathbf{I}^{(m)})= \mathbf{I}^i$.

$$\left[\begin{array}{l} \textbf{thematize } CL\ (\mathrm{SKI})^{(3)} \\ \left[\begin{array}{l} contextures^{(3)} \\ \left[\begin{array}{l} identify\ CL^1 \\ \left[\begin{array}{l} operators \\ \left[terms\right] \end{array}\right] \end{array}\right] \left[\begin{array}{l} identify\ CL^2 \\ \left[\begin{array}{l} operators \\ \left[terms\right] \end{array}\right] \end{array}\right] \left[\begin{array}{l} identify\ CL^3 \\ \left[\begin{array}{l} operators \\ \left[terms\right] \end{array}\right] \end{array}\right] \end{array}\right] \end{array}\right].$$

This kind of specification is an election of a contexture out of a compound contextures.In other words, also classic formulas are "bound" by the operation *"identify"*. Because there is only one identity and one way to identify in classic systems this operation can be omitted. Transclassic systems with many options of identification, that is thematizations, have to identify their contextures and formal systems explicitly.

1.5.3 Thematizations in Diamonds

Thematizations in Diamonds

$$\left[\begin{array}{l} \textbf{thematize } diamond \\ \left[\begin{array}{l} \textbf{identify } contexture \\ \left[\begin{array}{l} \textbf{separate } acc\ |\ rej-domain \\ \left[\begin{array}{l} \textbf{2 - define} < (2-Name\ of\ \left(Abstraction\ |\ \overline{Abstraction}\right)\ ) > \\ \left(\begin{array}{l} \textbf{2 - lambda} < 2-List\ of\ \left(Parameters\ |\ \overline{Parameters}\right) > \\ \qquad \left\{\begin{array}{l} < Statement_1 > | < \overline{Statement_1} > \\ < Statement_2 > | < \overline{Statement_2} > \\ \quad ...... \qquad\quad \overline{......} \\ < Statement_n > | < \overline{Statement_n} > \end{array}\right\} \end{array}\right) \end{array}\right] \\ \textbf{elect } acc\ |\ rej-domain \end{array}\right] \end{array}\right] \end{array}\right]$$

Diamond systems are mainly systems of *complementarity*. Thus, all concepts have to be doubled in a complementary sense. Abstractions, reference, synthesis as main concepts of formal systems, say lambda calculus or combinatorial logic, are *double-faced*. This holds even before any dissemination of the systems over contextures happens.

2 Metaphor of double naming

"wave particle duality"

The history of quantum physics shows good examples of double naming. Werner Heisenberg, in his book *"Physik und Philolsophie"*, is discussing the problems of complementarity and language. As an example he mentions the double and complementary word "Wellenpaket‘‘ (waveparcel), "wave particle duality", in the context of his Uncertainity Principle.

> "The more precisely the POSITION is determined, the less precisely the MOMENTUM is known." (Heisenberg)

> "In Bohr's words, the wave and particle pictures, or the visual and causal representations, are "complementary" to each other. That is, they are mutually exclusive, yet jointly essential for a complete description of quantum events. Obviously in an experiment in the everyday world an object cannot be both a wave and a particle at the same time; it must be either one or the other, depending upon the situation."
> http://www.aip.org/history/heisenberg/p09.htm

The double term "Wellenpaket" has the contradictory meaning of wave and parcel at once; both together. But, as a rejectional term it has its complementary meaning, too: neither wave nor parcel. Both interpretations are holding simultaneously. Measure this, and measure that, then you have the complementary answer of both-at-once and neither nor, of the interpretation of the results of measuring.

Complementarity of description and interpretation

Modern approaches to complementarity are developed *in extenso* by Lars Löfgren.

> "The general principle underlying these limitations was called the *linguistic complementarity* by Loefgren. It states that in no language (i.e. a system for generating expressions with a specific meaning) can the process of interpretation of the expressions be completely described *within* the language itself. In other words, the procedure for determining the meaning of expressions must involve entities from outside the language, i.e. from what we have called the context. The reason is simply that the terms of a language are finite and changeless, whereas their possible interpretations are infinite and changing." (Heylighen)
> http://pespmc1.vub.ac.be/Papers/Making_Thoughts_Explicit.pdf

> "Programs are written in a language and have a proposed meaning; semantics. The main idea is that *description* and *interpretation* are complementary in a language; they cannot be fragmented *within* a language." (Ekdahl)

Algebraic: *"terms of a language are finite and changeless"*,

Coalgebraic: *"possible interpretations are infinite and changing"*.

