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Abstract

ARS - Generalization of the Lambda-Calculus, Another Ultimate Lambda Power, Polycontextural Logics, Universal and Combining Logics, Grandfathers of Super-Additivity of Combining Logics, Peter Padawitz's Swinging World, How Universal is Universal Logic?, Professor Günther's Proemial Relationship

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Sushi's Universal Logic Catalogue –
The Ultimate Lambda Pow(d)ers

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Sushi's Universal Logic Catalogue –
The Ultimate Lambda Pow(d)ers

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A composition of texts and pictures about combining logics, fibred systems, universal and polycontextural, and an introduction to magical metamorphosis with the help of Sailor Moon's AZZA-brooch and Gunther's Proemiality Operator in dispersing the Crystal of the Ultimate Lambda Calculus into the Eternal Fluids of Ultimate Multi-Verse Metamorphosis.

1 ARS -- Generalization of the Lambda-Calculus

All started with the discovery of an incredible book:

Georg P. Loczewski
Programmierung pur
Programmieren fundamental und ohne Grenzen
Die kleinste Programmiersprache der Welt
A++ inklusive
stmv, Darmstadt 2003, S. 919

Now all in english and online.
http://www.aplusplus.net/

Abstraction: Give something a name.

Reference: Reference an abstraction by name.

Synthesis: Combine two or more abstractions to create a new abstraction.

The pure Lambda Calculus is applicable only to functional programming. **A++** however is built on ARS which stands for the basic operations of the Lambda-Calculus in a generalized form. Guy L. Steele, one of the fathers of the Scheme Programming Language, praises the beauty of ARS in his foreword to [SF93] on page XV and XVI.

Also the Lambda Calculus is without doubt accepted by the members of Alonzo's Church as the Ultimate Calculus, ARS is nevertheless definitively the ultra-Ultimate Lambda Calculus: the Holy Grail of Ultimate Computing.

http://www.orpps.com/A++/

There are a lot of **A++** products on the market. Here I will restrict my studies to the one of Georg P. Loczewski, the father of **A++**.

Abstraction is all there is to talk about: it is both the object and the means of discussion. **Guy L. Steele Jr.**

A++
-- the Smallest Programming Language of the World.
Georg P. Loczewski

1.1 Rock-solid grounds

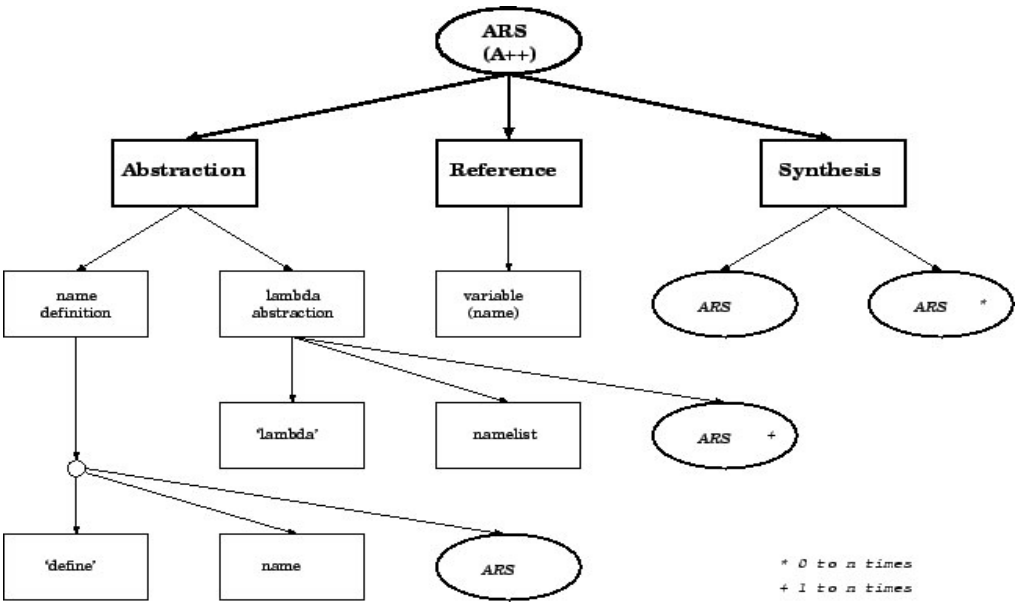
To not to get lost in fuzziness and fictional transformations in our attempt to introduce the real magic of metamorphosis we are looking for something like a rock-solid piece of theory, or better a crystal-hard formalism, which to transform and to involve into radical metamorphosis seems to be strictly impossible. Such erratic pieces of theories, hard core inscriptions, being ultimate and natural at once can be found at least in two new trends of thinking: ARS (A++) and Universal Logic.

ARS is well connected with the old program of Moses Schönfinkel (Moscow 1920) to find and inscribe the Urlogik, later realized perfectly by Haskell Curry (Combinatory Logic) and in parallel by the American logician Alonzo Church (Lambda Calculus).

> ***A++*** *is introduced as a universal learning tool for programming, confronting students with the essence of programming and helping to master this confrontation.*
> *The name A++ is just a compressed form of* ***ARS*** *itself:* ***A****bstraction +* ***R****eference +* ***S****ynthesis.*

Universal Logic has also a well documented history in Universal Algebra and Category theory. But both, Universal Logic and the radicalized lambda calculus A++ are very recent developments. The harder the theory the more radical is its deconstruction. A++ (ARS) gives us the guarantee that we are not dealing with some accidental aspects of a general theory of computation and programming.

A++ as a diagram



ARS provides a base for imperative programming and object-oriented programming as well and can be applied to programming in almost any programming language.

The Lambda Calculus does not allow for an explicit definition of a name. The only possibility to associate a name to a value in the Lambda Calculus is by calling a function with an argument. This operation corresponds to the synthesis operation however and not to the creation of an abstraction. Lambda-abstractions in the Lambda Calculus are `per se' anonymous.

1.2 Constitutive Principles of A++

The generalization of the Lambda Calculus consists in defining the concept of abstraction simply by 'give something a name'. The name hides all the details of the defined. Abstraction thus defined requires an explicit definition of a name.

ARS, the basic operations of the Lambda Calculus in their generalized form are defined as follows:

*ARS (basic operations)
*Abstraction
*+ Reference
*+ Synthesis
*Lexical Scope
*Closure
These are the Constitutive Principles of A++

A++ @ : http://ofo.jp/

Lexical scope can also be described as the context of a lambda abstraction in the program text.

These operations may sound rather trivial and abstract but taken as principles of programming they change the style and method of programming thoroughly.

Principles of ARS

***Abstraction**
to give something a name,
***+ Reference**
to reference an abstraction by name,
***+ Synthesis**
to combine one abstraction with other abstractions to create something new.

The constitutive principles of A++ are those, that make A++ to what it is. These principles are essentially the nucleus of the language, everything else can be derived from them. ARS, as introduced above in ARS provides three of these principles and `lexical scope' is the fourth.

Uniqeness of ARS

A constitutive principle is different from a simple characteristic of a programming language. In this sense ARS is not constitutive in languages like for example Pascal, C and C++. Every programming language must somehow provide a `name giving' mechanism, a feature allowing to call procedures or functions and the possibility to refer to variables.

Universality of ARS

In A++ ARS is universal, the principles can be applied anywhere at any time because they make up the language. In most other languages the operations symbolized by ARS can be applied only under certain conditions, only in certain constructs controlled by a complex set of rules, which on top of blocking ARS is different from language to language.

1.3 Another rock-solid minimal language: Chris Baker's Iota

Additionally to the desire for a rock-solid formalism we can ask for the smallest programming language concept, too. Here it is: Iota and there is also a Jota! Even a competion for the smallest formal language is running, A++ should win it. Iota is an unambiguous Turing-complete language with just two symbols developed by Chris Baker from *Esoteric Programming Languages Webring*.

http://ling.ucsd.edu/~barker/iota/#turing

```
The whole language is:  Syntax:      Semantics:
                        F --> i^     ^x.xSK
                        F --> *  F F [F][F]
```

That's the whole language. For comparison, the lambda calculus requires an infinite stock of distinct variable symbols, and even Combinatory Logic requires at least three symbols, including S, K, and something to serve the function of parentheses.

The syntax (of Iota) generates strings like i, *ii, *i*ii, or **ii*ii, but not ii, i*i, or **ii.

To prove that Iota is Turing-complete, I will provide a mapping from Combinatory Logic into Iota that preserves meaning; since CL is Turing-complete, Iota is too. The mapping goes like this:

```
CL        Iota
I    ==> *ii
K   ==> *i*i*ii
S   ==> *i*i*i*ii
AB  ==> *[A][B]
```

(The following) establishes that for every expression in CL, there is an expression in Iota with the same meaning.

```
   *ii
== (^x.xSK)(^x.xSK)
== (^x.xSK)SK
== SSKK
== SK(KK)
== I

   *i*i*ii
== i(i(ii))
                          ==
(^x.xSK)((^x.xSK)((^x.xSK)(^x.
xSK)))
== (^x.xSK)((^x.xSK)I)
== (^x.xSK)(ISK)
== (^x.xSK)(SK)
== SKSK
== KK(SK)
== K

   *i*i*i*ii
== i(i(i(ii)))
== (^x.xSK)K
== KSK
== S
```

2 The Ultimate Other Lambda Power

This is the Cosmos Crystal's, making everything into the static Cosmos, the ultimate Lambda Power.

Bishoujo Senshi Sailor Moon Manga Story

"The woman in a sailor suit and cape, two long ponytails flowing over her shoulders, a light sparkling on her forehead, stands before them. "I am Sailor Cosmos." > "Sailor Cosmos!?" says Ceres. "It can't be... It can't be... Are you the future... The future Sailor Moon's ultimate form!?" "I am only a coward," the woman says. "I abandoned everything, and ran away from where I should have been. Eternally, I am no match for the final courage and strength of Eternal Sailor Moon."

Takeuchi Naoko is the creator of Sailor Mo and other award-winning manga for the sho jo monthly magazine Nakayoshi. She wa born on March 15th, 1967 in Kofu City, Yam nashi prefecture. She graduated from Kyor su Chemical University.

Trivia

- ***Supposedly was in the Astronomy Club in high school**
- ***Height is 160cm**
- ***Hair color is black**
- ***Blood type is A**
- ***Right-handed**
- ***Drives a custom red Ferrari Spider**
- ***Shoe size: unknown?**

http://www.fortunecity.com/rivendell/everquest/90/picencyc.html
http://www.tcp.com/doi/mangaka/takeuchi-naoko.html

3 The Original 'Lambda Papers' 1976

Lambda the Ultimate Imperative (Declarative, Opcode, ..., little language)

The Original 'Lambda Papers' by Guy Steele and Gerald Sussman.

There are many beginnings but no origin. Origins are beginnings as all other beginnings too. But this is a great one. It has influenced the whole history of programming. And it is metamorphosis at its best: Using the trick of AZZA-brooch to transform data to programs and back again with the operators EVAL/QUOTE.

http://library.readscheme.org/page1.html

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
ARTIFICIAL INTELLIGENCE LABORATORY

AI Memo No. 353 March 10, 1976

LAMBDA

THE ULTIMATE IMPERATIVE

Majoko Ultimate Sailor Moon

by

Guy Lewis Steele Jr. and Gerald Jay Sussman

Abstr

We de ing common programming constructs in terms similar to LISP:

ons

The m Call by Reference condi -referent) lambda application, stack No complex data structures such as trans parent, involving only local syntactic

Some - GO TO and assignment, are already well known , Reynolds, and others. The models for escap d call by need with side effects are new. intent, gathering all the models toget

This the Artificial Intelligence Laboratory of th ology. Support for the laboratory's artificial intelligence research is provided in part by the Advanced Research Projects Agency of the Department of Defense under Office of Naval Research contract N00014-75-C-0643.

3.1 Lambda: Universal and Natural?

And again Lambdas everywhere: As Natural as 0,1,2

"Whether a visitor comes from another place, another planet, or another plane of being we can be sure that he, she, or it will count just as we do: though their symbols vary, the numbers are **universal**. *The history of logic and computing suggests a programming language that is equally* natural. *The language, called* lambda calculus, *is in exact correspondence with a formulation of the laws of reason, called* **natural** deduction. **Lambda** calculus *and* natural deduction *were devised, independently of each other, around 1930, just before the development of the first stored program computer. Yet the correspondence between them was not recognized until decades later, and not published until 1980. Today, languages based on* lambda calculus *have a few thousand users. Tomorrow, reliable use of the Internet may depend on languages with logical foundations. "*

http://homepages.inf.ed.ac.uk/wadler/topics/history.html#drdobbs

Gentzen 1934: Natural Deduction

$$\frac{}{A \vdash A}\ \mathrm{Id}$$

$$\frac{\Gamma, A \vdash B}{\Gamma \vdash A \to B}\ {\to}\text{-I} \qquad \frac{\Gamma \vdash A \to B \qquad \Delta \vdash A}{\Gamma, \Delta \vdash B}\ {\to}\text{-E}$$

$$\frac{\Gamma \vdash A \qquad \Delta \vdash B}{\Gamma, \Delta \vdash A \,\&\, B}\ \&\text{-I} \qquad \frac{\Gamma \vdash A \,\&\, B}{\Gamma \vdash A}\ \&\text{-E}_0 \qquad \frac{\Gamma \vdash A \,\&\, B}{\Gamma \vdash B}\ \&\text{-E}_1$$

3.2 DiamondStrategies: The Ultimate Crystal Fluids

n. pl. met·a·mor·pho·ses (-sz)
1. A transformation, as by magic or sorcery.
2. A marked change in appearance, character, condition, or function.

To fight fundamentalism we have to disperse the ultimate lambda power crystal into its powder. The ultimate pulverization of the powers crystal.

$$Q^i = Q^i\left(\neg^{i-1}\left(I^{i-1}\left(Q^{i-1}\right)\right)\right)$$

$$I^i\left(Q^i\right) = I^i\left(Q^i\left(\neg^{i-1}\left(I^{i-1}\left(Q^{i-1}\right)\right)\right)\right)$$

$$= \neg^{i-1}\left(I^{i-1}\left(Q^{i-1}\right)\right)$$

SAILOR MOON is a story aimed at young girls (4 to 12 years old), and can be considered a magical girl story.

Maybe, SUSHI'S LOGICS, a collage/sabotage and patchwork&catalogue, is aimed at girls/young ladies (13–23 years old & more). One just got her degree in logic at Oxford university. It also can be considered as having some threats of a compendium for chiastic and subversive thinking and acting in a frozen world of digitalism.

(Where is she?)

A patchwork &catalogue of interplaying contextures doesn't need a narrative with its beginning and end, nor any drive and suspension to motivate the reader to invest his/her time.

The ultimate power of the Lambda Calculus is the historical fact that it has succeded to create a community which is accepting this kind of beginning of an abstraction, accepting the common context, lexical scope of the calculus, and developing the endless research of this empire. The Church of **Alonzo Church** has its high sophisticated high priests and common priests where ever we need the pureness of the Crystal of the Static Universe.
This Crystal of the Static Universe has power to all Purist of this Globe: From the Roman-catholic Jesuits to the Presbyterian Protestants, the Jewish Orthodox and the mesmerized high priests of Digitalism; all are united in the trance of the secret power of the Ultimate and Eternal Lambda.

http://lambda-the-ultimate.org/node/view/134

4 Dispersing Ultimate Crystal to Multimate Lambda Powder

4.1 The difference of system and environment

Lexical scope can also be described as the context of a lambda abstraction in the program text.

So, things are not as simple as we learnt in our text book about the Lambda Calculus?

