Towards Diamonds

– DRAFT –

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The Book of Diamonds, *Intro*

The Book of Diamonds, *Another Intro*

How to compose?

The Book of Diamonds, *Preview*

The Book of Diamonds, *Intro*

A book I didn’t write

The Book of Diamonds, *Another Intro*

How to compose?

The Book of Diamonds, *Preview*

Proto-Structure of Diamond Strategies

The Logics and Arithmetic of Diamonds

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, multitemporality 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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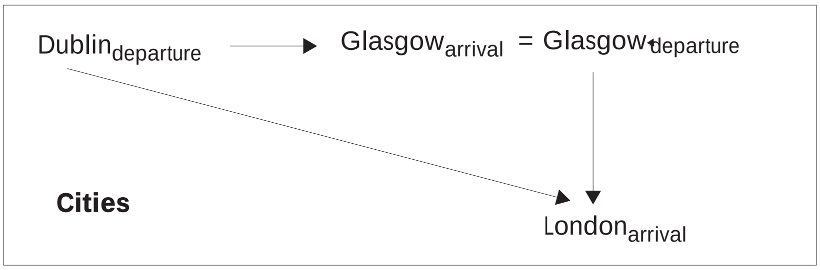
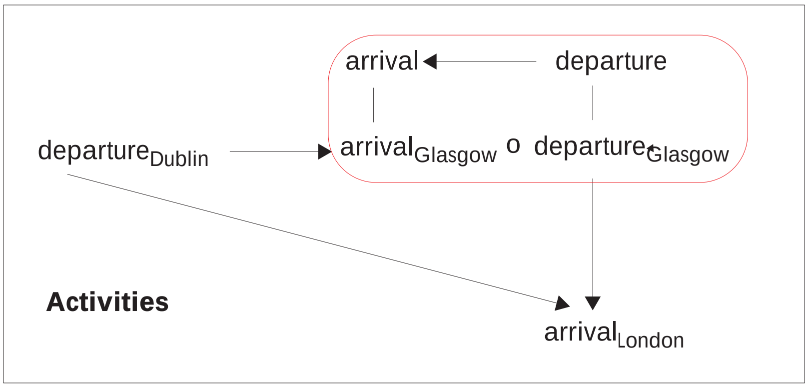
City-oriented travel diagram



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

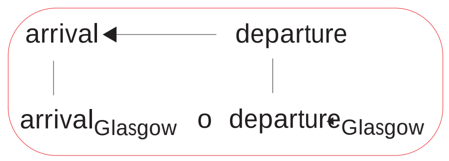


The activity-oriented diagram is thematizing what really happens at the place of *"arrival(Glasgow)=departure(Glasgow)"*. That is, the internal logical structure of the simple or simplifying equality, *"arrival(Glasgow)"* and *"departure(Glasgow)"*, is analyzed and has to be studied in its 2-leveled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



zooming into the composition

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!

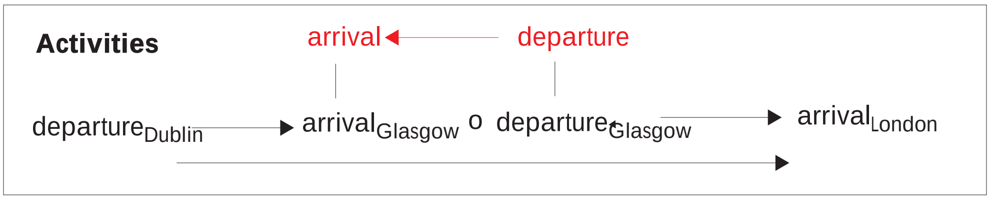
This intriguing situation we are discovering with our zoom, happens for all stations of our travel. We started at Dublin and ended in London. And these two stations are looking simple and harmless. But this is only the case because we have taken a *snapshot* out of the dynamics of traveling. That is, 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

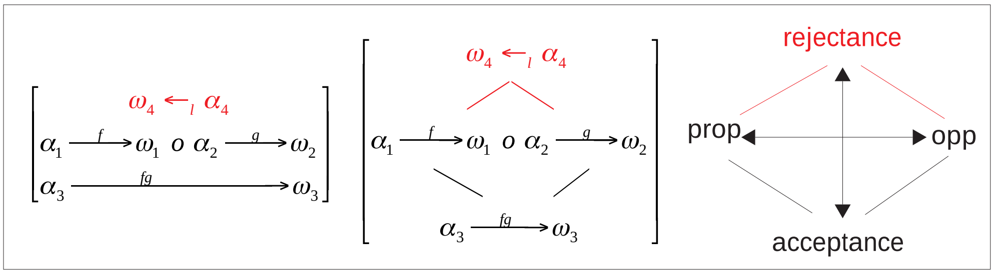
In mathematics, the study of such composed arrows is called category theory. *Category theory* is studying arrows (morphisms), *diamond theory* is studying composition of morphisms as the primary topic. The activity is not in the arrows but in the composition of the arrows. Hence, the complementary movement 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*.

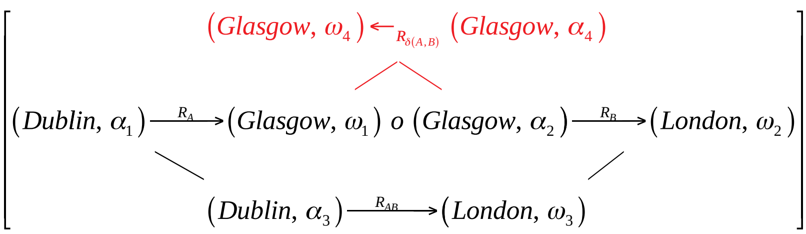
The class of compositions can be taken as the position of the *acceptance*.

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

Acceptance means: both at once, proposition and opposition.

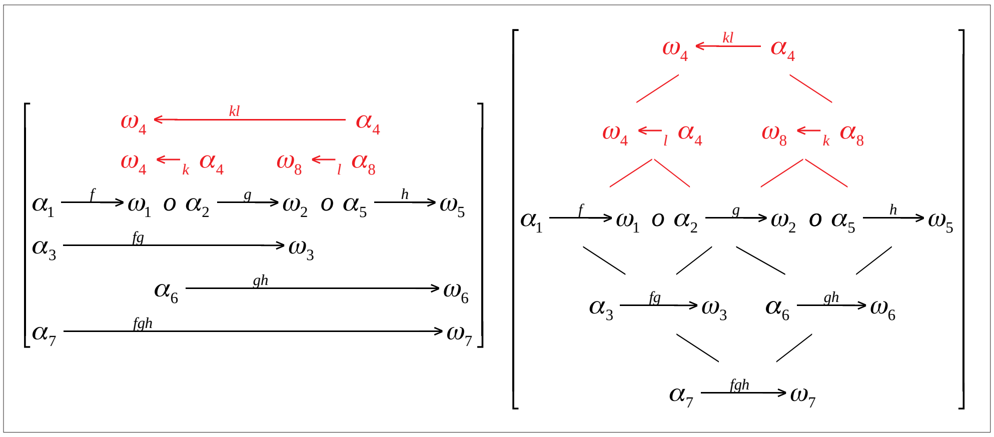
Rejectance means: neither-nor, neither proposition nor opposition.

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.