Complementarity of complementarity

Complementarity, therefore, has itself, principally, a double meaning: *complementarity of contextures* and *complementarity in diamonds*.

Complementarity of contextures is covered by polycontextural logic as a dissemination of categorical systems. Each disseminated category has its own logic, which is structurally similar to the logic of other contextures.

Complementarity in diamonds is realized by diamond theory as an interplay of categories and saltatories. The logics of categories and the "logics" of saltatatories are structurally different.

Thus, a new contribution has to be developed to contrast diamond and contextural approaches with the deep analysis of complementarity given by the work of Lars Löfgren. From a polycontextural point of view their was a discussion and correspondence with Lars Löfgren about the problem of interpreting and formalizing complementarity.

The double meaning of diamond objects is complementary and in their orientations they are not in parallelism but *antidromic* (gegenläufig, verkehrt) and *deferred* (verschoben) in respect to the complementary system.

It is not yet clear in which sense, if any, these characteristics of diamond objects of being antidromic and deferred will have a correspondence in complementarity theory of description and interpretation of languages in the sense of Lofgren.

2.1 Hetero-morphisms and morphograms

> "In mathematics, a *morphism* is an *abstraction* of a structure-preserving mapping between two mathematical structures.
>
> A *category* C is given by two pieces of data: a *class* of *objects* and a class of *morphisms*.
>
> There are two operations defined on every morphism, the *domain* (or source) and the *codomain* (or target).
>
> For every three objects X, Y, and Z, there exists a *binary operation*
> hom(X, Y) x hom(Y, Z) —> hom(X, Z) called *composition*." WiKi

The "double gesture" of inscription is not enfolded as a succession of different contextural decisions. It is given/installed at once. Hence, there are some similarity in the description of diamond objects to morphograms. Morphograms are inscribing standpoint-free complexity. But there is also another approach to morphograms.

As Heinz von Foerster proposed, morphograms can be regarded as the *inverse* function of a logical function. Hetero-morphisms are inverse to morphisms. Hence, there is a possible connection between hetero-morphisms of a composition and morphograms of such a composition. In this sense, morphograms can be seen as the inscription of the inversion of morphisms, i.e., of rejectional morphisms. But hetero-morphisms as inverse morphisms are not simply dual to morphisms, they are not only "morphisms" with an inverse arrow to acceptional morphisms, they are on a different level of *abstraction*, too. Because morphisms are mappings between objects, and hetero-morphisms are abstractions from the operator of composition, their conceptual status is principally different. Morphisms are mappings as mappings; hetero-morphisms are abstractions from the interaction of morphisms. Hence, the new couple in diamonds is: *morphism/morphogram*.

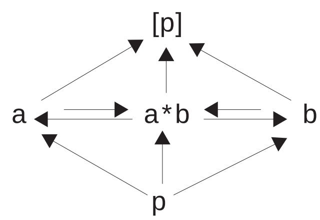
Objects in diamond systems are based on as-abstractions. The core system is abstracted by its acceptional and/or rejectional aspect. There is no neutral object in diamonds like in the lambda calculus. Reference in the lambda calculus is an identification of an object as an identity. This identity can be simple or complex (composed) but its naming and reference is realized by a simple operation of identification, establishing the identity of the object.

Thus, the fundamental properties of hetero-morphisms before questions of identity/diversity and commutativity, associativity properties are studied, are:

1. *inverse morphism* property
2. *actional abstraction* property

These two properties are defining the rejectional status and the saltatory structure of jumpoids.

An accessible, and first interpretation of the two properties of hetero-morphisms can be found in the theory of morphogrammatics. Morphograms can be regarded as inversa of compositions. They are "object-free, thus, more abstract than morphisms. But as morphograms of compositions they are connected to compositions of morphisms. They may be seen as generalizations of compositions of abstract morphisms.