The Ultimate Lambda Abstraction has a context in which the process of abstraction happens. Contexts are, as we learned from Context Logics, not easy objects, they come en mass. Where there is a context, there is also another context. To stop this invasion, logicians and linguists invented the General Context, also called the Ultimate context of the Universal Language (Goddard/Routley, 1973).

But this is not the only dispersion of the Ultimate. The context of a lambda abstraction, that is, of any lambda abstraction and especially of the Ultimate Lambda Abstraction, is its embedments in a (program) text. And again, we have not to invent it ourself, textuality is not only magic but highly disseminative, escaping all attempts of unifying controls by an absolute and ultimate co-text.

What is your Context is my Ultimate and what is your Ultimate is my Context. This could be a first magic rule to escape the coldness of the Static Universe. Not to forget, that between me and you, there is the same interlocking game, accepting the ultimate differences between you and me, and denying and rejecting any attempts to subsume us both under a common Ego.

The *context of a lambda abstraction* is the textual space in which a decision has to be realized, a distinction be drawn and an inscription of this beginning written.

What you are not been told

Sometimes, the pedagogical gestures, offers more to see, than the doxic academic exposition of the subject in the text books, esp. in computer science text books. Some questions are allowed, some preliminary steps mentioned, some reflections opened up to find an agreement in negotiations. Showing the conversational and negotional character of the established conventions.

In his ultimate book *Programmierung pur,* Georg P. Loczewski writes:

"Die Bildung einer Abstraktion ist in A++ nicht ein absolutes, von Allem losgeloestes Ereignis. Eine Abstraktion erfolgt immer in einem bestimmten Kontext, der somit wesentlich zu der gebildeten Abstraktion gehoert. Die Lambda-Abstraktion wird im Zeitpunkt ihrer Erzeugung mit ihrem Kontext oder ihrer Umgebung verbunden. Das Resultat dieser Verkapselung wird 'Closure' genannt.

"Bei einer Closure (dadegen) erfolgt diese Verkapselung nicht durch willkuerliche, ausdruekliche Definitionen, sondern alles, was zum textlichen Umfeld einer Funktion gehoert wird automatisch in diese Verkapselung einbezogen. Loczewski*, p. 32*

> *"The formation of an abstraction in A++ is not an absolute event, detached of all. An abstraction always takes place in a certain context, which belongs thus substantially to the formed abstraction.*
> *Lambda abstraction is connected at the time of its production with their context or their environment. The result of these encapsulation is called 'Closure'.*
> *With a Closure this encapsulation does not take place via arbitrary, declared definitions, but everything that is belonged to the text surrounding field of a function will automatically be included into this encapsulation."*

That is, the formation of an abstraction A is not falling from the sky, it has to be realized in a concrete situation, selecting possibilities, separating and excluding other constellations from being candidates for a start of ARS.

Therefore, the formation of a formal system like ARS, starting with the abstraction A, depends on a decision which is as such not included in this very formalism. The attempt to formalize the process of such a decision would iterate the argument and introducing a new kind of Closure as an environment of the new formalism.

Also this situation is mostly not mentioned, even not in Loczewski english texts, it is not trivial at all. It maybe very obvious that a formalism is written against such a textual environment, nevertheless it is exactly this fact which opens up the possibilities to identify directly and without introducing external terms the environment as a sine qua non of formal systems.

4.2 Shadows and Blind Spots

Let's focus on this environment of a formal system like ARS.

To give a simple model of the difference between a formal system and its environment in the sense I just mentioned, it is convenient to remember how a (simple) calculus is build.

Alphabet A = {x, y, z, non, and, (,)}

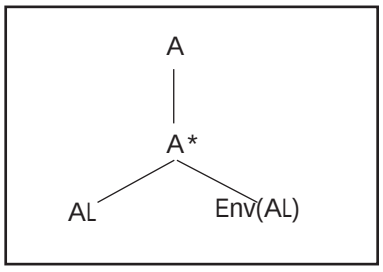
A* is the free monoid on the base of A. That is, all combinations of the elements of the alphabet can be build. Surely they have to be ordered linearly and each element has to be unambiguously identified, no overlapping or tabular field is allowed.

Therefore for instance: x, xx, xx, xy, yy, xnonxx, xyandnon, xandx, non(xandy), (())non, etc. are allowed combinations of the free monoid.

From A* we select or discriminate some special combinations to form the syntax of propositional logic. This is established with 3 simple rules.

Syntax for AL (X and Y are considered here as variables):
R1: ==> x (You can introduce a variable x, this will be an atomar term)
R2: X ==> non (X) (If you have introduced a term, the negation non(X) is a term)
R3: X, Y ==> ((X) and (Y)) (From X ,Y you can build the composed term (X and Y).

All terms of AL are build by the rules R1 – R3.



The environment Env(AL) is composed of all linearly ordered sign combinations of A* except the set of combinations build by the rules of AL. That is, the union of sign(AL) with sign(Env(AL)) is exactly sign(A*).

This syntactical environment of AL can be understood in a metaphorical way as the shadow of AL. The magnitude of the shadow of AL is much bigger than the magnitude of the formalism AL. This shadow of a formalism is the other side, the not focussed context, the otherness or even the blind spot of the formal system.

Take another example: Iota

```
F --> i
F --> *  F  F
```

The syntax (of Iota) generates strings like i, *ii, *i*ii, or **ii*ii, but not ii, i*i, or **ii. Therefore, the environment of Iota are the "pre-Iota" productions which are not allowed by the two rules of Iota.

All formalisms are embedded in such a contextual shadow.

Because the term *context* is used inside of a formal system, e.g. as in context logic, I call this constellation of a system and its environment a *contexture*. Contextures are including contexts and contexts are parts of contextures. In another terminology a contexture could be called a framework, e.g. a logical framework in the sense of Raymond Smullyan or not surprisingly a Universal Logic. But contextures always comes en mass.

The new logic or formal system is surely not dealing with the nonsensical syntactical combination of the former system but with the otherness of this system. The otherness in this constellation has two meanings: the shadow of one system and simultaneously the focus and brightness of the other system. That is, the shadow is designing a locus for a new system, not to be confused with the preceding one. To introduce loci is possible only by means of a new abstraction from the whole of the difference system/environnment. Then we see that also the system as such is located, occupying a structural locus for its own. To thematize this field of loci would require a theory of kenogrammatics (kenos gr. empty). The loci are empty because everything which is not empty belongs to the system and its environment, even signs for empty situations like zero, nil, nothing etc. are part of the system and not of its kenogrammatics.

AL_i —— $Env(AL)_i$ / / Al_{i+1}——$Env(AL)_{i+1}$

This gives us a mechanism for a distribution and mediation of formal systems which is not simply an abstract dissemination in the sense of labelled or indexed systems. This form of combining different formal systems involves from the very beginning the possibility of a semantic and pragmatic understanding of the mechanism of distribution and mediation, short dissemination (in the polycontextural sense). Such an understanding is not semantic in the usual sense, restricted to propositions, because it is based on the architectonics of the whole system, it has to be called an architectonic understanding, involving architectonic semantics and pragmatics.

5 Polycontextural logics

Until now we have disseminated logical systems over different loci, and this dissemination is ruled by the proemial relationship, and has the structure of chiasm.

Prepared with this distinction of system/environment we can develop a chiastic mechanism of interlocking and interwoven formal systems. A colored tissue of formalisms. If we take the concept of disseminated logics seriously we have to deal with the question of extending, over passing, transcending the scope of logic as such. There are many other strategies to overcome the expressional limits of classical logics.

The most important strategy is to introduce or to re-introduce into the formal apparatus all the linguistic, epistemological, ontological and so on particles which had been excluded in the development of symbolic or mathematical logic for formal-extensional reasons, that is to produce the concept of a formal logical proposition, which is something different than a linguistic sentence. This includes all sorts of interesting new logical particles or operators: from modal, temporal, deontic, eristic or erothetical, etc. to imperative, space-time, computational etc. operators.

This can be called as an extension from the inside of the original formal logical system, say propositional logic or First Order Logic (FOL). The new operators are more or less incorporated into the body of the classical system. We can call this a logification of the immanent parameters of a system. But the rationality and the laws of the basic logical system is preserved. The same happens, if we start the enlargement game not with logic but with the ultimate Lambda Calculus or with its cousin Combinatory Logic.

In contrast to this immanent strategy of extension there is also an attempt to extend logics from the outside. This can happen by attacking the limits of formal reasoning from the point of view of dialectics, hermeneutics, rhetorics, engineering, deconstructivism and many others.

Polycontextural logics are not heterodox, deviant, alternative or what ever logics neither attacking or criticizing existing logical systems.

Like in Derrida's Fines Homines, polycontextural logic has to be created at once from the inside and outside and neither-nor.

Nevertheless, there is another gentle (early) intro to some PCL ideas and formalisms.

RACSAM: 98, (1), 2004
número especial sobre
Computación Simbólica en Lógica e Inteligencia Artificial

Revista de la Real Academia de Ciencias

Jochen Pfalzgraf

On Logical Fiberings and Automated Deduction in Many-valued Logics Using Gröbner Bases.

http://racefyn.insde.es/Publicaciones/racsam/indices/vol98_1.htm
http://racefyn.insde.es/Publicaciones/racsam/art%C3%ADculos/racsam%2098_1/2004-pfalzgraf.pdf

6 Dov Gabbay: ``I am a logic" – what are you?

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6.1 LDS-`Perhaps this was it'

``In the literature, there have been instances of where labels were used. You had, for example, Anderson and Belnap who used labels to compute relevance. But labels were used only as a side effect. It was a bit like moving all the furniture against the wall because you want to wash the floor. It is a side effect of washing the floor, not redesigning the room. So people used labels, but not as a general method.

``I tried to see what happens if you put labelling into the logic, and then I saw that diverse systems begin to look similar. I thought that perhaps this was it. I gave some lectures, checked more systems, and then applied to the SERC (Science and Engineering Research Council) for a five years' sabbatical, to do labelled deductive systems. I got some projects; a project on labelled tableaux, a project on consequence relations, and started working on it. The motivation was to connect all these roads in the roundabout. Fibering systems, why we move from one system to another... Because this is what we do. This is intelligence.
If I say that she is a smart girl, I do not say that because she can do so many resolutions per second. I say that because she can move from one logic to another, one mode to another. It is not only power, but also the right adjustments; intelligence is a mixture of these things.

``I do not believe that there is a single logic, like classical logic. I look at how people reason, and that is the logic. In order to describe this logic you would have to have notations for action, notations for mechanisms. You should not look at a theory and what follows from it, but at a theory and how it develops. I think a logical system is really what AI people call agents. The whole matter comes into it, and that's a system: evolving, maybe continuously reacting systems. The way we are; I am a logic, each one of us is a logic (Gabbay, 1994). Someone said: `Each man is a world unto itself.' I say: `Each man is a logic unto himself.'

``Perhaps LDS (Labelled Deduction Systems) could be the framework to connect these different formalisms. LDS is a very flexible formalism. For example, if you take lambda calculus and you have an application area, then you have to translate the application area into lambda calculus formulas. With LDS, you look at the application, take some of the application area, name it and use it as labels. So you are bringing the semantics into the language, you help the natural logic in there. You can go with the application.

``LDS is not a single logic, it is a methodology, a framework in which you can bring things from the application area into whatever system you are doing. It means that you never necessarily have a clash between the formalism and the application. You do not have to bend the formalism to hack the application in. You don't have to do this, because you take from the application as labels and bring it in in that way.

``Consider Newtonian mechanics. It does not matter for Newtonian mechanics whether you invent relativistic mechanics before or after, because it is a limit case of relativity theory for low speeds. So if you get it before or after you know relativity, that does not matter. But if you take the steam engine: you don't want to look at a steam engine if you already have

> diesel. The question is whether LDS, or anything you put forward, is like a steam engine-when something better comes, you don't like it anymore-or it is like Newtonian mechanics, which is a limit case or part of something bigger. I believe that I am looking for some logical principles that people will use. I hope that some of the stuff that I isolated will be kept because I isolated the principles.
>
> ``I once followed a very strange course on meteorology. They had models of the atmosphere and stratosphere and how particles come from the sun and fall down again, all kinds of things like this. They had an ideal model, but they would show that it was wrong. Made a correction, and then made another correction... It looked like a suit with a lot of patches on it. And I always asked myself: `Don't they have a new model?' But that was all there was: so-and-so's correction, and another guy's correction. Maybe we are doing the same for the time. Until we have better theories."
>
> http://www.let.uu.nl/~Anne-Marie.Mineur/personal/Ta/Gabbay.html

6.2 What do you think about LDS as Fibred Logics?

"Fibering systems, why we move from one system to another... Because this is what we do."

Fibering systems inscribes the structure of p-analog moves from one logic to another logic. Proemiality is the operator which realizes, does, in concreto, these moves between logics. Fibring systems don't tell you how you are moving and will happen if you are moving. Fibring systems as fibring logics only tell you what happens if you move but not how you are moving. But don't forget, classic logics with its eternal and ultimate demands, give you no possibility of structural moves at all. Insofar, fibred logics are a great advance.

Because this is what we do.

Are we doing this? Who is we? Is it Ego to Ego moves or is it I to You interaction? What is the difference between the Ego-Ego- and the I-Thou-paradigm (Buber, Gunther)? Why do we not like the Ego-Ego-Solution? Simply because it presuppose and/or produces an ultimate Super-Ego as the common ground of all existing Egos. This Ego-Ego-Scheme is also working behind the scenes of the more friendly looking Ego-Alter-Ego-Concept of communication (Habermas).

"If I say that she is a smart girl, I do not say that because she can do so many resolutions per second. I say that because she can move from one logic to another, one mode to another."

That's the real ultimate power of the little girls of Sailor Moon. To change personality, to change unto another person. *"The way we are; I am a logic, each one of us is a logic."* This is to switch between logics, as wee witches are switching their appearance according their wishes and virtues.

The Ultimate Lambda Programming is something for Boys. They fear transformation and metamorphosis. They like iteration and ultimate recursion as the secure iterability of the eternal sameness.

Also their Lambda Power Sign involves some dynamics, it's the dynamic of the Wheel: the Eternal Return of the Same. The call and recall of the function itself. All this is nicely protected by the closure property of recursion. You can be sure, you will never get lost – in another world. Their desire for another world is ruled by the exceptional ritual of Hallowe'en. But Hallowe'en is an ASIF world and this is fundamentally different from the radical metamorphosis of the AZZA world. In an ASIF world you can feel secure to not to loose your identity, to not to change your very self. It's not real, it's only ASIF! Ask Hans Vaihinger, a German Philosopher (1852 –1933).

Magic girls, majokko, don't understand this safe world of iterability, they get immediately bored – and are quickly switching to another world, with another logic and another arithmetics. Where even numbers are transforming themselves unto other meanings. Wee witches don't like to understand, that this game of switching identities would be the perfect and ultimate Chaos for all the Boys, whatever age.

Patchwork of logics

And I always asked myself: `Don't they have a new model?' But that was all there was: so-and-so's correction, and another guy's correction. Maybe we are doing the same for the time. Until we have better theories.

Ultimate Theory of Unification

Until we have better theories.

Do we need such an Ultimate Unification? The ultimate new Fundamentalism? I don't think so. Do we therefore accept total relativism and nihilism? There is no need for that. What we need is an insight into the rules and mechanisms of translations, transformations and metamorphosis between logics, theories and world-views. But this is not a new theory, because it is between, beyond, beneath all this theories. The suit is then simply a very special patchwork, the one with only one patch. The suit is not primary and patches secondary. Also what's between the patches are neither parches nor the proper whole of the suit.

Patchwork of programming languages. To believe that category theory is the ultimate unificator, is simply mixing another patchwork to the whole. To have a nice overview with category theory is not more than to have another patch which is working as patching the patches – and even more.

Therefore:

LDS is not a single logic, it is a methodology, a framework in which you can bring things from the application area into whatever system you are doing.