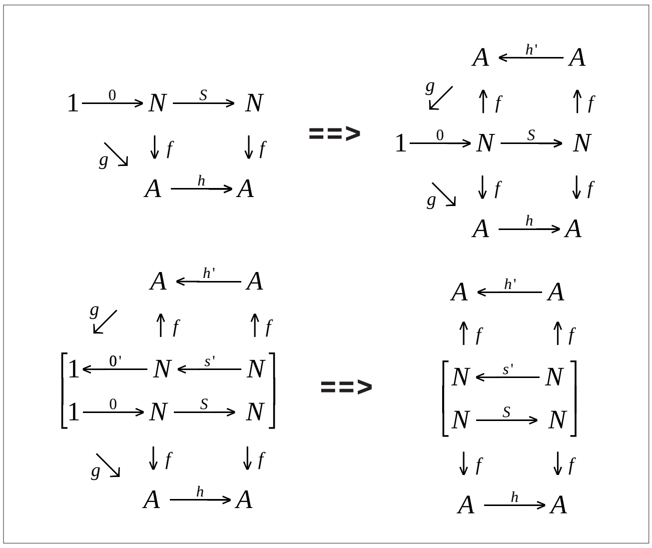
At a time where this proudness has achieved its aims, we are wakening up from this dream of liberty. The whole hallucination of the openness turns round into the nightmare of a sinister narrowness of endless iterativity and the shocking discovery of the endlessness of its resources.

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 with 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.

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

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:

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

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:

$$\begin{array}{ccc} \left(A^{1},\,\alpha_{1}\right)\xrightarrow{R_A}\left(B^{1},\,\omega_{1}\right)\ o\ \left(A^{2},\,\alpha_{2}\right)\xrightarrow{R_B}\left(B^{2},\,\omega_{2}\right) \\ \diagdown \qquad\qquad\qquad \diagup \\ \left(A^{1},\,\alpha_{3}\right)\xrightarrow{R_{AB}}\left(B^{2},\,\omega_{3}\right) \end{array} \qquad \begin{bmatrix} \omega_{1}\simeq\alpha_{2} \\ A^{2}\triangleq B^{1} \\ \left(A^{1},\,\alpha_{1}\right)=\left(A^{1},\,\alpha_{3}\right) \\ \left(B^{2},\,\omega_{2}\right)=\left(B^{2},\,\omega_{3}\right) \end{bmatrix}$$

And now, a full complementation towards a Diamond category.

$$\begin{array}{c} \left(B^{1},\,\omega_{4}\right)\leftarrow\left(A^{2},\,\alpha_{4}\right) \\ \diagup\diagdown\ \delta \\ \left(A^{1},\,\alpha_{1}\right)\xrightarrow{morph}\left(B^{1},\,\omega_{1}\right)\ o\ \left(A^{2},\,\alpha_{2}\right)\xrightarrow{morph}\left(B^{2},\,\omega_{2}\right) \\ \diagdown \qquad\qquad\qquad \diagup\ \varphi \\ \left(A^{1},\,\alpha_{3}\right)\xrightarrow{morph}\left(B^{2},\,\omega_{3}\right) \end{array}$$

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.

$$\begin{bmatrix} o=\begin{cases}\lambda\left(\omega_{1}\right)\simeq\lambda\left(\alpha_{2}\right) \\ \lambda\left(A^{2}\right)\triangleq\lambda\left(B^{1}\right)\end{cases} \\ \varphi\left(A^{1},\,\alpha_{1}\right)=\varphi\left(A^{1},\,\alpha_{3}\right) \\ \varphi\left(B^{2},\,\omega_{2}\right)=\varphi\left(B^{2},\,\omega_{3}\right) \\ \delta\left(\left(B^{1},\,\omega_{1}\right)\ o\ \left(A^{2},\,\alpha_{2}\right)\right)= \\ \left(\delta\left(B^{1}\right),\,\omega_{4}\right)\leftarrow\left(\delta\left(A^{2}\right),\,\alpha_{4}\right) \end{bmatrix}$$

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.

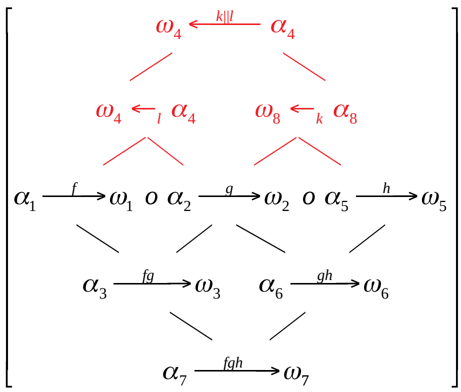
2 Complementarity of composition and hetero-morphism

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

$$\frac{\left(\begin{array}{c} A \xrightarrow{f} B \xrightarrow{g} C \xrightarrow{h} D \\ b_1 \xleftarrow{k} b_2 \parallel c_1 \xleftarrow{l} c_2 \end{array} \right)}{A \xrightarrow{m} D \mid b_1 \xleftarrow{n} c_2}$$

$$\frac{\left(\begin{array}{c} id_A \ o \ f \\ diff_A \ o \ f \end{array} \right)}{f \mid b}$$

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.

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

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

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

$$If\ \ coinc(\omega_1,\ \alpha_2),\ and$$

$$\begin{pmatrix} coinc(\alpha_1,\ \alpha_3), \\ coinc(\omega_2,\ \omega_3) \end{pmatrix},$$

$$then$$

$$morph(\alpha_1,\ \omega_1)\ o\ \ morph(\alpha_2,\ \omega_2) = morph(\alpha_3,\ \omega_3),$$

$$and\ \ if$$

$$\begin{pmatrix} diff\,(\alpha_2) = \alpha_4, \\ diff\,(\omega_1) = \omega_4 \end{pmatrix},$$

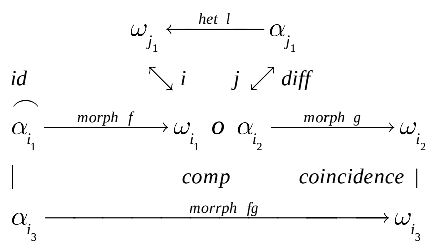
$$then$$

$$compl\big(morph(\alpha_3,\ \omega_3)\big) = het(\alpha_4,\ \omega_4)$$

$$Diamond(morph) = \chi\langle accept,\ reject\rangle$$

$$accept\ \ (morph_1,\ morph_2) = morph_3$$

$$reject\ \ (morph_1,\ morph_2) = morph_4$$



Terms

morph / het

coinc / diff

id / div

o / ||

dual / compl

accept / reject

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.

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

1. Matching Conditions

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

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

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

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

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

$$(l \parallel m) \parallel n \text{ are defined},$$

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

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

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 $h\ o\ ((g\ o\ f)\ o\ k) = ((h\ o\ g)\ o\ f)\ o\ k$ 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 $(\bar{l}\ o\ f)\ o\ \overline{m} = \bar{l}\ o\ (f\ o\ \overline{m})$

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

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

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?

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’.”

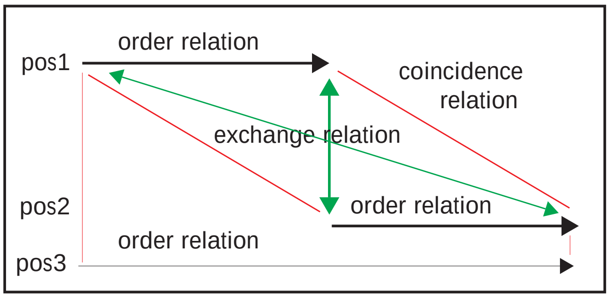
http://www.uwlax.edu/urc/JUR-online/PDF/2004/durski.pdf

"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

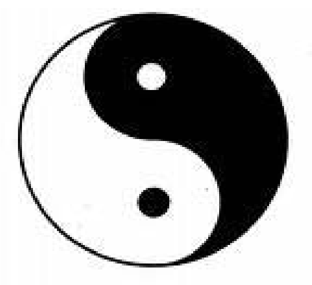
Zeugma (from the Greek word "ζευγμα", meaning "yoke") is a figure of speech describing the joining of two or more parts of a sentence with a common verb or noun. A zeugma employs both ellipsis, the omission of words which are easily understood, and parallelism, the balance of several words or phrases.