The categorical product "a*b" is founded in p. The categorical product is based on the inverse product, the thematization of the compositor, as a morphogram [p]. The core elements of the diagram, a, b, a*b, have a double meaning. They belong to categories and to saltatories. Insofar, they define the structure of the morphogram [p].

As an example, we can think of a logical disjunction "a v b", which is based on its constituents "a" and "b" as core elements. These together can be inverted to the hetero-morphism [p], which defines the morphogram of the binary disjunction as the operativity of the operator "v", but concretized in its complication, as a binary action, by the constituents "a" and "b".

Because morphograms can be conceived as inversa of compositions, and are generating a generalization of the composition of morphisms, they are representing a permutation-invariant class of compositions. In the example, the morphogram [p] is representing the disjunction "avb" as well as all negations of it "¬(avb)". Hence, again, morphograms are negation-invariant patterns.

If a product composition is called a *process* (Baez) then the complement of the process is the form or structure of the process, hence inscribed as the morphogram of the process.

Graphematic metaphor for bi-objects

A graphematic metaphor for bi-objects may be the Chinese characters. They are, at once, inscribing, at least, two different grammatological systems, the *phonetic* and the *pictographic* aspects of the writing system, together in one complex inscription, i.e., character. The composition laws of phonology are different from the composition laws of pictography. Because in Chinese script, characters with their double aspects, are composed as wholes and not by their separated aspects, composition laws of Chinese script is involved into a complexion of two different structural systems.

It can be speculated that the phonological aspect is categorical, with its composition laws of identity, commutativity and associativity, while the composition laws of the pictographic aspect is different, and may be covered, not by categories but by saltatories. At least, there is no need to map the laws of composition for Chinese characters into a homogenous calculus of formal linguistics based, say on combinatory logic.

The Western writing system is based on its phonetic system.

> "*Pictophonetic compounds* (å`„fléö/å`êſéö, Xíngsh?ngzì)
> Also called *semantic-phonetic* compounds, or phono-semantic compounds, this category represents the largest group of characters in modern Chinese.
> Characters of this sort are composed of two parts: a *pictograph*, which suggests the general meaning of the character, and a *phonetic* part, which is derived from a character pronounced in the same way as the word the new character represents."
> http://en.wikipedia.org/wiki/Chinese_character#Formation_of_characters

2.2 Ontology of objects

Diamond objects are bi-objects

The complexity of diamond objects as bi-objects is realized inside of a contexture. It is defining a new kind of contexturality not included in Gunther's definition of contextures and their polycontexturality. Also diamond objects are in a new sense mono-contextural they are not belonging to an identity ontology like intra-contextural objects of polycontextural systems.

> "The difference between an elementary contexture as self-cycle and an elementary contexture distributed over two values consists in the fact that in the first case the contexture is understood as "reflexionless Being" (Hegel) and in the second case it is understood as two-valued image of reflection. This means, that we are now provided with a two-valued system but the theme of reflection which is thematic still is of strict one-valuedness. The corresponding second value does not get any chance as an ontological theme, i.e., as contexture.
> It is just this (calculus) theoretical equivocation of the concept of an elementary contexture what is necessary in order to formalize the dialectic [principles]. Both, one-valuedness and two-valuedness refer to elementary contextures but in a somewhat different meaning which can be determined exactly by the distinction of the valuedness." (Gunther)
> http://www.thinkartlab.com/pkl/archive/GUNTHER-BOOK/HIST_K1.html

Polycontextural objects are m-objects

The objectionality of polycontextural objects is realized by the mediation of the objectionality of different elementary contextures. Polycontexturality is depending on different points of view, each containing its full ontology and logic of identity. Hence, ontological, logical and computational complexity of objects is produced as a *mediation* of distributed identity systems, like distributed lambda calculi in poly-lambda systems.

Polycontextural diamond objects are m-bi-objects

Polycontextural bi-objects are disseminated over different contextures of polycontextural systems, hence they are m-contextural bi-objects, short m-bi-objects.

OPPOSITIONS AND PARADOXES IN MATHEMATICS AND PHILOSOPHY
John L. Bell
http://publish.uwo.ca/~jbell/Oppositions%20and%20Paradoxes%20in%20Mathematics2.pdf

2.2.1 From schizophrenic to Janus-faced objects, and more

There are some sophisticated discussions and even struggles how to name dual objects at the *n-Category Café*.