``*I do not believe that there is a single logic, like classical logic.*

Dov M Gabbay who is a logic himself starts to shake up the hegemony of the ultimate classical logic. Does he shake himself up, is he swinging like his colleague Peter Padawitz?

7 Universal and Combining Logics - Sons&Daughters

7.1 Combining Logics

Carlos Caleiro
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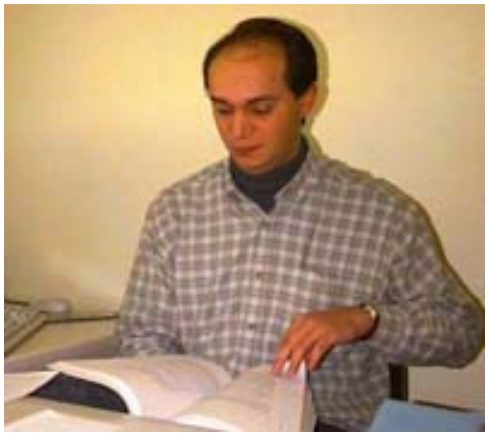

Combined logics are essential for reasoning about complex phenomena. Different aspects of a given phenomenon may be adequately dealt with using different logics, but a unique logic encompassing all these aspects and catering to the various ways they can possibly interact is certainly a goal to pursue. The motivations for this work come not only from practical problems, namely in the fields of knowledge representation, software engineering, or linguistics, but also from well-known examples (eg, multi-modal logics). We adopt a methodological abstract viewpoint that is concerned with general universal mechanisms for combining logics. Rather than focusing on the specific details of the combination of particular logics, we aim at rigorously defining a logic combination mechanism at the adequate level of abstraction and then establishing meaningful transference results that may be used in many situations. The typical questions to be asked and answered are:

* When does it make sense to combine two given logics and what is the result?
* If two logics with property P are combined does the resulting logic inherit the property P?

http://www.uni-log.org/one2.html

The important task in the combination of logics is to find the right level of abstraction related to the problem about the nature of logic.

グラスゴーの珍種ガレージ？

Go to Nice&Sleazy, Glasgow

7.2 One logic, two logics, many logics: logical plurality, logical pluralism and universal logic.

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Up to the end of the 19th century, logic was seen as the discipline governing correct reasoning, and in this sense it was not specific to any discipline or subject-matter (logic was seen as topic-neutral); moreover, even if there might be competing systems, the general opinion was that there should be only one true logic.

A hundred years later, the status of logic as a discipline has changed dramatically: we now have different logics, specially designed for certain situations, topics or tasks (what I call logical plurality), and the idea that there is only one correct way of reasoning and thus only one correct logic is no longer unanimously accepted (logical pluralism). In this context, a universal logic seems to be a welcome development: it should allow for the comparison between systems, and for the arbitration of the dispute between competing systems.

But important philosophical questions concerning universal logic must be dealt with, in particular the features that such a logic must have in order to legitimately play this role. In times of logical plurality and logical pluralism, can a logic still claim to be universal?

References

S. Haack, Philosophy of Logics. Cambridge University Press, 2000.
JC Beall and G. Restall, 'Logical Pluralism'. Australasian Journal of Philosophy, 78 (2000) 475–493.
J. Y. Béziau, 'Universal Logic'. In T. Childers & O. Majer (eds), Logica'94 -- Proceedings of the 8th International Symposium, Philosophia, Prague, pp. 73-93.

Universal logic is not a new logic, it is a way to unify this multiplicity of logics by developing general tools and concepts that can be applied to all logics.

http://www.unine.ch/unilog/

7.3 Combining Logics: Combination or Copulation?

Jean-Yves Béziau's paradox of combinging logics

Given two logics $L1$ and $L2$, let us call $L1 * L2$ the combination of $L1$ and $L2$ described by Gabbay, i.e. the smallest logic for the combined language which is a conservative extension of both $L1$ and $L2$. If we have a mechanism for combining semantics or proof systems, how can we be sure that this mechanism produces $L1 * L2$? If we have a technique to combine a Kripke semantics $K1$ generating a logic $L1$ and a Kripke semantics $K2$ generating a logic $L2$, we would like to be sure that the combination of $K1$ and $K2$ generates the combined logic $L1 * L2$. Modal logic is one of the favourite subject of logic combinators and it has been investigated since many years, so it is not surprising that people have found some techniques producing the expected result. But there are some other cases, where there is not yet a solution. The difficulty does not appear in a remote region of the logic land, e.g. the combination of super turbo polar fuzzy logics, but in a very simple case: good old classical propositional logic.

Consider the semantics SC for classical conjunction, given by the following usual condition: $b(F \wedge G) = 1$ iff $b(F) = 1$ and $b(G) = 1$. We call LC the consequence relation (logic, for short) generated by this condition using the usual method.

Similarly we consider the semantics SD for classical disjunction, given by the following usual condition: $b(F \vee G) = 1$ iff $b(F) = 1$ or $b(G) = 1$ and we call LD the generated logic.

Now if we put together the two conditions SC and SD in the natural way, we get a logic LCD which is not the expected one, it is not $LC * LD$, i.e. the smallest logic for the combined language which is a conservative extension of both LC and LD.

In the logic LCD generated by the combination of SC and SD, we have distributivity between conjunction and disjunction:

$(F \wedge G) \vee H \dashv\vdash (F \vee H) \wedge (G \vee H)$

$(F \vee G) \wedge H \dashv\vdash (F \wedge H) \vee (G \wedge H)$

The reader can check this with the truth-table method. But distributivity does not hold in LC LD by definition. Strangely enough, the combination of SC and SD produces something new, which was apparently neither in SC nor in SD. This kind of combination remembers biological phenomena and should perhaps better be called copulation. Note furthermore that here we have two logics which are presented in a very similar way, not heterogeneous presentations as suggested by Gabbay. So the challenge seems bigger than expected.
What can be said is that truth-functionality is not preserved by combination, since LC and LD are truth-functional (i.e. have a truth-functional semantics) but not LC * LD. The combination of SC and SD is a particular case of combination of logical matrices. What the paradox shows is that if we combine logical matrices in the natural way, we don't necessarily get what we want.

What shows the paradox here, is that if we put rules of two systems together, we may get more than expected, like if the rules were copulating.

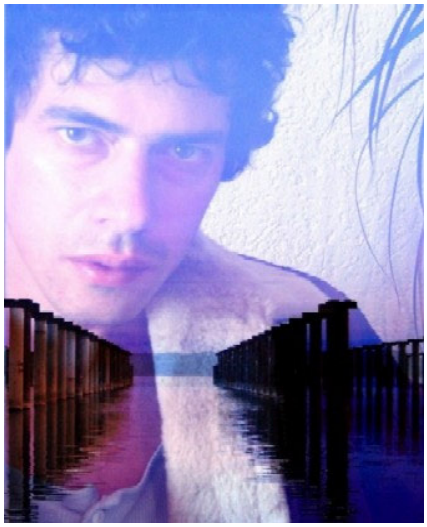
We may find several other examples where this kind of paradox appears. The paradox can-

be explained by the fact that in a semantics, or in a proof system, all features are not explicit. The implicit features may not manifest themselves isolately, but they may manifest, become active and produce something new by the combination process.

Combination then turns into productive copulation.

http://www.unine.ch/unilog/

Keywords:
combination, copulation, natural way, logical matrices, challenge, paradox.



Combining logics is therefore a misleading term, producing a lot of hype. Not logics are combined but logical systems based on a common logic as a common ground of combination.

"Even at the simplest level propositional based level, although it is well understood from a proof-theoretic perspective, fibred semantics is a hard problem." Caleiro, Diss, p.2

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http://www.unine.ch/unilog/
This website gives you a very interesting insight about the development of (paraconsisten and universal) logics in France, Brazil and Poland, and Switzerland, which is not well known in the US-english world.

The only point I missed was a discussion of the work of Raymond Smullyan about his Logical Frameworks which are a kind of a General Framework for logics of all kind. I remember that there was some priority claims by a Polish logician in the sense that Smullyan's Frameworks had been studied algebraically before.

Look at the website for:
SORITES, ISSN 1135-1349
Issue #12. May 2001. Pp. 5-32.
From Paraconsistent Logic to Universal Logic
by Jean-Yves Béziau

8 Grandfathers of Super-Additivity of Combining Logics

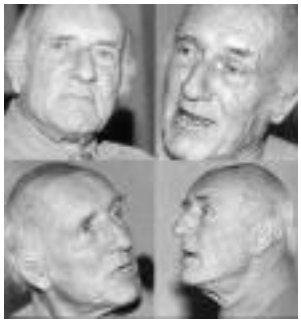
Coalitions, productive copulations, co-creations: the phenomenon of super-additvity.

8.1 Heinz von Foerster's Bio-Logic of Coalitions

Gotthard Günther, Formal Logic, Totality and The Super-additive Principle. BCL Report, 1966

Some progress has been made just the same. In a very relevant paper on biologic "coalitions" H. von Foerster has pointed out that such phenomena are characterized by what he calls, a super-additive nonlinear principle of composition where some measure Φ of the whole is more than the sum of the measures of its parts:

$$\Phi(x+y) > \Phi(x) + \Phi(y)$$



H. von Foerster´s argument cannot be repeated in detail. It will be sufficient to say that by applying the concept of "logical strength" (Carnap, Bar-Hillel) according to which a truth function increases its strength with the number of negative values it applies the author shows that a "coalition" of two statements A and B signifies such a super-additive principle. (Gunther)

Heinz von Foerster, Bio-Logic, Plenum Press, New York 1962.

8.2 Gotthard Gunther's Principle of Super-Additivity

But the introduction of a third value generates a new principle of superadditivity. In von Foerster´s case the super-additivity concerned only the increase of the classic negative value in a truth function. In the case of the founding-relation an increase in the number of two-valued systems is concerned. All "truth functions" of a three-valued system are compositions of three two-valued systems represented by the values 1+2, 2+3 and 1+3. For each value we might further add, we would obtain a new super-additive increase of (two-valued) systems. We can determine this increase in analogy to von Foerster´s formula $\Phi(x+y) > \Phi(x)+\Phi(y)$ by introducing the expression

$$\Phi(z) = 1/2z(z-1)$$

If z is composed of two terms, a and b, representing the poly-validity of two logical systems we have

$$z = a + b$$

The super-additivity we are looking for is then demonstrated by

$$1/2(a+b)(a+b-1) > 1/2a(a-1) + 1/2b(b-1)$$

where clearly the left hand side of this inequality exceeds the right hand side by

$$ab$$

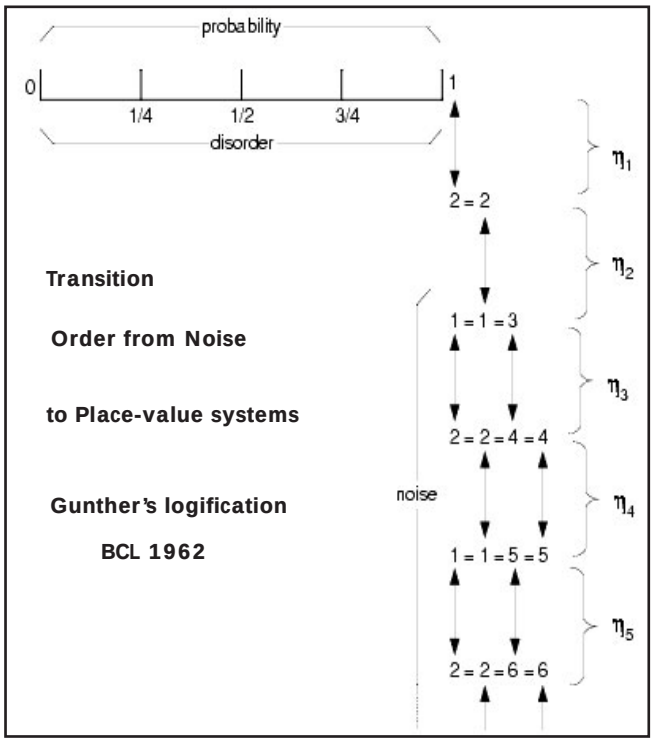
This is nothing other than the cross-term interaction of a and b. Thus a four-valued system which our impartial observer would require must consist of 6 two-valued systems of reflection. In the case of a five-valued logic this number would increase to 10 two-valued subsystems. (Gunther)

This super-additivity principle tells us that the number of subsystems in a combined, that is, mediated logic is higher then the number of its isolated parts. It does not yet characterize the new internal and interactive logical functions.

8.3 Heinz´s Order from Noise

Order from order.
Order from disorder.
Order from noise(=order and disorder).

The sentence "Order from order and disorder." is not entailing a propositional conjunction between order AND disorder. As a conjunction it would simply produce a contradiction A et non-A. What is introduced is an interplay between two different logical systems and viewpoints producing more a mediation than a combination. This approach is not properly modeled by paraconsistent logics despite the contradictionary definition of noise.



8.4 Gotthard Günther's Transjunctions

$Op\ (Log_1 + Log_2) > Op(Log_1) + Op(Log_2)$

Additionally to the super-additivity of combined logic in the sense of place-value systems or poly-contextural logics we observe an increase of logical operators, the transjunctions. Transjunctions are the logical operations between different logical systems, they represent the operations of interaction between different logics and are not included in the isolated logical systems. That is the combination of, say two logics with conjunction and disjunction, produces first 3 logical systems and second, additionally to the combinations of conjunction and disjunctions, the new transjunctions. There is no equivalent in the literature of combining or fibred logics in the sense of Gabbay et al. The only known exception is Pfalzgraf's interpretation of poly-contextural logics by fibre bundle theory.

The combinatorics of these additional operators is well studied by Hsien Na (1965) and reconstructed and programmed in ML by Thomas Mahler.

ML&Combinatorics&p-LISP: http://www.thinkartlab.com/pkl/tm/
Ad Gunther: http://www.vordenker.de/ggphilosophy/gg_bibliographie.htm

8.5 Combining vs. mediating logics

As we see, there is a significant difference between the idea and realization of combined logics and that of disseminated and mediated polycontextural logics. In this sense they are strictly different approaches dealing more with logical systems (modal, temporal, etc.) than genuine with logic.

The approach of fibred logics by Jochen Pfalzgraf seems to be the only exception. His category theoretic approach is formalizing a special aspect of polycontextural logics and is using the architectonic and operational super-additivity and especially transjunctions for different modellizations and applications developed in the framework of category theory (fibrings).

"…the key point in fibring is to be able to write formulas where connectives can be intertwined." Caleiro

We can finally define the fibring of deductive systems in formal terms.

DEFINITION 11. The *fibring of deductive systems* $\mathcal{D}'$ and $\mathcal{D}''$ denoted by

$$\mathcal{D}' + \mathcal{D}''$$

is the deductive system $\langle C, R_\ell, R_\mathbf{g}\rangle$ where $C_k = C'_k \cup C''_k$ for each $k \in \mathbb{N}$, and $R_\ell = R_\ell{}' \cup R_\ell{}''$ and $R_\mathbf{g} = R_\mathbf{g}{}' \cup R_\mathbf{g}{}''$.

Clearly, it makes sense to combine the signatures C' and C'' into a larger signature $C' \cup C''$, where all shared constructors appear in their common subsignature $C' \cap C''$. Indeed, we say that the fibring is *constrained* pre-

Gentle intro:
http://www.cs.math.ist.utl.pt/cs/clc/fibring.html
Technical surveys:

A. Sernadas, C. Sernadas, and C. Caleiro. Fibring of logics as a categorial construction. Journal of Logic and Computation, 9(2):149-179, 1999.
http://www.cs.math.ist.utl.pt/ftp/pub/SernadasA/98-SSC-fiblog.pdf
and
Fibring of logics as a universal construction.
http://wslc.math.ist.utl.pt/ftp/pub/SernadasC/04-CCRS-fiblog23.pdf.