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

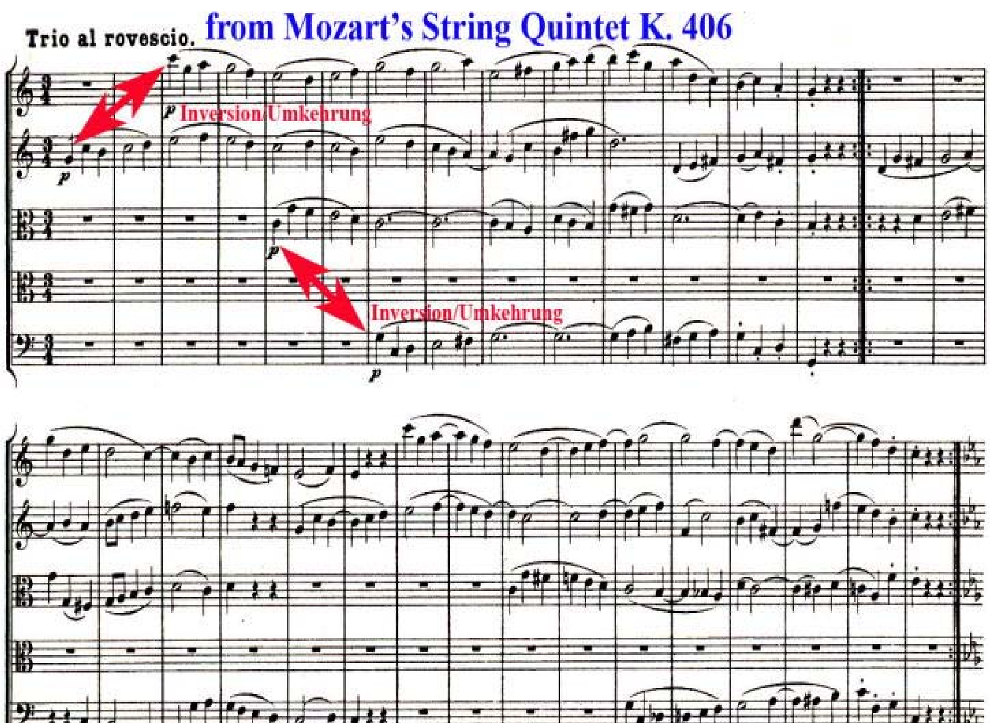


Taijitu, the traditional symbol representing the forces of yin and yang.

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."

6 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*.

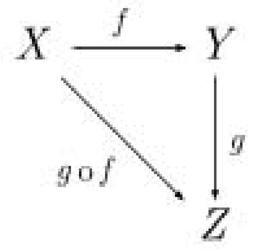
"... category theory is based upon one primitive notion – that of composition *of morphisms." D. E. Rydeheard*

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.

$$\begin{bmatrix} \alpha_1 \xrightarrow{f} \omega_1 \ o\ \alpha_2 \xrightarrow{g} \omega_2 \\ \alpha_3 \xrightarrow{\qquad fg \qquad} \omega_3 \end{bmatrix}$$

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

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.

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

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).

$$\begin{bmatrix} \alpha_1 \xrightarrow{f} \omega_1 \ o\ \alpha_2 \xrightarrow{g} \omega_2 \ o\ \alpha_4 \xrightarrow{h} \omega_4 \\ \alpha_3 \xrightarrow{\qquad fg \qquad} \omega_3 \qquad\qquad\qquad \\ \qquad\qquad \alpha_5 \xrightarrow{\qquad gh \qquad} \omega_5 \\ \alpha_6 \xrightarrow{\qquad\qquad fgh \qquad\qquad} \omega_6 \end{bmatrix}$$

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

$$\begin{bmatrix} \alpha_1 \xrightarrow{f} \omega_1 \ o\ \alpha_2 \xrightarrow{g} \omega_2 \ o\ \alpha_4 \xrightarrow{h} \omega_4 \\ \diagdown \quad \diagup \quad \diagdown \quad \diagup \\ \alpha_3 \xrightarrow{fg} \omega_3 \quad \alpha_5 \xrightarrow{gh} \omega_5 \\ \diagdown \quad \diagup \\ \alpha_6 \xrightarrow{fgh} \omega_6 \end{bmatrix}$$

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

7 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*
$R_i (xi\text{-}1, yi\text{-}1)$ *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)

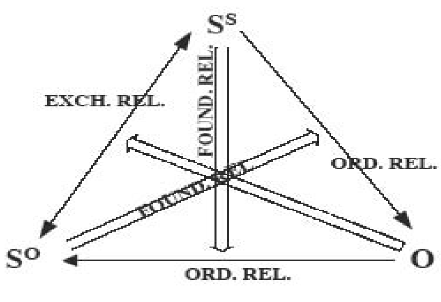
$$\mathbf{PR}\left(\mathbf{R_{i+1}}, \mathbf{R_i}, \mathbf{x_{i+1}}, \mathbf{x_i}\right)::$$

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

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."

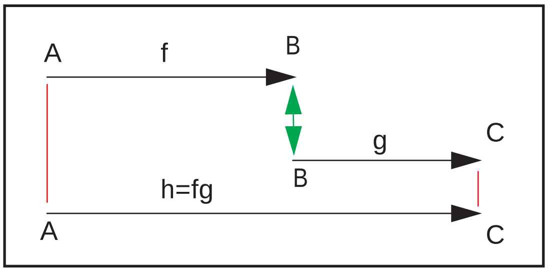
O=object
So= objective subject (Thou)
Ss= subjective subject (I).

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.

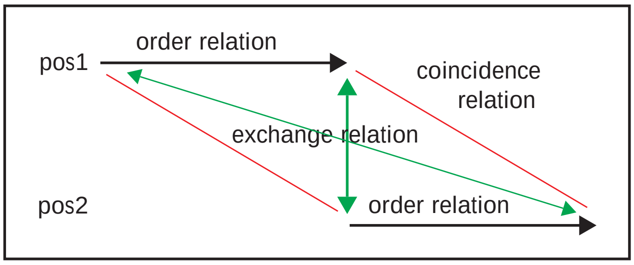
8 Chiasm of composition

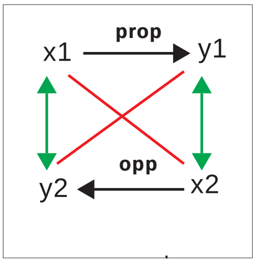
The chiasm of composition is reflecting all parts involved into the composition.

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.

8.1 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	*x1 exch y2*	*x1 ord y1*
y1 coinc y2	*y1 exch x2*	*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.