> "Does one ever find duality between bicategories arising from an object having two 'commuting' structures? I mean is it ever the case that something like the category of sets can be seen as possessing two structures, and so be used schizophrenically?" (Corfeld)
>
> "Re: Terminology
> Janusian thinking–"actively conceiving two or more opposite or antithetical ideas, concepts, or images simultaneously," according to the author's definition–is proposed as a specific thought process that operates in the act of creation.
>
> If there is some residual sense of "oppositeness" to "Janusian" or "Janus-faced", as in the figure of Janus facing in opposite directions, then it doesn't seem to me all that accurate for describing objects formerly known as schizophrenic.
>
> "Schizophrenic", literally "split-minded", was perhaps ill-conceived for the reason Tom gives, but perhaps if we just keep the "schizo" and change the "phrenic" to something more accurate? I thought of "schizomorphic", which already sounds mathematical, but there may be better options. ("Schizomorphic" already has various technical meanings, including an Aristasian one, but I think these could safely be ignored.)
>
> Or, how about "ambimorphic"? I think I like that even more."
> (Trimble)
>
> http://golem.ph.utexas.edu/category/2007/01/more_on_duality.html

Japanese Journal of Religious Studies 31 / 1: 73–103
© 2004 Nanzan Institute for Religion and Culture
Gereon Kopf
Between Identity and Difference
Three Ways of Reading Nishida's Non-Dualism
http://www.nanzan-u.ac.jp/SHUBUNKEN/publications/jjrs/pdf/675.pdf

Bi-Polar is the replacement word for Schizophrenic.
Bloomberg News, also on September 4, 2007, reported, "The expanded use of bipolar as a pediatric diagnosis has made children the fastest-growing part of the $11.5 billion U.S. market for antipsychotic drugs."
http://www.alternet.org/healthwellness/67705/

3 Diamonds and Nishida Kitaro's Logic of Place

"An emerging theme of Nishida Kitaro's later works was expressed in the complex phrase *"zettai mujunteki jikodoitsu",* variously translated by Schinzinger as *"absolute contradictory self-identity,"* "the self-identity of absolute contradictories," or more simply as "oneness" or "unity" of opposites.
The theory of contrariety or opposition that Nishida (1870-1945) worked out between 1927 and 1945 can be taken as a stimulus for East/West comparative thought. This is so because of the special significance of Nishida's thought, but also more generally because contrariety is itself a prime subject for comparative philosophy."
http://ccbs.ntu.edu.tw/FULLTEXT/JR-PHIL/axtell1.htm

Comparative Dialectics: Nishida Kitaro's Logic of Place and Western Dialectical Thought
By G. S. Axtell, Philosophy East and West
Vol. 41, No. 2 (April 1991), pp. 163-184

Topic: "the self-identity of absolute contradictories"
logically
polycontexturally
morphogrammatically
diamondally

necessity of Coincidence relation in oppositions (chiasms):

But the third reason Lloyd gives is quite philosophically intriguing: conceptualization in terms of pairs of opposites, he argues, helped the Greeks define "regions" or "dimensions" of experience. *"Any pair of opposites...defines a dimension."* This presents a more fruitful way also to approach Nishida's account of contrariety. A central theme of Nishida's benshoho is that "there is always identity at the root of mutual contradictories." [39] "Self-identity" is not static as in abstract logic, but is the identity-in-difference of the permanent flow -- or of the infinite whole of the process. Nishida uses "absolute" to mark the ontological implications of the aspects opposed or identified. Identity-in-difference is explored by Nishida through his contention that what he calls "absolute contradictories" have a relation like "species" within the same "genus." As he put this in The World of Action,

Mutual contradictories must be absolutely different, on the one hand, yet very similar, on the other. They must exist in the same genus. Colors and sounds are not contradictories. [40]. p.174
http://ccbs.ntu.edu.tw/FULLTEXT/JR-PHIL/axtell1.htm

3.0.1 Isomorphism in Category, n-Category Theory and Diamond Theory

"So, what's categorification? This tongue-twisting term, invented by Louis Crane, refers to the process of finding category-theoretic analogs of ideas phrased in the language of set theory, using the following analogy between set theory and category theory:

elements	objects
equations between elements	isomorphisms between objects
sets	categories
functions	functors
equations between functions	natural isomorphisms between functors