Semantics for combining logics is hard. (Cajello)

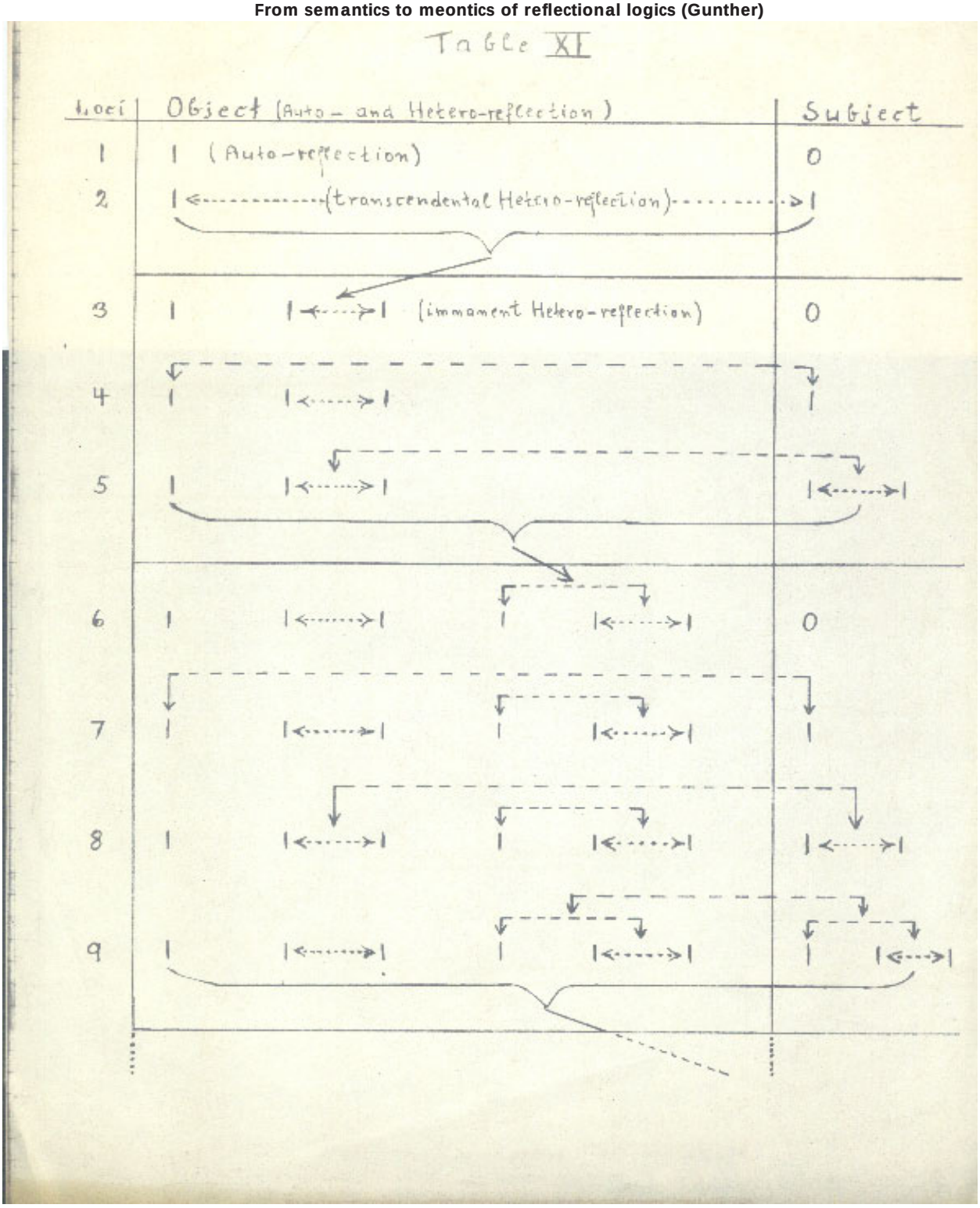
But it is hard in a double sense: hard conceptually, and hard from its combinatorics.

If we have a first idea about a semantic for fibred logics it turns out that category theory is not very helpful. What is suddenly needed is combinatorics to deal with very complex and complicated situations.

In a strict sense mediation of logics as in polycontextural logic is only a secondary application of a general mechanism of mediation ruled by the proemial relationship. Thus, mediation is properly applicable to consequence systems.

Contrary to the Combining Logics approach the distinction *local/global* is a basic architectonic concept of the whole formalism in polycontextural logics and is not to be reduced to modal logic constructs. This point is also clearly established by Pfalzgraf (1988) by his fibred/indexed distribution of logic systems. And, it was at the very beginning of Gunther's more conceptual and philosophical constructions of polycontextural logic. The transition from semantics to meontics, the distinction between negativity and non-designation are crucial examples.

From semantics to meontics of reflectional logics (Gunther)



GHOST TOWN

My name is Elena, I run this site and I don't sell anything in here and to tell the true, I don't have anything to sell. What I do have is my bike and this absolute freedom to ride it wherever curiosity and speed demon take me to.

http://www.fcdnet.org/chernobyl/chapter26.html
Ukraine 03187 Kiev-187 Zabolotnogo 20/A Post Box 25 Elena

8.5.1 Why do we not combine consequence systems?

REMARK 9. Our presentation could be situated at the level of a general theory of consequence relations, within what is known as general abstract logics, if we were not concerned with fibring. Usual consequence systems are not concerned with the structure of formulas, and so are not adequate as a starting point for fibring. In order to understand why, we now briefly introduce the theory of consequence relations. Let $\wp(X)$ be the powerset of a set X. As usual, given a set L of formulas, we say that $\triangleright \subseteq \wp(L) \times L$ defines a *(Tarskian) consequence relation* on L if the following clauses hold, for any formulas α and β, and subsets Γ and Δ of L (formulas and commas at the left-hand side of $\triangleright$ denote, as usual, sets and unions of sets of formulas):

- $\alpha \in \Gamma$ implies $\Gamma \triangleright \alpha$ (reflexivity);
- ($\Delta \triangleright \alpha$ and $\Delta \subseteq \Gamma$) implies $\Gamma \triangleright \alpha$ (monotonicity);
- ($\Delta \triangleright \alpha$ and $\Gamma, \alpha \triangleright \beta$) implies $\Gamma, \Delta \triangleright \beta$ (transitivity);
- ($\Delta \triangleright \alpha$ and ρ is a substitution) implies $\rho(\Delta) \triangleright \rho(\alpha)$ (structurality).

So, a logic could be seen as a structure of the form $\langle L, \triangleright \rangle$, containing a set of formulas and a consequence relation defined on this set. This structure will be called a *consequence system*.

The main difference between polycontextural dissemination of formalisms and combining (mixing, weaving, slicing) logics is grounded in the difference between a multi-versal and a uni-versal world view. The polycontextural options is obviously involved in a multitude of contextures. The universal logic approach is strictly mono-contextural.

Consequence systems are too poor for fibring, and not adequate, as mentioned before, since the key point in fibring is to be able to write formulas where connectives can be intertwined. For instance if we have two modal logics with $\Box'$ and $\Box''$ we want to be able in the fibring to write formulas like $((\Box'(\Box''\delta)) \Rightarrow \gamma)$ which does not belong to the union of the consequence systems associated with both logics. $\triangle$

In a polycontextural formalism consequence systems are not to poor for dissemination because the whole concept of consequence systems is distributed over a multitude of contextures. Thus, each contexture has intra-contexturally a consequence system with its internal reflexivity, monotonicity, transivity and structurality. This in isolation would produce only a restricted isolated parallelism of CSs. Additionally, trans-consequence operations are involved between different contextures which don't have the form of CS. These trans-contextural operators, super-operators, are rule-guiding interactivity and metamorphosis between logical systems, fibred or naked, without playing the role of a new meta-universal logic. With that in mind, we have established a quite clear distinction between the concept of combining logics and the strategy of disseminating formal systems. Combined and fibred logics are still embedded in the eternal sleep of ultimate mono-contexturality.

SUSHI'S LOGICS is/are a patchwork, mosaic&catalogue of epistemological pictures&patterns, reflections, hints&links.

8.5.2 Diagrams from the early beginnings

The following tables are simple examples from the very beginning of polycontextural logics, then called place-value systems, developed by Gotthard Gunther mainly at skiing in mountains of New Hampshire and then with bio-mathematical strength and the collaboration of Ross Ashby, Heinz von Foerster et al. in the early 60s at the famous pioneering BCL (Biological Computer Lab, Urbana, Ill, USA).

Place-value systems started in the late 50s as a new interpretation of multi-valued logics with the aim to give a semantic interpretation of all logical functions of m-valued logics.

First results: The composition/decomposition principle worked properly for unary and binary functions but not in general for n-ary connectives.

This, in the 60th, is not much, but it is more than the highly technical approach of today combining logics. Happily, the story went on and a general theory of mediation of formal systems of any kind is on the way to be developed. Thus, the example of combining semantic 2-valued logics is only a start and happens for didactical reasons only.

You can, if you want, switch from constructivist dialogical logic (Lorenzen, Game logics) to a combination of polylogics of any kind and mixed copulation and you have not to be restricted by logical matrices. But it wouldn't be bad if there would at least exist a working logical semantics for combined logics on just that simple base.

Diagramm 1 **Example of a simple semantic mediation**

Beispiel:

Variablen		S_1	S_2	S_3	Stellenwertjunktor
p	q	$\wedge_1$	$\wedge_2$	$\wedge_3$	$J = \wedge_1 \wedge_2 \wedge_3$
1	1	1	$\overline{VB_1}$	1	1
1	2	2			2
1	3			3	3
2	1	2			2
2	2	$2\ \overline{VB_2}\ 2$			2
2	3		3		3
3	1			3	3
3	2		3		3
3	3		$3\ \overline{VB_3}\ 3$		3

$J = \wedge_1 \wedge_2 \wedge_3$ in Matrixdarstellung:

J	1	2	3
1	(1)	2	3
2	2	(2)	3
3	3	3	(3)

This game of decomposition is based from the very beginning on the distinction between global and local. Globally you have a function with 3 values and two variables, locally you have decomposed this total 3-valued function in 3 two-valued (still total) functions. In the case of transjunction the game become more intricate and you have to decompose total functions into partial functions.

Obviously, some conditions have to be accepted: VB (Vermittlungsbedingungen).

Diagramm 2 **Violated conditions of mediation**

Beispiel: Die drei Junktoren j_1, j_2, j_3:

j_1	1	2
1	1	2
2	2	2

j_2	2	3
2	2	3
3	3	3

j_3	1	3
1	1	3
3	3	1

lassen sich nicht zu einem globalen Stellenwertjunktor zusammenfassen:

Variablen		S_1	S_2	S_3	Stellenwertjunktor
p	q	j_1	j_2	j_3	$J = j_1 j_2 j_3$
1	1	1	$\overline{VB_1}$	1	1
1	2	2			2
1	3			3	3
2	1	2			2
2	2	$2\overline{VB_2}2$			2
2	3		3		3
3	1			3	3
3	2		3		3
3	3		$3\overline{VB_3}1$		1,3

Some Combinatorics

Semantics for combined logics is hard, but combinatorics of combined constellations even harder. It begins with the simple question: How many logical operations do we have for a L(3,2) logic and how can they be classified in different categories?

Diagramm 3 **Number of logical functions for 2 variables and 3 values**

$$\begin{aligned} N_J(3) &= \sum_{i=1}^{3} S(3^2, i) \times P(3^2, i) \\ &= 1 \times 3 + 255 \times 6 + 3025 \times 6 \\ &= 19683. \end{aligned}$$

Allgemein ist:

$$N_J(n) = \sum_{i=1}^{n} S(n^2, i) \times P(n^2, i) = n^{(n^2)}.$$

Place-value systems are a very restricted case of polycontextural logics. They are limited by the very concept of a function which involves all sorts of identity principles. But they give at least a hint for further dealing with Béziau's paradox of combining logics.

Diagramm 4 **Classification and combinatorics of the morphogrammatics of L(2,3)**

G_i	$g\{3_i\}$	φ	Familie	σ	MP		**R**	**M**
			α^3	1		1	1	1
			$\alpha^2\beta$	9		1	2	2
			$\alpha^2\gamma$	3		1	3	3
			$\alpha\beta^2$	27	1+1 =	2	2	3
			$\alpha\beta\gamma$	18	2+1 =	3	3	4
G_1	1	10	$\alpha\gamma^2$	3	2+4+1 =	7	3	5
	○○○		β^3	27	1+3+1 =	5	2	4
			$\beta^2\gamma$	27	4+5+1 =	10	3	5
			$\beta\gamma^2$	9	4+14+8+1 =	27	3	6
			γ^3	1	4+32+38+12+1 =	87	3	7
			$\alpha\xi^2$	16		1	2	2
			$\alpha\xi\rho$	40		1	3	3
			$\alpha\xi\phi$	8		1	4	4
			$\alpha\rho^2$	25	1+1 =	2	3	4
			$\alpha\rho\phi$	10	2+1 =	3	4	5
			$\alpha\phi^2$	1	2+4+1 =	7	4	6
			$\beta\xi^2$	48	1+1 =	2	2	3
			$\beta\xi\rho$	120	2+1 =	3	3	4
			$\beta\xi\phi$	24	3+1 =	4	4	5
G_2	3	18	$\beta\rho^2$	75	2+4+1 =	7	3	5
	○○△		$\beta\rho\phi$	30	6+6+1 =	13	4	6
	○△○		$\beta\phi^2$	3	6+18+9+1 =	34	4	7
	○△△		$\gamma\xi^2$	16	2+1 =	3	3	4
			$\gamma\xi\rho$	40	2+4+1 =	7	3	5
			$\gamma\xi\phi$	8	6+6+1 =	13	4	6
			$\gamma\rho^2$	25	2+10+7+1 =	20	3	6
			$\gamma\rho\phi$	10	12+24+10+1 =	47	4	7
			$\gamma\phi^2$	1	12+60+54+14+1 =	141	4	8
			ξ^3	64		1	3	3
			$\xi^2\rho$	240	1+1 =	2	3	4
			$\xi^2\phi$	48	2+1 =	3	4	5
			$\xi\rho^2$	300	1+3+1 =	5	3	5
			$\xi\rho\phi$	120	4+5+1 =	10	4	6
g_3	1	10	$\xi\phi^2$	120	4+14+8+1 =	27	4	7
	○△□		ρ^3	125	1+7+6+1 =	15	3	6
			$\rho^2\phi$	75	8+19+9+1 =	37	4	7
			$\rho\phi^2$	15	8+46+46+13+1 =	114	4	8
			ϕ^3	1	8+100+184+98+18+1 =	409	4	9

Abbildung 8.4: Analyse der $L(2,3)$ Komposition nach [Na64], S. 112f.

9 Peter Padawitz's Swinging World

What I have pictured until now as Universal Logic and Combining Logics was mainly based mathematically on algebras and category theory. But the new obsession, as I called it in another paper, is co-algebra. Co-algebra is in some sense a dual concept to algebra, but as Peter Gumm clearly pointed out, it comes with some transformations, producing new and not simply dual concepts. Co-algebra is not only dual to algebra but in some sense also subversive to it. You have the choice to focus on its duality or more on its subversiveness; it's up to you.

9.1 Coalgebras, streams, interaction, duality

„New mathematical tools are needed to model stream-based computation, because inductive methods of definition and reasoning only work in domains of finite objects. The chief new notions are coinduction, coalgebras, and non-well-founded sets.