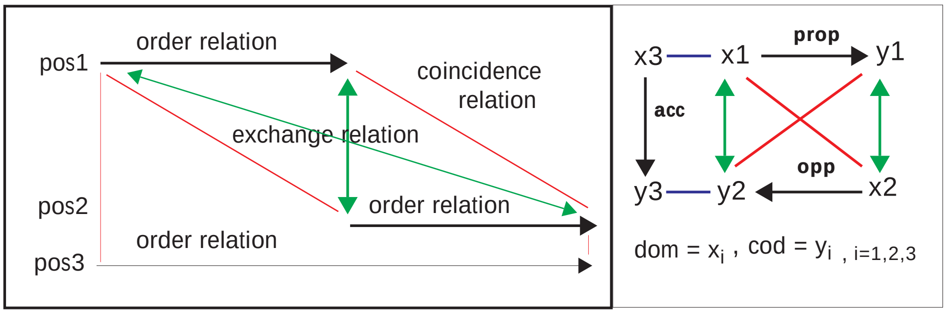
A metaphor: From chiasm to diamond

"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.

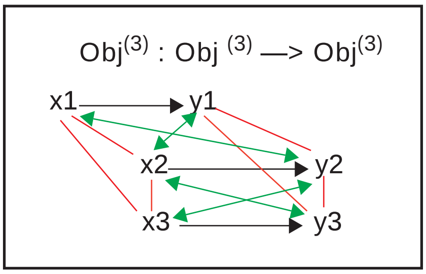
8.2 Proemiality with acceptional systems



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*.

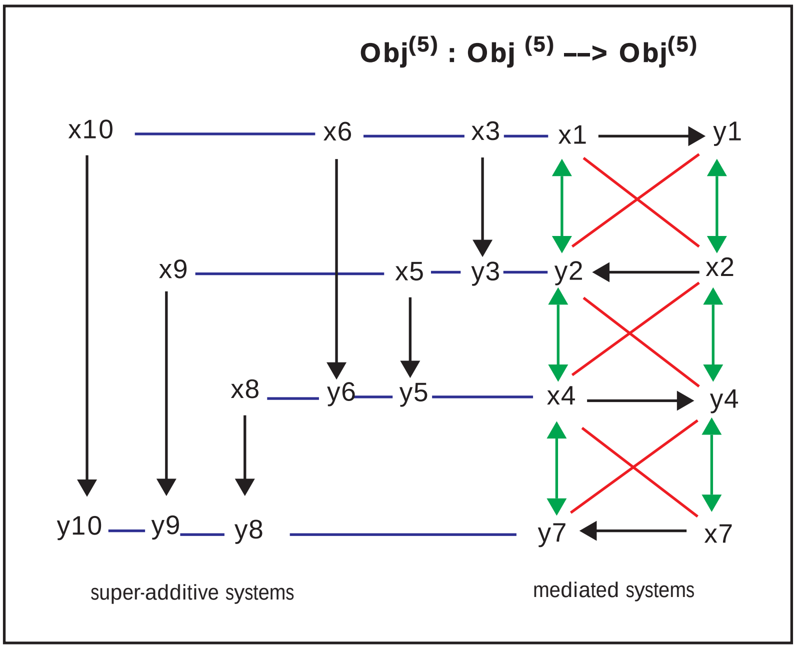


This diagram shows explicitly all possible relations of the chiasm.

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				

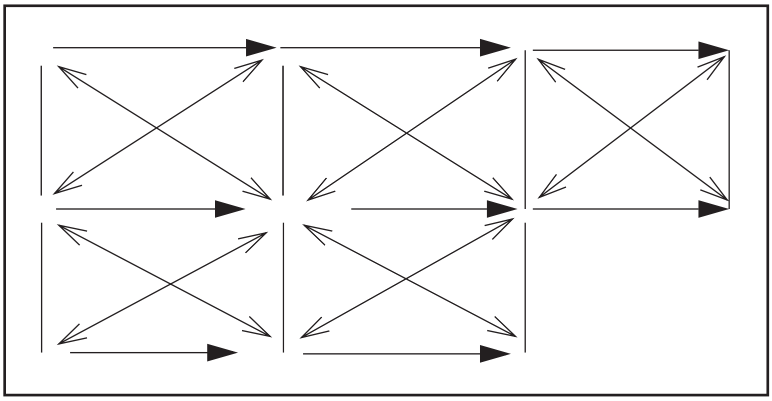
This is the table of a highly detailed description of the chiastic proemial relationship. In the following, I will omit this additional information about the distinction of similarity and coincidence.

Iterative composition of chiasms



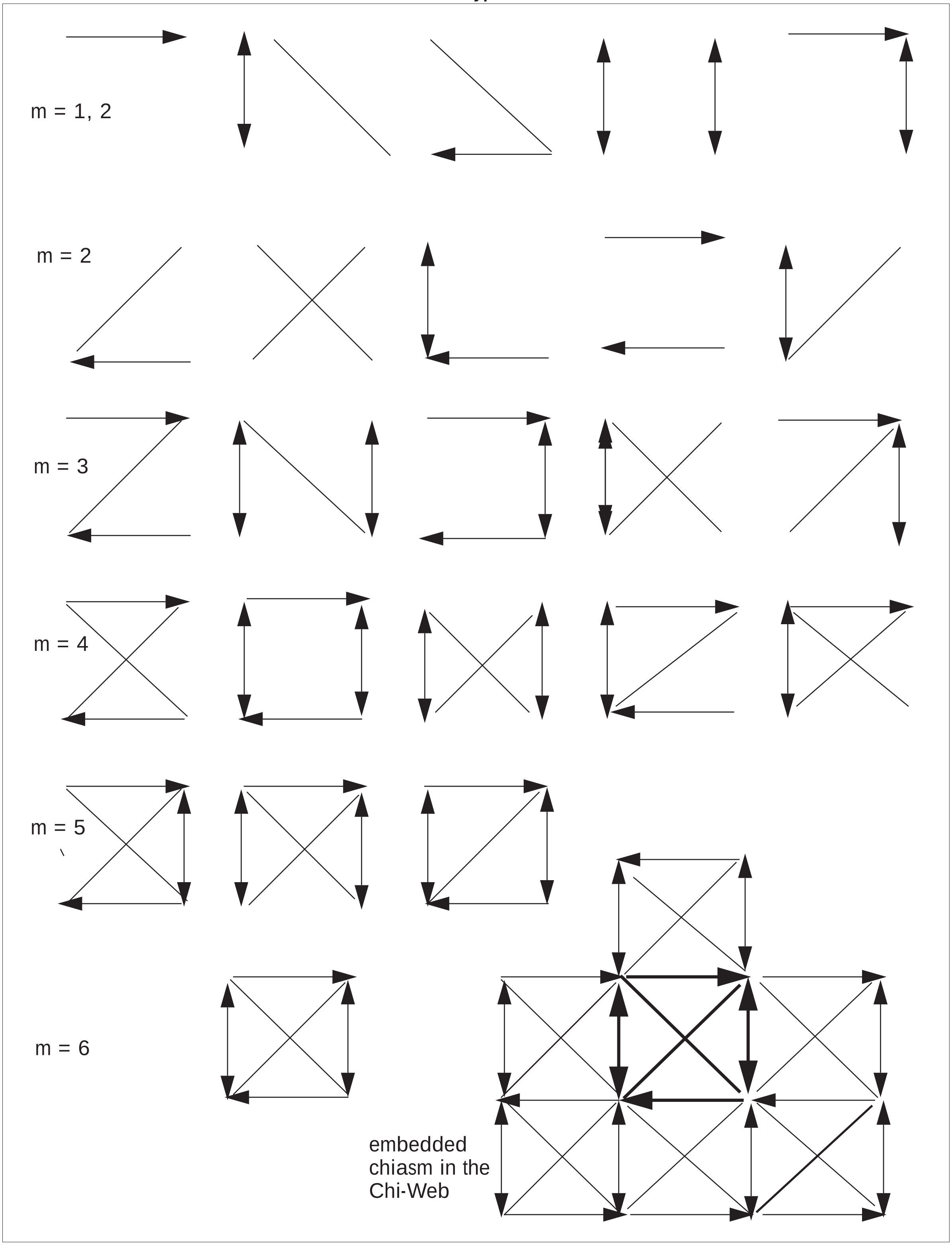
Not only morphisms can be composed but chiasms, too. This can happen in a mix of accretive and iterative compositions of diamonds.