Just as sets have elements, categories have objects. Just as there are functions between sets, there are functors between categories. Interestingly, the proper analog of an equation between elements is not an equation between objects, but an isomorphism. More generally, the analog of an equation between functions is a natural isomorphism between functors." (Baez)

http://math.ucr.edu/home/baez/week121.html

Equality

Equivalence

Isomorphism

Poly-Morphism

Diamond Iso

Inversion of architectonics of categorical methodology

"Given A and B, ..." should be replaced by "conceiving diamonds", interactions, and interplays might be re/constructed, which are dealing with compositions and saltisitions and their rules, which are playing with objects, like bi-objects, and their structures. Hence, the structure of the invention/discovery of a theory is not mapped by its text-book presentation.

From "given" to "giving the given". Second-order giveness.

Research as fishing

"Research is, in some respects, like fishing. If you make your living as a fisherman, you must fish where you know that there are fish, even though you also know that those fish are only small ones. No one but the amateur can take the risk of going into completely unknown areas in search of a big prize. Similarly, the professional scientist cannot afford to spend twenty or thirty of the productive years of his life in pursuit of some goal that involves a break with the accepted thought of his profession. But we uncommitted investigators are primarily interested in the fishing, and while we like to make a catch, this is merely an extra dividend. It is not essential as it is for those who depend on the catch for their livelihood. We are the only ones who can afford to take the risks of fishing in unknown waters."

http://www.reciprocalsystem.com/nbm/nbm00pre.htm

4 Why Universal Logic isn't Universal?

Unfortunatly, I couldn't take part at this congress.

We are now well enabled to understand why Universal Logic isn't as universal as the universalists are believing.

Interestingly, the same arguments are holding for Polycontextural Logic, too.

Both approaches are based on conceptual triads.

Universal Logic is based and using Category Theory. Categories are, despite the ternary construction of Natural Transformation, fundamentally triadic.

Universal Logic is not only triadic, it is 1-triadic. Polycontextural Logic is conceptually m-triadic.

UNILOG'07

http://www.uni-log.org/second1.html

The book Laotse contains massive paradox propositions. Laotse Said, *"Do nothing and everything is done"*. But a theory may contain paradoxes, or apparent contradiction, without necessarily containing any unresolved or apparent contradictions. p40

From the standpoint of paraconsistent logic, these theses are all extremely natural.

The Paraconsistent thought in Ancient China
Wujin Yang
Renmin University of China - China
yangwujin1964@yahoo.com.cn

Beziauz's 1-step argument

Before such a monster as Universal Logic has been constructed, Bziaou recognize its impossibility. But with this insight the business is not stopped but opened up with a clever 1-step move. UL is not a new logic but the study of all logics. Like linguistics is not a new language but the study of all languages. Well done!

As we could learn during the history of linguistics, from descriptive to axiomatic linguistics, linguistics was always set up in a language: the proto-language of the science of linguistics. Depending on what trends existed from modal logics to paraconsistency, from dialectics to phenomenology or structuralism, or, now, to neurosciences and other myths, the study of languages, that is linguistics, was itself always a language per se.

The question is: In what language are we doing, i.e., writing and communicating, linguistics. What is the underlying logical paradigm of the study of Unniversal Logic? Is this underlying logic itself part of the object of the studies, i.e., of UL? Are there paradoxes of self-applications involved? Why should we be happy with a paraconsistent "solution" of the paradoxes of UL?

And linguistics had and has all its dialects and idiolects, too. When I asked Helmut Schnelle, then Berlin, for an assistant job, I was told that I'm studying the wrong linguistics. In other words, I expressed my thoughts in a different dialect not accepted by the Chomsky school. Today, students are punished if they come with a Chomsky jargon. Not only politically.

Short, Beziauz's argument is clever but remains a 1-step argument, which looses its coherence with a second step of reflection.

As a result, I still think that UL is the logic of globalism, and therefore it is highly involved in a complicity with the Western hegemony and imperialism of rationality.

Nevertheless, after Beziouz's argument we can feel free to go on with the universalistic project of Universal Logic.

What the experts say:

http://dis.4chan.org/read/prog/1195467271

lambda ultimate

caml