Inductive definitions provide three conditions:

(1) initiality,

(2) iteration, and

(3) minimality. (…)

While induction formalizes the metaphor of constructing finite structures from primitives, coinduction formalizes the observation metaphor of stream-based environments. Coinductive definitions eliminate the initiality condition of induction, and replace the minimality condition by a maximality condition. (…)

*Coinduction provides a mathematical framework for formalizing systems that interact with the external world though infinite interaction sequences. In addition to greatest fixpoints, the semantics of coinduction assumes lazy evaluation; the tokens of the stream are observed one at a time, rather than all at once. Hence, coinductive definitions permit us to consider the space of all processes as a well-defined set, even if the input streams are generated dynamically and cannot be predicted a priori.“ (*Dina Goldin und David Keil)

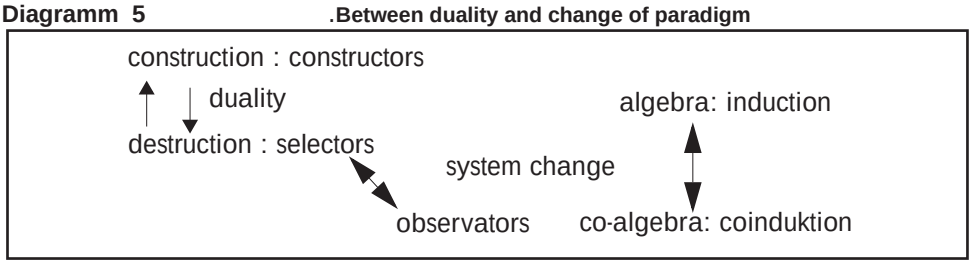
Algebra	Co-Algebra
induction initial constructor total algebra	co-induction final object destructor partial functions coalgebra
visible structure well founded Turing Machine Horn clauses	hidden behavior non well founded sets Persistent TM liveness axioms

9.2 Coalgebra, subversion, new paradigm of computing?

Algebras are describing the structure of computation, co-algebras are dealing with the streams of interactions between computing agents.

What does it mean for the paradigm of polycontextural logics?

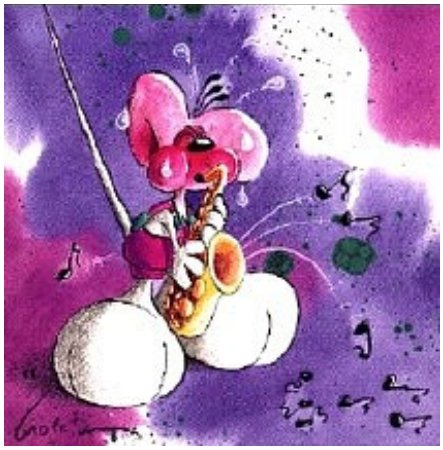
Diagramm 5 **.Between duality and change of paradigm**

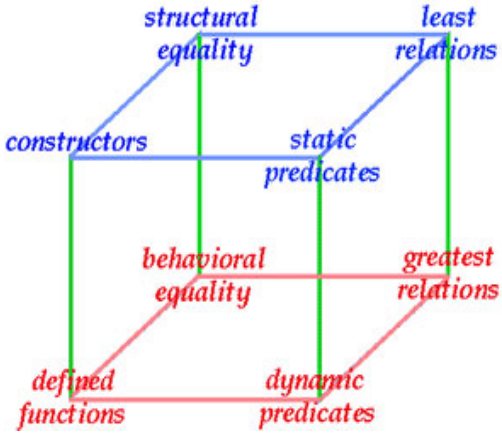


In a dynamic world we are living in it is not good enough simply to change the focus from algebra to co-algebra and to celebrate the new approach of co-algebraic thinking. A radically new possibility of dynamics is opened up by the interlocking mechanism, the ultimate switch between algebraic and co-algebraic ways of thinking and formalizing.

This enormous playful dynamics is especially needed in computer science. The ultimate tantra about the interplay of algebraic and co-algebraic approaches in general is written by the German computer scientist Peter Padawitz, the inventor of the swinging types.

9.3 The Swinging World in Computer Science





Swinging Types provide a specification and verification formalism for designing software in terms of many-sorted logic. Current formalisms, be they set- or order-theoretic, algebraic or coalgebraic, rule- or net-based, handle either static system components (in terms of functions or relations) or dynamic ones (in terms of transition systems) and either structural or behavioral aspects, while swinging types combine equational, Horn and modal logic for the purpose of applying computation and proof rules from all three logics.

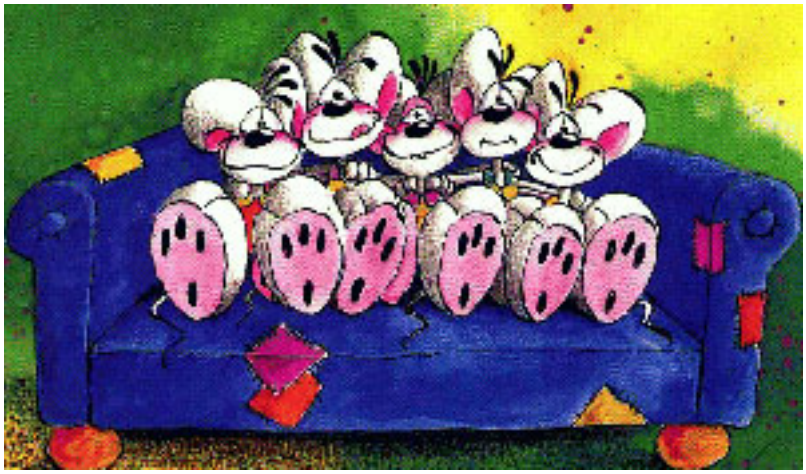
A swinging specification separates from each other visible sorts that denote domains of data identified by their structure; hidden sorts that denote domains of data identified by their behavior in response to observers; predicates (least relations) representing inductive(ly provable) properties of a system; and copredicates (greatest relations) representing

complementary ``coinductive'' properties, which often describe behavioral aspects ``in the infinity''.

A model that combines static with dynamic features and structural with behavioral aspects of a system is obtained naturally if all involved entities (objects, states, etc.) are presented as terms built up of constructors for visible or hidden sorts and if functions are specified by conditional equations (= functional programs), least relations by Horn clauses (= logic programs or transition system specifications) and greatest relations by co-Horn clauses. Term equivalences are either structural or behavioral, the former being least, the latter being greatest solutions of particular axioms derived from the type's signature.

Don't get confused! There is safety in these swinging dances, they are dualistic turns, there is a common ground, even a common logic, although many logical systems are freely involved, they are safe-guarded by one and only one basic logic: the dance parquet of the many-sorted logic.

Peter's Research Group at the university of Dortmund (Germany)



The Swinging World in Computer Science
http://ls5-www.cs.uni-dortmund.de/~peter/#2

9.4 Peter's philosophical tantra: Swinging Conclusion

Dualities are pure oppositions binary oppositions as structuralists have called them reductionistic models merely pure inventions picture puzzles of the digital brain. A duality describes two sides of the same thing and thus seldom reveals the separating and conversely the cooperating aspects of the two sides.

Polarities originate in the myth oriented metaphorical brain and mean acting and thinking in circles between poles that in contrast to dualities work together complement each other best illustrated by the Yin Yang symbol. Let s go back to Shakespeare or further to ancient Greece, India, Asia, America, Australia whatever you like when the dreamtime dramatic reigned when life was theater and theater was life when practitioners were actors and theoreticians were the audience watching either a tragedy or a comedy.

In the tragedy they recognized the upper semi circle getting up caught by the light working things out keeping control rising to the stars and when the goals were reached and the dreams came true the gods got envious robbed the clue to power and brought our poor human beings down to earth and death and darkness. The comedy described the lower semi circle the end as a beginning tears and twilight falling into sleep committing to dreams losing control making love listening to silence and all actions of the night playing disguising trying out roles joking jumping and dancing around performing transforming and nally nding oneself gaining control and waking up as a new person.

Here we have the dialectic of any evolution of any development. New structures new views new insights emerge from dark inscrutable black box processes. The night has no horizon everything is true everything is possible nevertheless much happens that will cause changes and crystallize into new forms. Natural and social sciences found the dialectic everywhere. So why should we not see a comedy in the way a greatest fixpoint gradually emerges from all relations. And in the way a behavioural equivalence first identies everything before step by step more and more things are separated from each other due to re ned observations and measurements. And is it not tragic how a least fixpoint takes an empty relation and builds up brick by brick visible and seizable structures high into the sky until they fall into vanishing pieces. As tragic as a derivable equivalence, first identies nothing before, step by step more and more things are made the same by brutally transforming them into each other.

http://ls5-www.cs.uni-dortmund.de/%7Epeter/Swinging.html

9.5 Peter's technical swinging tantra

„Initial structures are good for modelling constructor-based data types because they fit the intuition about these types and admit resolution- and rewrite-oriented inductive theorem proving. The corresponding specification and verification methods do not comply so well with non-free or permutative types such as sets, bags and maps and are still less appropriate when infinite structures like streams or processes come into play.

Non-free and infinite structure are better modelled as dynamic objects, which are identified through reactions upon actions (methods, messages, state transitions) rather than through constructors they might be built of. Extensional, contextual, behavioural, observational or bisimilarity relations model object equality and the suitable domains are final structures that are conservative with respect to visible subtypes. Consequently, a collection of data types and programs should be designed hierarchically as a "swinging" chain of specifications each of which extends its predecessor by either constructor types or action types.

Constructor types introduce the visible domains and come with inductively defined totalfunctions, structural equality and safety predicates with Horn clause axioms, while action types provide the hidden domains together with coinductively defined partial functions, behavioural equality and liveness predicates with liveness axioms that are dual to Horn clauses. A swinging specification is interpreted as a sequence of initial and final models. General proof rules capture this semantics and exploit the duality of induction and coinduction to its outmost extent.

The deductive tractability is further enhanced by making both constructor and action types amenable to rewrite oriented proof methods so that we can reason about swinging specifications in the same way we are used to reason about exclusively constructor-based types."

After another flooding.

http://www.fotocommunity.com/pc/pc/mypics/420981/display/1376319

10 How Universal is Universal Logic?

10.1 What is Universal Logic?

• In the same way that universal algebra is a general theory of algebraic structures, universal logic is a general theory of logical structures. During the 20th century, numerous logics have been created: intuitionistic logic, modal logic, many-valued logic, relevant logic, paraconsistent logic, non monotonic logic, etc. Universal logic is not a new logic, it is a way of unifying this multiplicity of logics by developing general tools and concepts that can be applied to all logics.

• One aim of universal logic is to determine the domain of validity of such and such metatheorem (e.g. the completeness theorem) and to give general formulations of metatheorems. This is very useful for applications and helps to make the distinction between what is really essential to a particular logic and what is not, and thus gives a better understanding of this particular logic. Universal logic can also be seen as a toolkit for producing a specific logic required for a given situation, e.g. a paraconsistent deontic temporal logic.

• Universal logic helps to clarify basic concepts explaining what is an extension and what is a deviation of a given logic, what does it mean for a logic to be equivalent or translatable into another one. It allows to give precise definitions of notions often discussed by philosophers: truth-functionality, extensionality, logical form, etc.

http://www.uni-log.org/one2.html

References

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*F.J. Pelletier & A. Urquhart. Synonymous Logics , Journal of Philosophical Logic, 32, 2003, pp. 259-285.

*Stephen Pollard. Homeomorphism and the Equivalence of Logical Systems, Notre Dame Journal of Formal Logic, 39, 1998, pp.422-435.

Also modern logic is proud to deny any roots in ontology and, say, cosmology, it is very difficult to see how logic could define itself as universal and unique, and therefore natural, without involvement into non-logical paradigms.

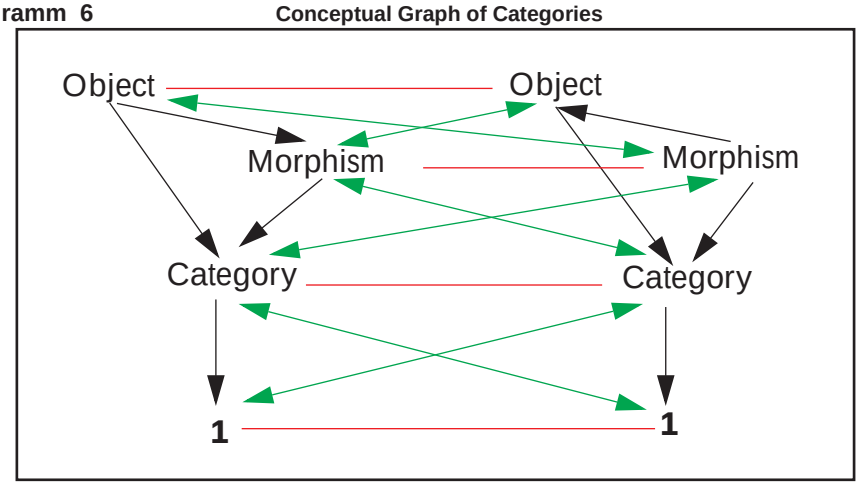
All known attempts to characterize a formalism, strategy or game as THE logic in general failed (Lorenzen, Lenk, Beth).

11 The Mechanism of Metamorphosis

Is swinging enough as a mechanism of metamorphosis and change? Is the Yin / Yang-world view strong enough to open up futures of unforeseen new horizons? Probably not.

11.1 Metamorphosis of categories

Diagramm 6 **Conceptual Graph of Categories**

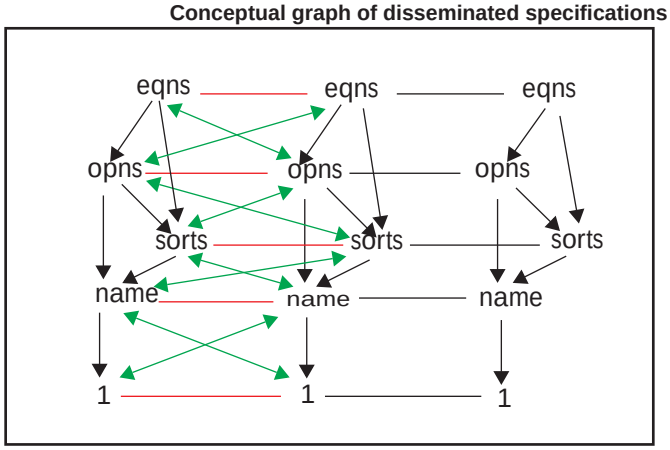


One of the most abstract notions in mathematics is that of a category in the sense of mathematical category theory. A category is defined by its objects and its morphisms based on the uniqueness of the notion. A polycontextural dissemination of categories opens up the possibility to apply category to itself. A conservative translation from one category to another is given by the one-to-one (ultra)morphism from the notion of objects to the notion of objects, and from morphisms to morphism, and from the notion category to the notion category, and finally from uniqueness to uniqueness.

Metamorphosis comes into play with the abandonment of this normality. Morphisms can change to objects or category or uniqueness. A less wild metamorphosis is the symmetric change: morphisms to objects and objects to morphisms, etc. This is known in rhetorics and ancient philosophy as chiasmus.

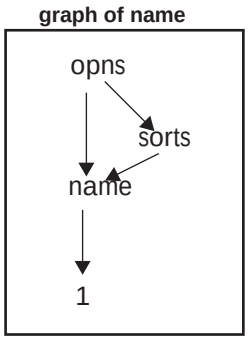
Abstract objects (algebras) as concretizations

Diagramm 7 **Conceptual graph of disseminated specifications**



A further concretization is achieved with the introduction of abstract algebras (objects) which are well known by logicians and computer scientists. I use the method of conceptual graphs.

Diagramm 8



The arrows in this diagram represents conceptual dependencies in the notion of abstract object with the name "name".

The notation

opns —> sorts

for example, means that:

the concept of opns varies as the concept of sorts varies.