Accretive and iterative compositions of chiasms



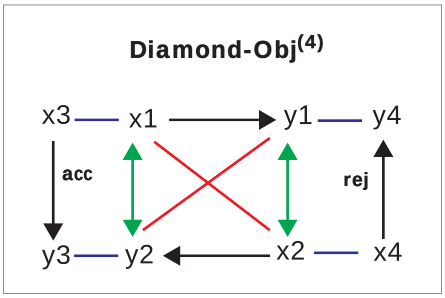
This diagram of iterative and accretive compositions of diamonds is omitting the super-additive systems of acceptionality and the rejectional sub-systems of rejectionality, too.

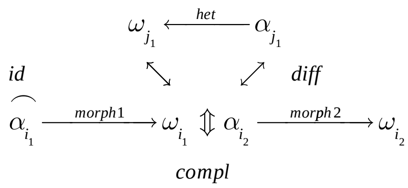
Table of different types of chiasms



9 Diamond of composition

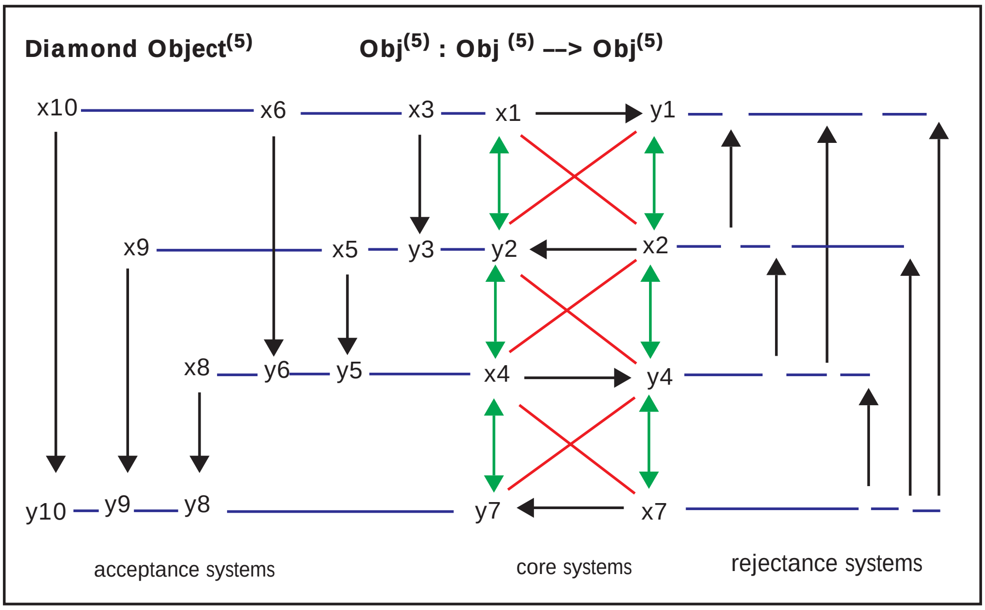
Finally, after 30 years of proemializing and chiastifying formal languages, the *diamond* of composition is introduced, which is accepting the *rejectional* aspect of chiastic compositions, too. It seems, that the diamond concept of composition is building a complete holistic unit. With its radical closeness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





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

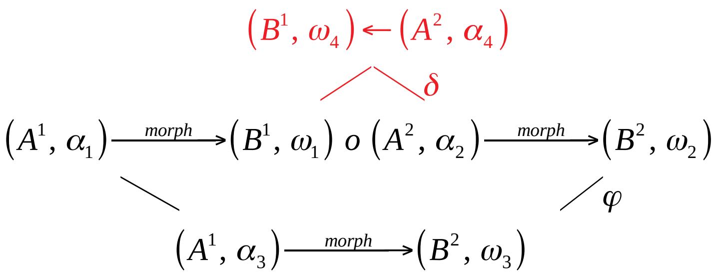
Not only the coincidence relations are realized, and the inverse exchange relation, but also, additionally to the acceptional mediation relation, the rejectional mediation relation, defining all together the diamond structure of composition of morphisms.



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

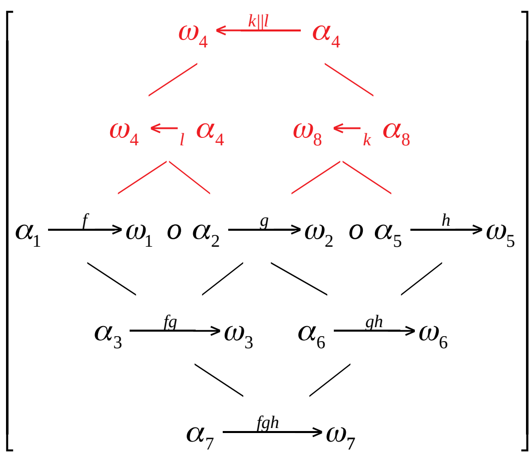
$$\left[\begin{array}{l} o=\begin{cases}\lambda(\omega_1)\simeq\lambda(\alpha_2)\\ \lambda(A^2)\triangleq\lambda(B^1)\end{cases}\\ \varphi(A^1,\alpha_1)=\varphi(A^1,\alpha_3)\\ \varphi(B^2,\omega_2)=\varphi(B^2,\omega_3)\\ \delta((B^1,\omega_1)\ o\ (A^2,\alpha_2))=\\ (\delta(B^1),\omega_4)\leftarrow(\delta(A^2),\alpha_4)\end{array}\right]$$

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^o,f^o)=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 f^a and h^o, (h^o,f^o)=k||l.

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, ($f^o g h^o$).

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

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

$dom : Cm \longrightarrow Co,$

$cod : Cm \longrightarrow Co,$

$id : Co \longrightarrow Cm$

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

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

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

Diamond

Cat +

$Hetero - Objects \quad C_o^h = \{A^h, B^h, ...\},$

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

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

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

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

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

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

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

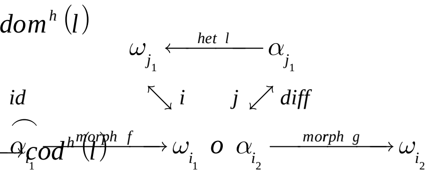
$(m \parallel l) \parallel k = m \; o \; (l \parallel k)$

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

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

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

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



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

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

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

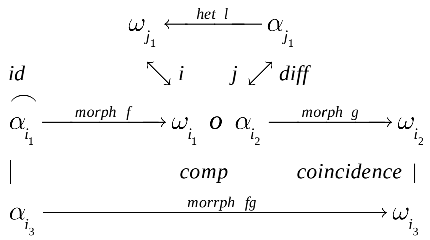
$(g \; o \; f) \; o \; (j \parallel i) = l$

$reject(gf) = k$

$reject(hg) = l$

$reject(hgf) = m$

$accept = reject^{-1}$



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

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

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.*

2. Associativity Condition

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

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

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

3. **Unit Existence Condition**

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

4. Smallness Condition

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

Diamond rules for morphisms

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

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

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

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

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

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

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

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

– 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.

$$Diamond = [\ Morph,\ \overline{Morph},\ o,\ ||\ ]$$

o = composition-operator
||= jump-operator
Morph = morphisms
$\overline{Morph}$ = hetero-morphisms

10 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.