In particular, it means that the concept of opns, the one that we have in mind, cannot be independent of the concept of sorts and neither can a particular opn be independent of its particular sort.

The notation

sorts —> name

means that the concept of sorts varies as the concept of name varies.

Therefore the notion of opns varies as the notion of name varies:

opns —> name.

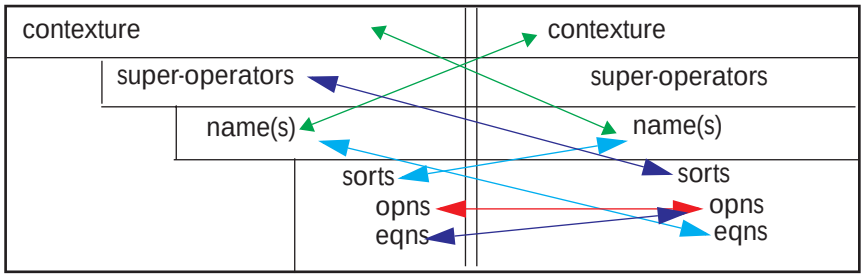
In a conceptual diagram, 1 represents the absolute. The notion

name —>1

expresses that the name notion is absolute, for it tells us that the name notion varies as the absolute varies – which is not at all.

Subgroups of the sorts "sort" are operations "opn" and equations "eqn".

Exemplify "name", say, with nat0, and you have the abstract object of natural numbers, here without the defining rules, only the abstract frame is given.



It seems to be natural in a multi-verse of metamorphosis to accept that there are at least the following operations of interaction between the systems to observe.

ID: *Identity*. Mappings of a system onto itself
RED: *Reduction*. Mappings of systems into other systems (Acceptance)
PERM: *Permutation*. Transversions between systems, exchange of positions
BIF: *Bifurcation*. Mappings of systems onto themselves & at once into others.

```
IDi:       (G1G2...Gi...Gn)    ===>  (G1G2...Gi...Gn)
PERMij:    (G1G2...Gi Gj...Gn) ===>  (G1G2...GjGi...Gn)
REDij:     (G1G2...Gi Gj...Gn) ===>  (G1G2...GiGi...Gn)
BIFi :    (G1G2...Gi...Gn)   ===> (G1G2...(Gi1...Gin)...Gn)
```

I call these additional operators *super-operators*. In contrast to the operators which are defined inside the system, e.g. *locally*, the superoperators are defined between the natural systems of a collection of cloned systems and are therefore of a *global* character.

11.2 Metamorphosis of abstract objects

•1 Chiasm of sorts and names: CHI (sorts, names)

This is similar to the chiasm of sorts and the universe (of sorts) in a many-sorted logic.

It seems not to be non-natural that a sort can change into a name of a new object and on the other side a name as being hierarchically superior to the sorts can change into a lower level object as a sort in another contexture.

But this seems to be an ordinary procedure for interacting systems. The conceptualizing process of different agents can differ exactly in the sense that for one agent the set of sorts or of one of the sorts of the other agent corresponds to the name, that is, the whole or contexture of his own system. In contrast, what is the whole scope of one agent can be a sort with many other sorts for another agent. There is nothing magic with that. And there is also no reason for unsolvable conflicts if both are aware about this situation and understand the mechanism of change between each other. This common understanding can be modelled or realized in a further system, without being forced to negate the differences between the two agents.

Sorts and names occurs on different levels of the conceptual hierarchy. The mechanism is generalization and reduction or specialization of concepts.

•2 Chiasm of sorts and operations: CHI (sorts, opns)

Sorts in one system can play the role of operations in another system. To build sort is then an operation which is not modelled in the former system. In this system, sorts are introduced by construction and not by operations. If sorts are produced by operations, that sorts are defined as operations, the product "sort" can be the notion "sort" including operations and equations in another system. Therefore, the hierarchy between sorts and operations is involved in a dynamic game of mutual definitions.

•3 Chiasm of unizity and names: CHI (unicity, names)

Unicity (uniqueness) can be understood as the *contexture* of the local abstract algebra. Classical theories have not to be concerned with their contexture and uniqueness because they are unique per se, that is they are mono-contextural. Because of their uniqueness there is no reason to notify it by a special term like 1.

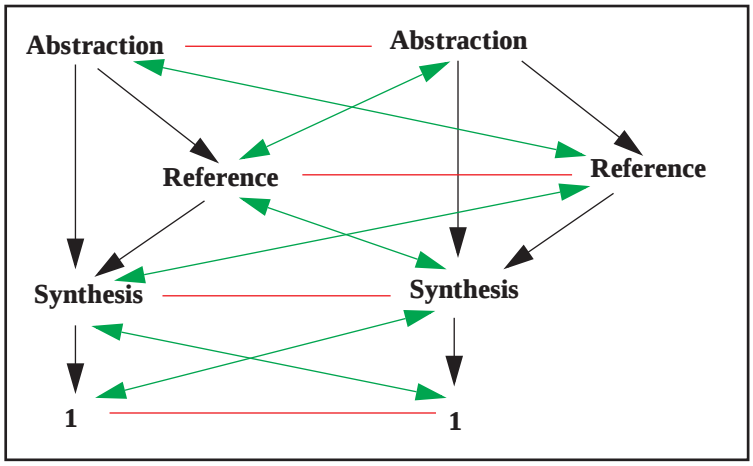
Because the uniqueness is absolute, every possible change of it has fundamental consequences for the whole framework of reasoning. The chiasm between the absolute unizity and the relativity of the names denies a simple mapping of the loci of the dif-

ferent systems onto the linearity of natural numbers. The chiasm between uniqueness and the other has no beginning and no end. The chiasm is the mechanism of change. To connect the different unitizes with numbers we have to abandon the idea of an initial object, a starting point of the number series. Natural numbers, as we understand them, are constructed by algebras, induction and initiality. As a first step, we can try to model the chiastic situation in the context of co-algebras, co-inductivity and finality. This chiastic way of thinking is closer to the metaphors of *streams* and flows, and the lack of ultimate beginnings and endings as origins and telos.

More precisely, we should think of the chiastic paradigm as an interlocking play of algebraic and co-algebraic strategies and methods.

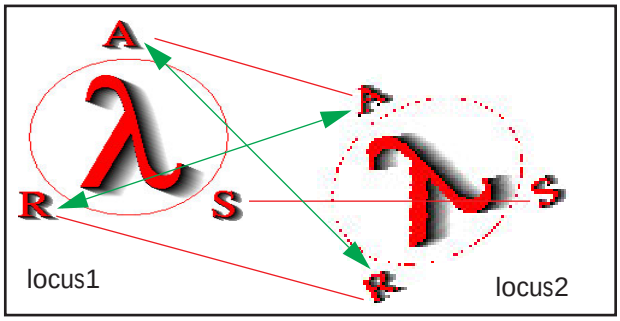
I really thought you would do it yourself!?

Remember the Ultimate Crystal ARS (A++)
***Abstraction: to give something a name,**
***+ Reference: to reference an abstraction by name,**
***+ Synthesis: to combine one abstraction with other abstractions.**



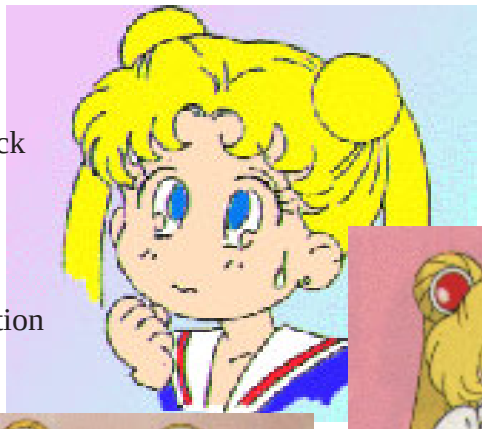
Make a conceptual diagram of ARS! Then distribute it! Mediate it with arrows of order, exchange and coincidence relations! Don't forget to mark the uniqueness of each A++ by, say, 1. What was the shadow of A++ at the locus1 is now a new crystal A++ at locus2. Both crystals are complete, but relativized in there hegemony, interacting together.

To simplify wordings, think of the concept of an operation with its operator, operands and uniqueness. From DERRIDA'S MACHINES you know things are more intricate, but this is a good start into the world of change. Ones abstraction becomes the others reference. What's my synthesis is your uniqueness, etc.: and all at once, simultaneously. Dispersions and fluidness of a multitude of autonomous A++ crystals in play.



11.3 Usagi transformation photo album

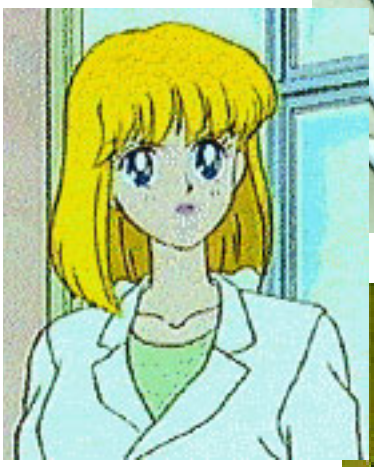
One day a strange black cat Luna appeared, gave me a strange transformation brooch...



Tsukino Usagi/ Sailor Moon

Super Sailor Moon

Ultra Sailor Moon



Eternal Sailor Moon

pictures of my other selves.

It is up to you to map these transformations onto the abstract formalism of metamorphosis!!

11.4 Is the AZZA-brooch enough?

Martin Jay: Speacking Azza
http://www.lrb.co.uk/v24/n23/jay_01_.html

Is there a plague of 'azza' thinking?

There's another problem with identity politics. Let's call it 'the azza problem'. It's not just society itself that's fragmented, we also have increasingly fragmented personal identities. Do I react to something as a white man, as a person with a visual handicap, as a Marxist, as an exile, as a musician, as a non-motorist, as a person in a cross-racial relationship, as a poor person with no savings, as a Japan-lover? I have many possible hats, and many possible -- and possibly conflicting -- interests. How many clubs and organisations do I have to join? How many political parties campaigning on single issues can I vote for? What does 'identity' mean if I can switch roles and alliances so quickly?

http://www.livejournal.com/users/imomus/2004/11/09/

tariqramadan - 03:57pm Dec 6, 2004 GMT (5.1)

The question of identity is a tricky one. We have to start by saying that we have a multidimensional identity that is never closed, always in a process of being built and rebuilt. The British Muslims have much in common with they fellow citizens and they have to build on these similarities and not to be obssessed with the differences. Within the ethical field they share many rquirements and hopes : justice, equality, less racism, les discriminations, more human brother and sisterhood. Within the cultural sphere the second and onward generations of Bristish Muslims are now British with many common tastes, ways of life and sense of humor. Let them build on that without forgetting the differences but without being obssessed by them...

http://talk.guardian.co.uk/WebX?14@2.ePwRdS70c5L.0@.7747890

"What does 'identity' mean..." The problem lies in our language. To speak about "switching roles" presuppose an identity which is neutral to the switches, an Ichpol (I pool or pole), an egological centre, which is holding the roles, that is the masks or hats. That is "I as X and I as Y and I...and I as X, means, I as X and as Y and...and as Z". Which is a one-to-many correspondence between the I and its different empirical realizations, say roles, masks or hats.

But what happens if this ego-centre is itself a mask or a hat? Identity as role and roles as identities? That is if we have: "I as X and X as I". And until now there is nothing like another I, or as an Other, which is not necessarily another I, but a Thou, which is an I only for her/himself but not for me. Switching identities is not switching roles and preserving identity. Switching identity is more a kind of incarnation as a form of metamorphosis. X is Y, seems to be an abbreviation of X azza Y is Z, where Z=Y.

This azza-statement can be connected with the so called contra-grammar "The X of Y is the Y of X". So, the ego of the mask is the mask of the ego. This leads to the well known figures of circular and antinomic thinking. In the best case to the so-called Circulus Creativus of Heinz von Foerster.

12 A little typology of world views

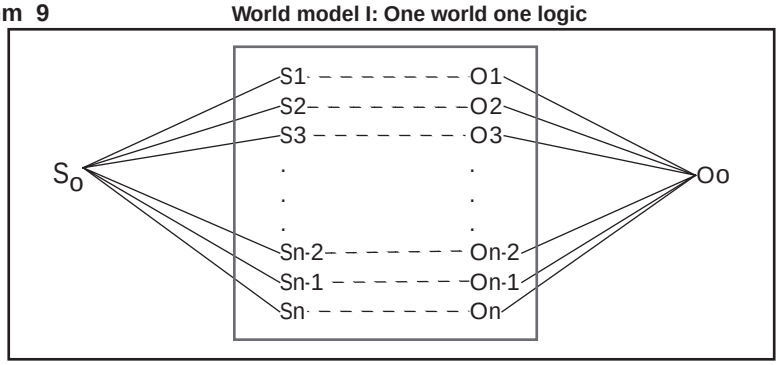
To clarify the wordings of ISIS, ASIF, AZZA and NINI a simple schematics of world views could be helpful.

12.1 The ISIS-world

One-to-one correspondence between ontology and logic (syntax and semantics).

Subjectivity as such So and objectivity as such O_0 are not accessible to empirical subjects S_i and empirical objects O_i. Both are the blind spots of the world model I.

Diagramm 9 **World model I: One world one logic**



S_o : Subjectivity, rationality, universal logic as such
O_o: Objectivity, reality, thingness (Ding an sich) as such
S_i : empirical subjects
O_i : empirical objects

Communication between subjects S_i and S_j about objects O_i and O_j are guaranted rationality and objectivity by their common reference to S_o and O_o.

World view I has the most stable and efficient form of communication of all world models because everything is stable, there is no ambiguity and no different points of view.

In this worl of ISIS Boolean Algebra is a main structure, and esp. the Double Negation Principle holds: non(nonX) = X. Simply because proof theory (subjective activity) and semantics (objective reality) goes hand in hand.

Metaphor: Rule- and reality-based proper car driving by humans or robots.

Tarski-World: Classic semantic propositional logic.

ISIS is logically a TARSKI-World.

Metamorphosis and mediation of plurality is reduced in world model I to one-to-one-translations based on singular unity of reality and rationality fulfilling Goguen's criteria for good semiotic morphisms.

> *"A good (semiotic) morphism should preserve as much of the structure in its source (sign) system as possible. Certainly it should map sorts to sorts, subsorts to subsorts, data sorts to data sorts, constants to constants, constructures to constructors., etc."*
> Goguen, Algebraic Semiotics, p. 11

Definition 2: Given sign systems S_1, S_2, a **semiotic morphism** $M: S_1 \rightarrow S_2$, from S_1 to S_2, consists of the following partial functions (all denoted M):

1. sorts of $S_1 \rightarrow$ sorts of S_2,
2. constructors of $S_1 \rightarrow$ constructors of S_2, and
3. predicates and functions of $S_1 \rightarrow$ predicates and functions of S_2,

such that

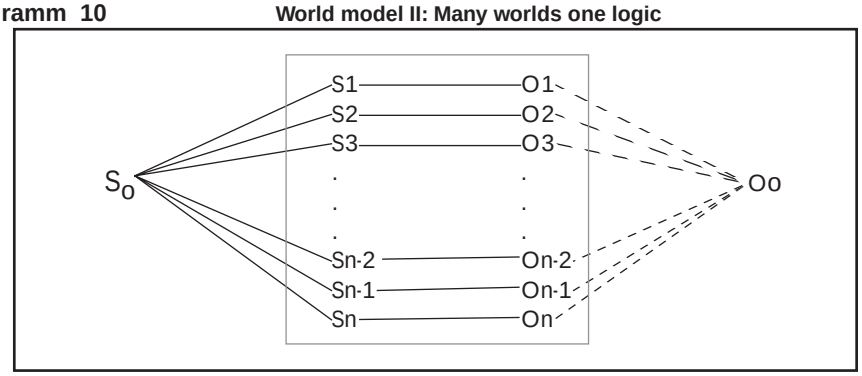
1. if $s \leq s'$ then $M(s) \leq M(s')$,
2. if $c: s_1...s_k \rightarrow s$ is a constructor (or function) of S_1, then (if defined) $M(c): M(s_1)...M(s_k) \rightarrow M(s)$ is a constructor (or function) of S_2,
3. if $p: s_1...s_k$ is a predicate of S_1, then (if defined) $M(p): M(s_1)...M(s_k)$ is a predicate of S_2, and
4. M is the identity on all sorts and operations for data in S_1.