10.1 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.

10.2 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.

10.3 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, formaliced in chiasms by the coincidence relations.

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

10.4 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

$$\begin{pmatrix} coinc(\alpha_1, \alpha_3), \\ coinc(\omega_2, \omega_3) \end{pmatrix},$$

$then$

$$morph(\alpha_1, \omega_1) \; o \; morph(\alpha_2, \omega_2) = morph(\alpha_3, \omega_3),$$

$and \; if$

$$\begin{pmatrix} diff(\alpha_2) = \alpha_4, \\ diff(\omega_1) = \omega_4 \end{pmatrix},$$

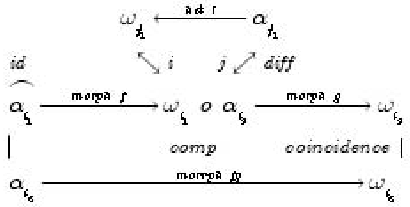
$then$

$$compl(morph(\alpha_3, \omega_3)) = het(\alpha_4, \omega_4)$$

$$Diamond(morph) = \chi \langle accept, reject \rangle$$

$$accept \; (morph_1, morph_2) = morph_3$$

$$reject \; (morph_1, morph_2) = morph_4$$



Terms

morph / het

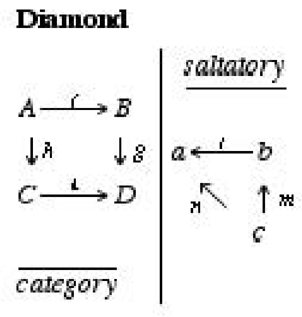
coinc / diff

id / div

o / ||

dual / compl

accept / reject



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

10.5 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".

10.6 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"*.

10.7 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.

11 Applications

11.1 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 *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* (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.

11.2 Diamond class structure

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

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

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

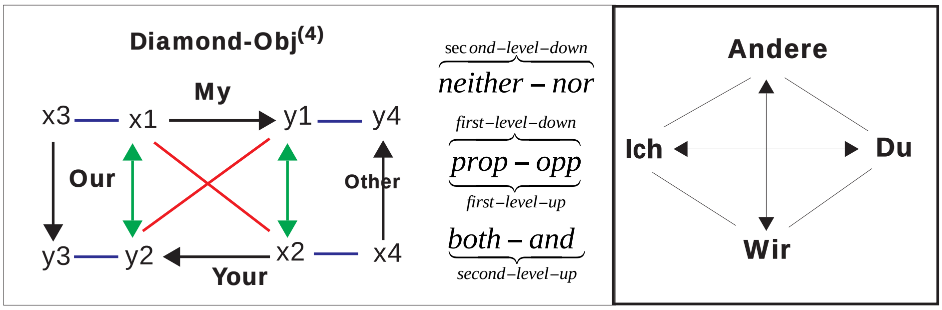
The harmonic My-Your-Our-Class conceptualization has to be augmented by a class which is incorporating the place for the other, the unknown, the difference to the harmonic system. That is, the NotOurClass is thematized positively as such as the class for others, called the *OthersClass*. Hence, the OthersClass 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.

11.3 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.

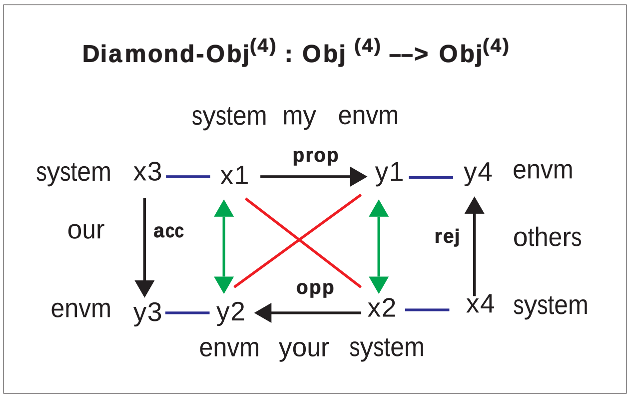
After the unpredictible happened, it can be domesticated, which means, it can be modelled in a new acceptional part of the system. Hence the complexity of the system as a whole is augmented by the domestication of the new experience. It also has to be questioned what made the experience such different 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).

11.4 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.



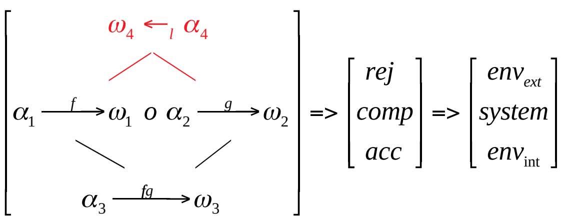
The diamond modeling of the otherness of the others is incorporating the otherness into its own system. An external modeling of the others would have to put them into a different additional contexture. With that, the otherness would be secondary to the system / environment complexion under consideration. 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.

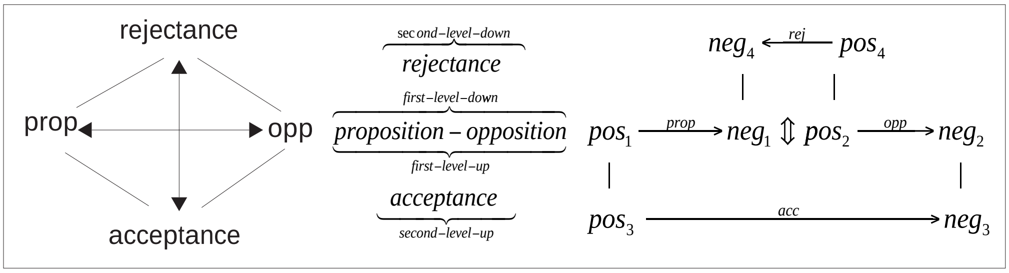
Diamond System Scheme



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.

11.5 Logification of diamonds



General Logification Strategy

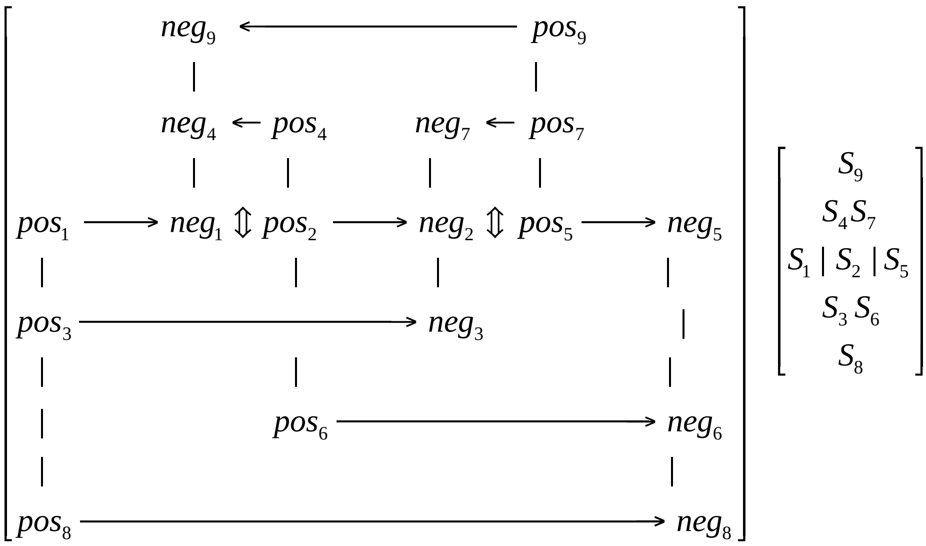
A logification of the diamond strategies, which is importing the architectonics of the diamond into the architectonics of polycontextural logical systems, has to consider 3 different types of logical systems:

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



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

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

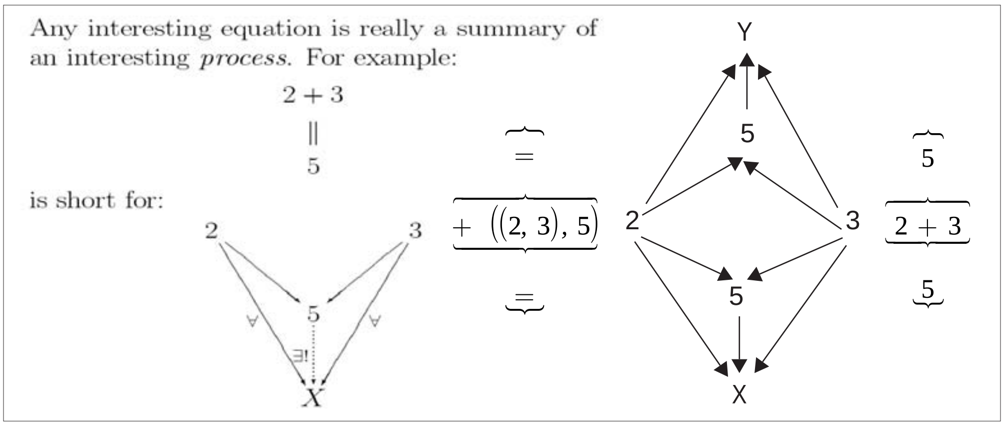
$$\begin{bmatrix} id_4 \\ id_1 non_2 \\ id_3 \end{bmatrix} : \begin{bmatrix} S_4 \\ S_1 \mid S_{2.} \\ S_3 \end{bmatrix} \xrightarrow{neg2} \begin{bmatrix} S_4 \\ S_3 \mid \overline{S_{2.}} \\ S_1 \end{bmatrix}$$

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

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

11.6 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).

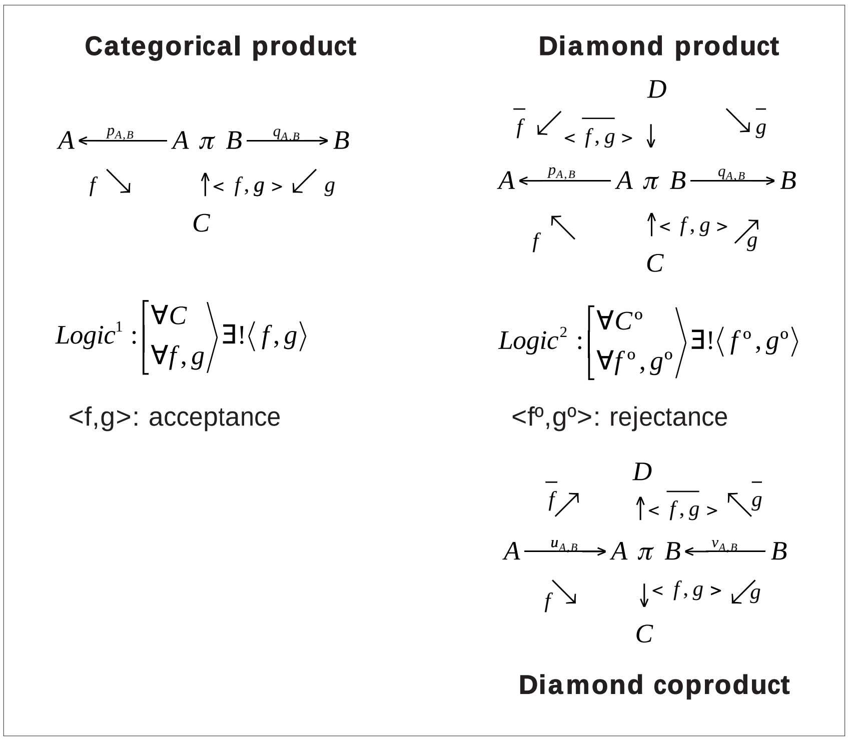
The second diagram shows the diamond representation of the addition 2+3. The wordings are the same, one for X, and one for Y. The equation is *stable* in respect of the acceptional addition and the rejectional addition iff X=Y. That is, iff the numbers and the operations belong to isomorphic arithmetical 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



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.

11.7 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.

11.8 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.

11.9 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.

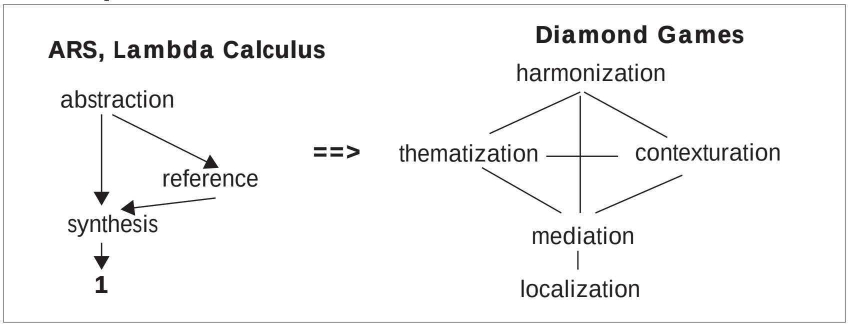
> "The central theme of the Confucian doctrines is 'the quest for equilibrium and harmony' (zhi zhong he). The whole tradition of Confucianism developed out of the deliberations about how to establish or reestablish harmony in conflicts and disorder. For Confucianism harmony is the essence of the universe 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

Towards a Diamond programming paradigm

Some transition schemes are proposed to realize diamondization in programming.

1 From operational to diamondizational devices



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.

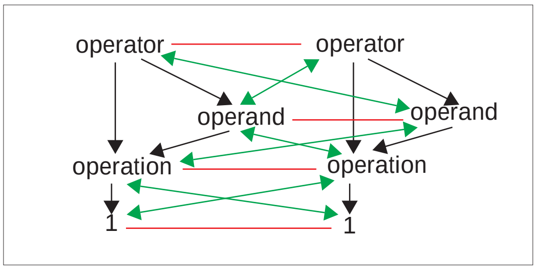
Localization is complex positioning in respect to mediation based in the kenomic grid.

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.

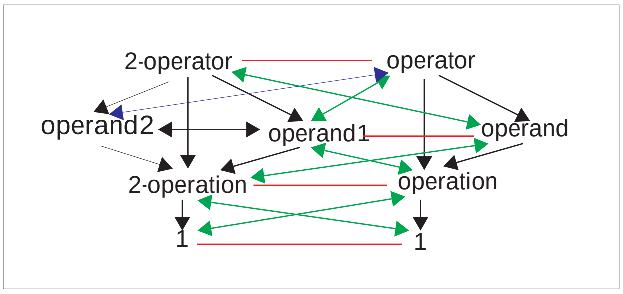
Firstly, diamonds are incorporating a tetradic structure which can be mapped onto the tetradic structure of proemiality.