More generally, a semiotic morphism can map source system constructors and predicates to compound terms defined in the target system[13]. □

12.2 The ASIF-world

Many-to-one correspondence between ontology and logics.

Diagramm 10 **World model II: Many worlds one logic**



Intuitionist negation

You have to proof your statements because you cannot presuppose a general pre-given reality and objectivity as in the ISIS-world.

Therefore the principle of double negation doesn't hold.

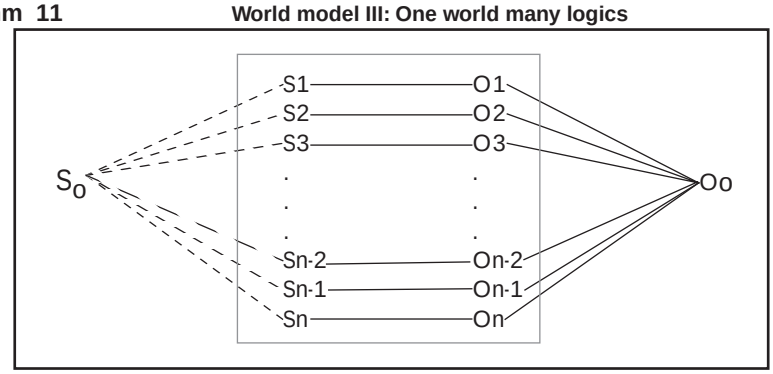
Kripke, Modal logics

ASIF is logically a KRIPKE-World.

12.3 The AZZA-world

One-to-many correspondence between ontologies and logic.

Diagramm 11 **World model III: One world many logics**



AZZA is logically a GROSSETEST-World

Do you know Grossetest? Probably not. But you surely know Carlos Castaneda or some ethnological work by others: there is no problem to be different beings at once.

Today we should be able to realize that there are many different realities at once and non of them has a priority.

A text as a program, a text as a data, different realities. What *is* the reality of a text? What IS the reality of textuality; now we know, even the form of the question is profoundly misleading. A text is not a potato! We are in the wrong box! Its not world view number I. Change your world view and reformulate your question again.

Because the AZZA-world is still difficult to understand the data/program example would mostly be interpreted as an ASIF-world member and therefore modeled in a Kripke-logic. This is for sure better than to put it into box number one.

The ASIF-world view is full of phantasy and phantasms, AZZA is the world of magic and transformation.

AZZA is the world of Ultimate Super Sailor Moon, the veritable MAJOKKO.

12.4 The NINI-world

Many-to-many correspondence between ontologies and logics.

neither-nor
both-and

Deconstructivism is working mainly with a NINI-strategy of argumentation. Ni-Ni (neither-nor) is not necessarily a logical operation like the Sheffer-Stroke as many deconstructivists belief, it is of more general value and also used in non-logical contexts. It is more a kind double negation (renversement / deplacement) and rejection (Verwerfung) than a logical negation or Sheffer's neither-nor, which is a clean operation of propositional logic.

Diagramm 12 **World model IV, step one: Destruction and Negation**

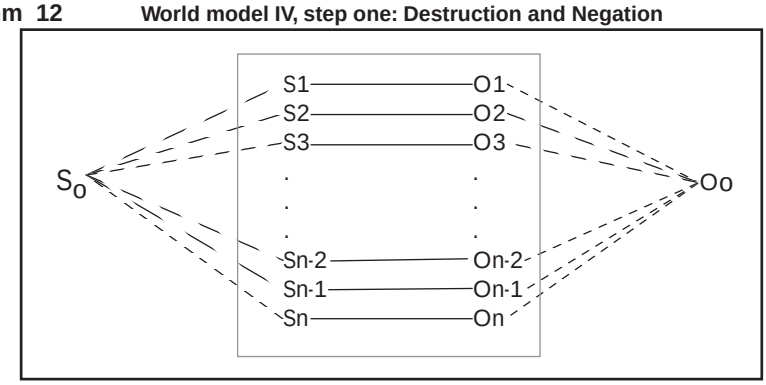
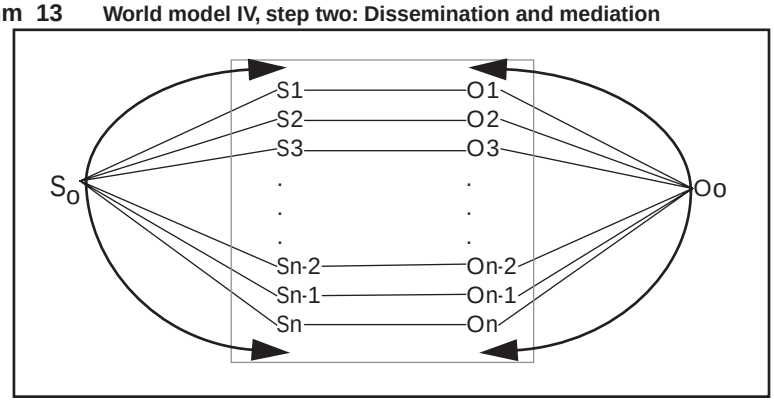


Diagramm 13 **World model IV, step two: Dissemination and mediation**



Dissemination is affirmation or acceptance of a multitude of logical and ontological systems and their distribution and their super-additive mediation.

NINI is logically a DERRIDA-World

Because of the inherent ambiguity and complexity of world model IV it can not be modeled by a single non-ambigue figure. At least two different models which are involved in a complementary interplay are needed.

All biological systems are of this kind of complexity. There is no living system independent of its environment and, what seems not to be easy to understand, there is no environment without living systems.

Look at AL, all these nice games are disambiguated from the very beginning. Look at Edkins Universal Cellular Automata Machine, no environment at all!

12.5 The togetherness of the 4 world views

CHI is the eternal&natural, ultimate&dynamic, universal&historical interplay of all 4 world views.

CHI is logically a GUNTHER-World;
or simply: (Y)OUR-world?

How does it work? The proemial relationship may give a first insight.

13 Professor Gunther's Proemial Relationship

A very first step in the direction of modelling subjectivity as a mechanism of switching identities was made by the philosopher Gotthard Gunther with his idea of a *„proemial relationship“* introduced in „Cognition and Volition“ (1970).

„In order to obtain a general formula for the connection between cognition and volition we will have to ask a final question. It is: How could the distinction between form and content be reflected in any sort of logical algorithm if the classic tradition of logic insists that in all logical relations that are used in abstract calculi the division between form and content is absolute? The answer is: we have to introduce an operator (not admissible in classic logic) which exchanges form and content. In order to do so we have to distinguish clearly between three basic concepts. We must not confuse

a relation
a relationship (the relator)
the relatum.

The relata are the entities which are connected by a relationship, the relator, and the total of a relationship and the relata forms a relation. The latter consequently includes both, a relator and the relata.

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

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

„Neither exchange nor ordered relation would be conceivable to us unless our subjectivity could establish a relationship between a relator in general and an individual relatum. Thus the proemial relationship provides a deeper foundation of logic as an abstract potential from which the classic relations of symmetrical exchange and proportioned order emerge.

It does so, because the proemial relationship constitutes relation as such; it defines the difference between relation and unity - or, which is the same - between a distinction and what is distinguished, which is again the same as the difference between subject and object.

It should be clear from what has been said that the proemial relationship crosses the distinction between form and matter, it relativizes their difference; what is matter (content) may become form, and what is form may be reduced to the status of mere „materiality“.

„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. If we apply that to the relation which a system of subjectivity has with its environment we may say that cognition and volition are for a subject exchangeable attitudes to establish contact but also keep distance from the world into which it is born. 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

What does the picture of Gunther skiing telling us: two skis, two sticks, two legs+arms – the constituents of the proemial relationship. But what's about the shadow? Is it the kenoma of the dynamics of proemiality? The pre-semiotic inscription of the ultimate emptiness of chiasms?

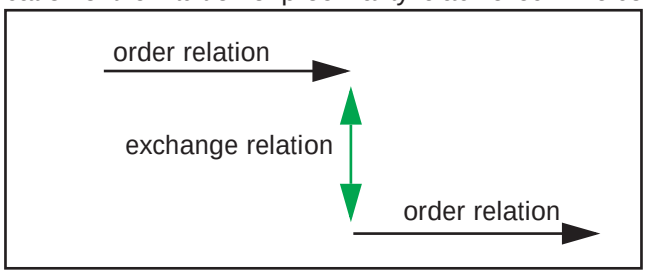
(Look at the movie: Thomas Schmitt, FREISTIL, oder die SEINSMASCHINE, Cologne 1991; at http://www.vordenker.de/ggphilosophy/freistil.htm)

And look at his shadow and listen to his breath (Atem) searching his way in and trough the unversal labyrinth.

13.1 My personal explanations of the professors idea of proemiality

The proemial relationship is therefore at first an interlocking mechanism of the two concepts of exchange and order or symmetry and asymmetry.

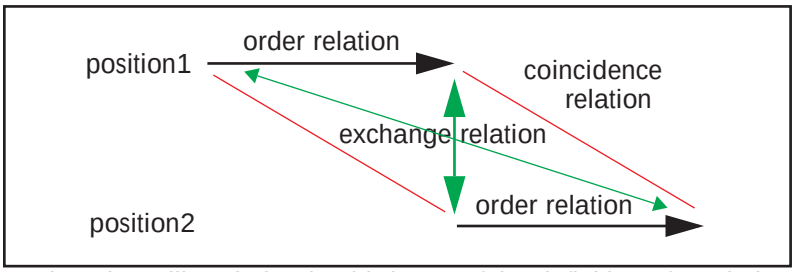
A further explication of the intuition of proemiality is achieved if we consider the fact



that the objects, the relator and the relata of the relations, have to fit together in a categorical sense. There is a similarity of the relators of different levels as well as for the relata of different levels in the sense that the different relators are relators and not something else. And the relata on each level are relata and not relators. For that I introduce the *coincidence relation*, which designates categorical sameness (likeness, similitude).

To finish the picture I introduce the exchange relation between the „first" and the „last" element of the interlocking mechanism of order and exchange relations. As a last step I mention the position, the *logical locus*, of the order relations according to the *„higher or lower logical orders".*

PrObj = (Obj; Ord, Exch, Coin, Pos)



But this explanation still excludes the third term of the definition of a relation, the relation itself. Remember: *We must not confuse a relation, a relationship (the relator), the relatum.*

And finally I consider the fact that there is one and only one concept of relation and relationality under consideration. therefore the concept of relation is based on *uniqueness*, represented by 1. This is surely not a harmless statement, it suppose something like a common intuition of relationality or operativity which finds itself explained and formalized in some mathematical constructions which are accepted by the scientific community. Therefore, Gunthers chain "a *relation, a relationship (the relator), the relatum"* has to be completed by the very concept of relation, that is, *relationality* based in *unicity* (uniqueness, singularity).

The full-fledged explanation, without the arrow "relation—>relationality", of the proemial relation over two loci is given by its conceptual graph. The scenario is the same for the distribution and mediation of other concepts, like operations, functions, categories, institutions etc.

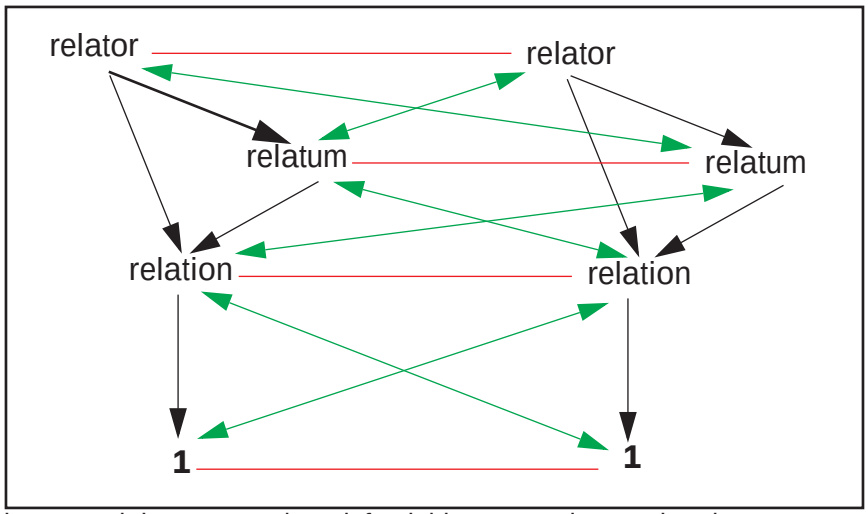
A further concretization of the theory of proemiality would be achieved with the

study of the structure between the different contextures, that is the structure of the distribution of the different loci, symbolizing singularity. We would have to deal with the distribution of the singularities over the kenogrammatical systems (grids) of proto-, deutero- and trito-structure. This would allow to introduce kenogrammatical differences between the disseminated contexturalities. Insofar the contexturalities are studied in their neutrality characterized by their singularity.

Thus the definition has to be expanded to:

PrObj = (Obj; Ord, Exch, Coin, Pos)

with Obj = { relator, relatum, relation, relationality, unicity}



In this context it is not my task to defend this construction against the many attempts to reduce it to something else. To go further in the game I make the option that it will be useful for developing some new mechanisms of combining abstract objects like institutions, logics, arithmetics, category theories and more. In exercising this game the new intuition will shape itself into a more academic form.

After having introduced the idea of proemiality it would be possible to formalize it further and to develop a preliminary theory of proemiality, also sometimes called *chiastics* or *theory of mediation*.

The main thesis, therefore, is that proemiality offers a mechanism of combining institutions which doesn't belong to the universe of combining categories.

This mechanism of combining institutions, e.g. distribution and mediation, is fundamentally different from the classical ones. Despite of this difference this strategy is in no contradiction or opposition to the known principles of combining systems of logics.