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.

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.

$$PR^{(m)} = \chi^{(m)}\left(rator, rand, op, pos\right)$$
$$DIAM^{(m)} = \chi^{(m)}\left(cat, salt, pos\right)$$

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?

$$\textbf{Diamond - Calculus :=} \left(\left\langle \textbf{Lambda}_{\textbf{acc}} \right\rangle \parallel \left\langle \textbf{Lambda}_{\textbf{rej}} \right\rangle\right)$$

$$[architectonics] \parallel [dissemination] \parallel [interactionality] \parallel [reflectionality]$$

$$[architectonics] := (\langle complexity \rangle \langle structuration \rangle)$$

$$[dissemination] := (\langle distribution \rangle \langle mediation \rangle \langle diamond\ calculus \rangle)$$

$$[interactionality] := (\langle super-operators \rangle \langle \delta\ term \rangle)$$

$$[reflectionality] := (\langle super-operators \rangle \langle \delta\ term \rangle)$$

$$[diamond\ calculus] := \langle \delta\ term \rangle$$

$$[\delta\ term] := (\langle \lambda\ acc-term \rangle \parallel \langle \lambda\ rej-term \rangle)$$

Basic structure of the mono-contextural diamond calculus

$$\left[\begin{array}{l} thematize\ diamond \\ \left[\begin{array}{l} identify\ contexture \\ \left[\begin{array}{l} separate\ acc-domain \\ \left[\begin{array}{l} define\ (Name\ of\ Abstraction) \\ \left(\begin{array}{l} lambda < List\ of\ Parameters > \\ \quad \left\{\begin{array}{l} < Statement_1 > \\ < Statement_2 > \\ \quad \ldots\ldots \\ < Statement_n > \end{array}\right\} \end{array}\right) \end{array}\right] \\ elect\ rej-domain \end{array}\right] \left[\begin{array}{l} separate\ rej-domain \\ \left[\begin{array}{l} define\ (\overline{Name\ of\ Abstraction}) \\ \left(\begin{array}{l} lambda < \overline{List\ of\ Parameters} > \\ \quad \left\{\begin{array}{l} < \overline{Statement_1} > \\ < \overline{Statement_2} > \\ \quad \ldots\ldots \\ < \overline{Statement_n} > \end{array}\right\} \end{array}\right) \end{array}\right] \\ elect\ acc-domain \end{array}\right] \end{array}\right] \end{array}\right]$$

$$\left[\begin{array}{l} thematize\ diamond \\ \left[\begin{array}{l} identify\ contexture \\ \left[\begin{array}{l} separate\ acc\ /\ rej-domain \\ \left[\begin{array}{l} 2-define\ (2-Name\ of\ \left(Abstraction,\ \overline{Abstraction}\right)) \\ \left(\begin{array}{l} 2-lambda\ < 2-List\ of\ \left(Parameters,\ \overline{Parameters}\right) > \\ \qquad\qquad \left\{\begin{array}{l} < Statement_1 >,\ < \overline{Statement_1} > \\ < Statement_2 >,\ \overline{< Statement_2 >} \\ \quad ......\qquad\qquad ...... \\ < Statement_n >,\ \overline{< Statement_n >} \end{array}\right\} \end{array}\right) \end{array}\right] \\ elect\ acc\ /\ rej-domain \end{array}\right] \end{array}\right] \end{array}\right]$$

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 = chiasm(name-acc, name-rej)

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.

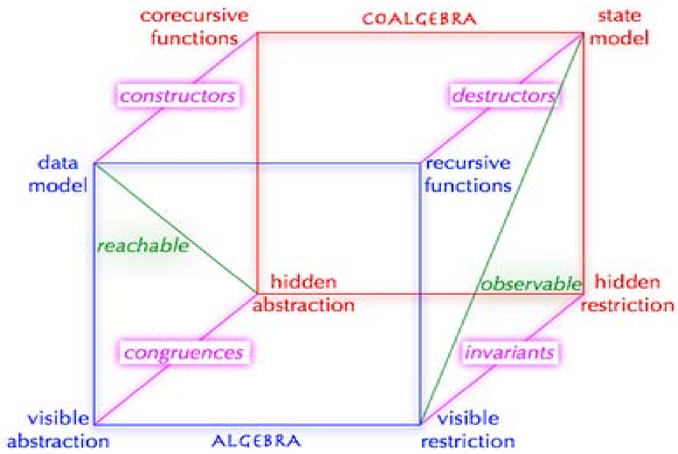
Seamless successions and patchy jumps

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 successional 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 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, simultaneity, of mediation

Modeling of LIST

Head of swinging types for the set of all finite sequences

$$
\begin{array}{ll}
\multicolumn{2}{l}{\text{LIST} = \text{ENTRY } \texttt{then}} \\
\texttt{vissorts} & list = list(entry) \\
\texttt{constructs} & [] :\to list \\
 & \_ : \_ : entry \times list \to list \\
\texttt{local preds} & \_ \in \_ : entry \times list \\
 & sorted : list \\
 & exists, forall : (entry \to bool) \times list \\
\texttt{vars} & x, y : entry \quad L, L' : list \quad g : entry \to bool
\end{array}
$$

Axioms for SP: Horn axioms (1) to (7)

$$
\begin{array}{l}
x \in y : L \quad \Leftarrow \quad x \equiv y \vee x \in L \\
sorted([]) \\
sorted(x : []) \\
sorted(x : y : L) \quad \Leftarrow \quad x \leq y \wedge sorted(y : L) \\
exists(g, x : L) \quad \Leftarrow \quad g(x) \equiv true \vee exists(g, L) \\
forall(g, []) \\
forall(g, x : L) \quad \Leftarrow \quad g(x) \equiv true \wedge forall(g, L)
\end{array}
$$

Axioms for compl(SP)

$$
\begin{array}{l}
x \notin y : L \quad \Rightarrow \quad x \not\equiv y \wedge x \notin L \\
unsorted([]) \quad \Rightarrow \quad False \\
unsorted(x : []) \quad \Rightarrow \quad False \\
unsorted(x : y : L) \quad \Rightarrow \quad x \not\leq y \vee unsorted(y : L) \\
notExists(g, x : L) \quad \Rightarrow \quad g(x) \not\equiv true \wedge notExists(g, L) \\
notForall(g, []) \quad \Rightarrow \quad False \\
notForall(g, x : L) \quad \Rightarrow \quad g(x) \not\equiv true \vee notForall(g, L)
\end{array}
$$

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.*

1.4 Metaphor of double naming

"wave particle duality"

The history of quantum physics shows good examples of double naming. Werner Heisenberg, in his book "Physik and 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-onece and neiter 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 [10]. 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 Löfgren about the problem of interpreting and formalizing complementarity.

1.5 Ontology and semantics of diamond 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 contextural objects of polycontextural systems.

Hetero-morphisms and morphograms

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 Henz von Foerster proposed, morphograms can be regarded as the inverse function of a logical function. Hetro-morphisms are inverse to morphisms. Hence, there is a possible connection between hetro-morphisms of a composition and morphograms of such a composition. In this sense, morphograms can be seen as the inscriptyion of the inversity of cmorphisms ofd rejectional morphisms.

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.

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

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.