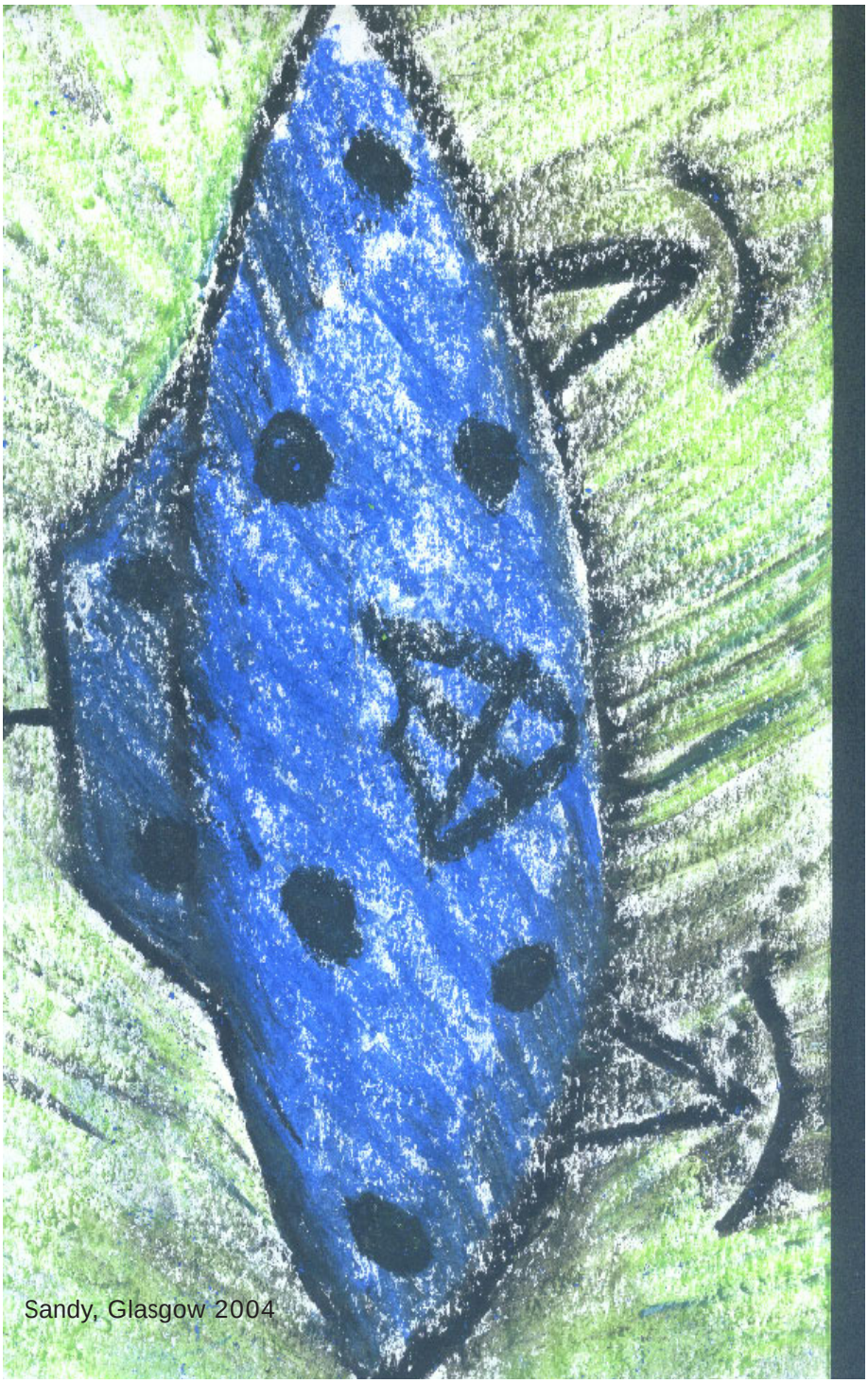
It is simply something different and the clue would be to explain this difference in full.

Don´t confuse the exchange of relator and relatum of a relation in the mechanism of the proemial relationship with the superposition of relator and relation in relational logics. There is no problem to apply a relator, or a operator or a functor to the result of a relation or operation or function as e.g. in recursion theory or in meta-level hierarchies.

Metaphor

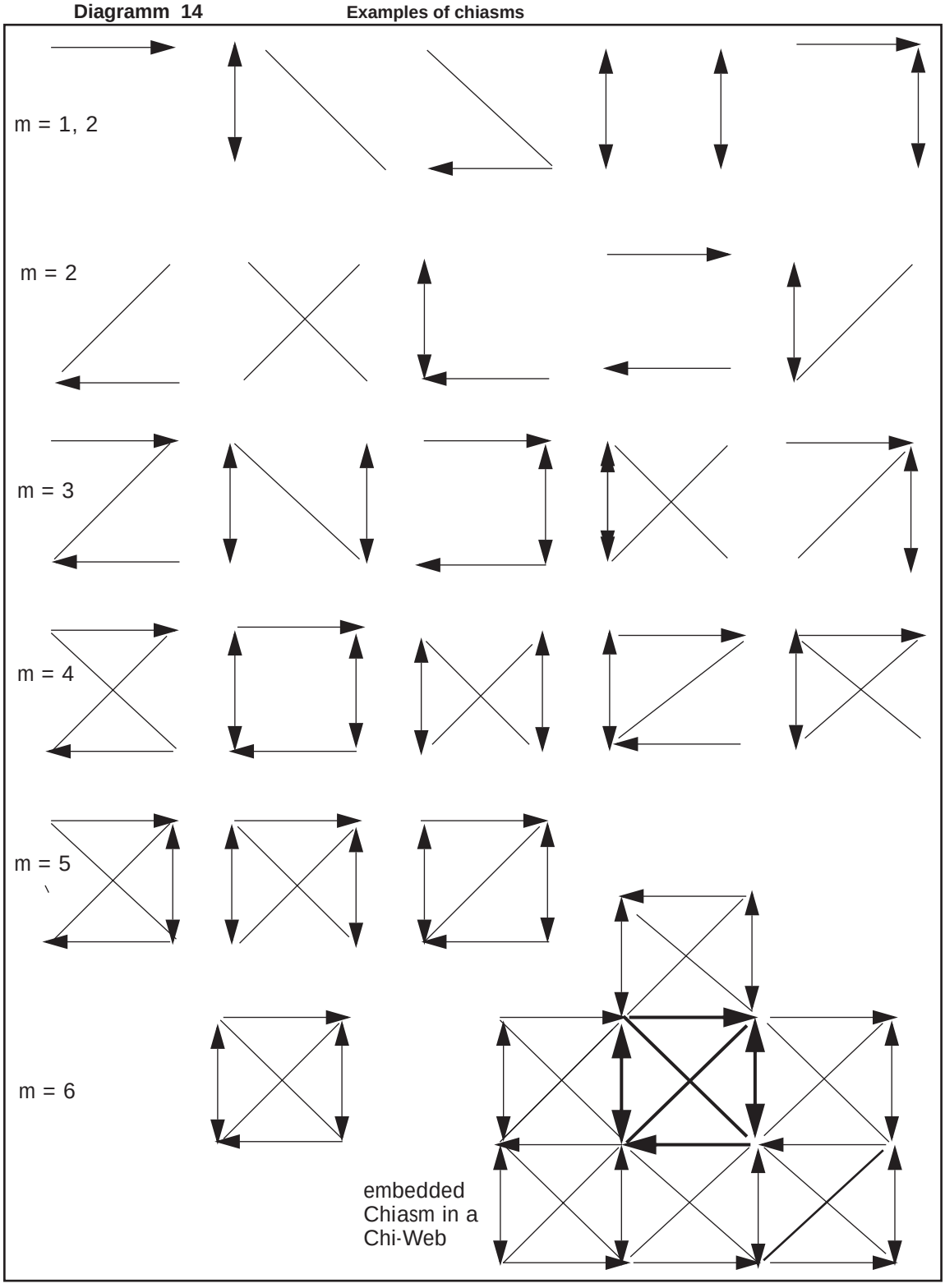
If we proemialize the linguistic subject-object-relation of a sentence we shouldn't hesitate to be strictly structural.

The example is borrowed from Heinz von Foerster.


Sandy, Glasgow 2004

"The horse is gallopping" (Das Pferd galopiert), the interchanged sentence can only be *"The gallop is horsing"* (Der Gallop pferdet). Nobody supposed that we are doing analytic philosophy. But what is missing in von Foerster's example is the mechanism how these transformation is working. First, proemiality explains that both sentence are valid at once. That is, both linguistic systems which are producing each of it the two sentences are simultaneously valid. Second, proemiality explains which conditions have to be fulfilled to make the transformation working. That is, exchange between (horse, galloping and gallop, horsing) and the structural coincidence condition between (horse, gallop and galloping, horsing). And for each sentence, obviously, the order relation between (horse, galloping and gallop, horsing).

Diagramm 14 **Examples of chiasms**



14 Let's learn some buzz words and definitions!

To feel more convenient in all these different worlds of AZZA, ASIF and NINI it is helpful to learn some new words from our dictionaries. We are surely fit for the ISIS-words. Good definitions are good weapons! We need them everywhere.

The strategy *morphism versus dissemination,* that is the difference between the Ultimate Crystal Power and the Dispersion of the Magical Crystal Powder, has to be set into a more explicit terminological network. Don't confuse crystal with cristal! It is not my aim to give an extensive linguistic and philosophic explanation of these terms only some more hints for orientation and clarification.

Terms like objects (systems), morphisms, structures, metamorphisms, heteromorphisms may hint to the main topics of a theory of polycontexturality.

Morphisms are translations conserving the abstract structure of their objects. Categorial distinctions and the tectonics of the situations under considerations are not touched or transformed.

Metamorphisms are transformations in the framework of a scenario which are not conserving but exchanging the categorical structures but remaining in the frame of the situation under consideration.

Heteromorphisms are not only including the possibility of conservative translations by morphisms and transformations by metamorphisms but are also changing the whole framework of the considered scenario by developing new structures surpassing the limits of the given situation.

In other contexts I used the term dissemination instead of heteromorphism for the abstract situation of creating new features and patterns of systems. Another term with a more ontological focus I use is *co-creation*. Similar terms are also *emergence* or *category of the new* (Gunther). Co-creation emphasis the aspect that the new (novum) is created in the process of interaction with the environment of a system. To recognize the otherness of the other is another topic of heteromorphism and heterological thinking.

Heteromorphosis

Heteromorphosis [Gr. eteros, other, + morphe, shape]: Ger. Heteromorphose;Fr. hétéromorphose; Ital. eteromorfosi.

The production by some organisms, under the stimulus of external forces, of organs or parts where such do not occur normally.

REGENERATION (q.v.) is the reproduction of parts which have been lost; whereas heteromorphosis is the production of parts unlike those which have been lost, as the replacing of eye-stalks by antennary structures.

If, for example, Tubularia mesembryanthemum, a hydroid polyp with stalk, head, and base, have its base and head removed and be then placed in the sand inverted (i.e. with the head end buried), the other end produces a head in a position which is abnormal.

Literature: the term was proposed by LOEB, Untersuchungen zur physiologischen Morphologie der Thiere, Organbildung u. Wachsthum, Heft 122 (1892-3); C. HERBST, Ueber die Regeneration von antennenähnlichen Organen, Arch. f. Entwicklungsmech., ii (1896). (C.LL.M.)

http://psychclassics.yorku.ca/Baldwin/Dictionary/defs/H3defs.htm

The logical and philosophical use of terms like heteromorphisms and heterarchy should also be connected to the transcendental-logical tradition of heterology of the German and Japanese post-Kantian philosophy (Rickert, Werner Flach, Nishida).

Interestingly, these terms (heteromorphosis, metamorphisms, heterology) are well known in classical biology but not in modern theories of living systems. Probably because these terms are not used in an abstract and mathematical sense which would correspond with, say, category theory. Maybe Robert Rosen with his *anticipatory* systems is an exception.

For example heterology

Het`er`ol´o`gy

Noun

1.**heterology** - (biology) the lack of correspondence of apparently similar body parts

dissimilarity, unsimilarity - the quality of being dissimilar

biological science, biology - the science that studies living organisms

Or more explicit.

Heterology

(n.) The absence of correspondence, or relation, in type of structure; lack of analogy between parts, owing to their being composed of different elements, or of like elements in different proportions; variation in structure from the normal form; -- opposed to homology.

(n.) The connection or relation of bodies which have partial identity of composition, but different characteristics and properties; the relation existing between derivatives of the same substance, or of the analogous members of different series; as, ethane, ethyl alcohol, acetic aldehyde, and acetic acid are in heterology with each other, though each in at the same time a member of a distinct homologous series. Cf. Homology.

http://www.brainydictionary.com/words/he/heterology173238.html

Here in contrary, I try to introduce these terms as new (post)category theoretic constructs applicable to computing.

Metamorphosis of Gregor Samsa

Franz Kafka, Gregor Samsa. This example shows perfectly how metamorphosis is working: a radical transformation of the object but keeping intact the scenario in which it happens and its personal subjective identity realized by his name Gregor Samsa. Until the young female room cleaner ended the story. So, metamorphosis isn't enough!

Met`a`mor´pho`sis

Noun

1.**metamorphosis** - the marked and rapid transformation of a larva into an adult that occurs in some animals

metabolism

hemimetabolism, hemimetaboly, hemimetamorphosis - incomplete or partial metamorphosis in insects

holometabolism, holometaboly - complete metamorphosis in insects

biological process, organic process - a process occurring in living organisms

2.**metamorphosis** - a striking change in appearance or character or circumstances; "the metamorphosis of the old house into something new and exciting"

transfiguration

revision, *alteration* - the act of revising or altering (involving reconsideration and modification); "it would require a drastic revision of his opinion"

3.**metamorphosis** - a complete change of physical form or substance especially as by magic or witchcraft
translation, *transformation* - the act of changing in form or shape or appearance; "a photograph is a translation of a scene onto a two-dimensional surface"
http://www.thefreedictionary.com/metamorphosis

But it should be mentioned, and not necessarily accepted, that the German use of this term is, as many other thoughts too, lost and disappeared in the mist of history and the new use of the term has to be recognized.

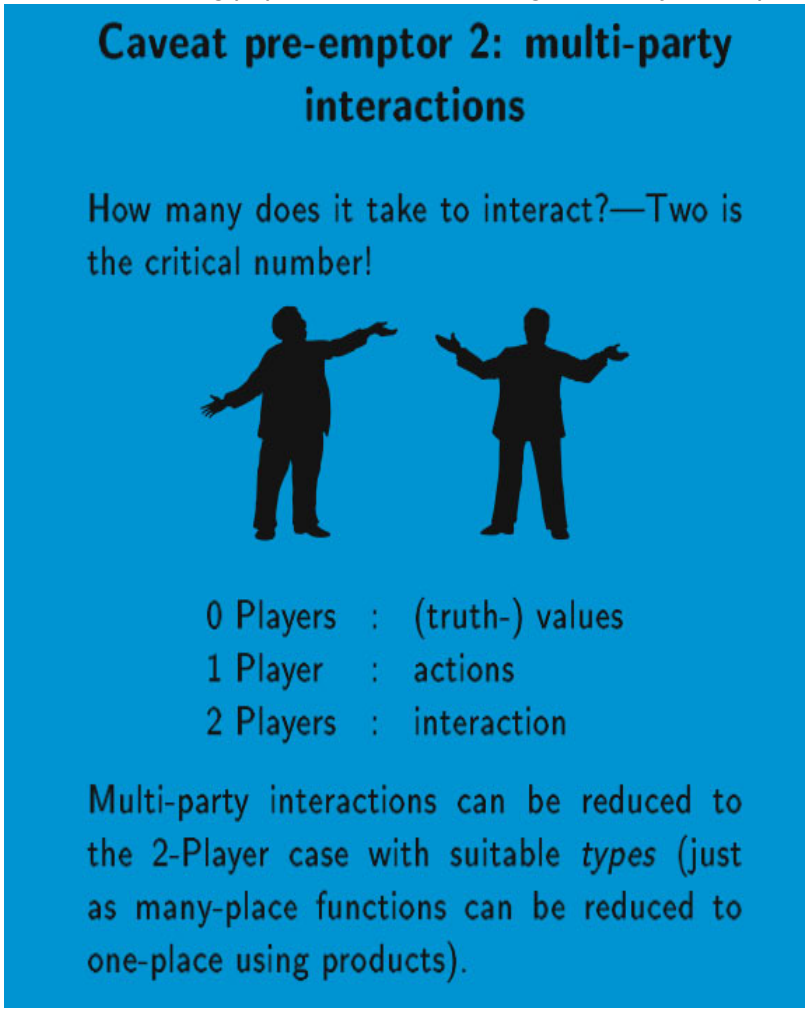
The term was in fact first used by the French novelist and essayist Georges Bataille, to describe the analysis or "science of the heterogeneous". Heterology analyses those "things and practices which are subject to prohibition and censorship" and which do not fit into the everyday mainstream world. It addresses the experience of limits and the transgression of those limits and strenuously rejects what Pefanis describes as "the homogeneous body: be this body political, textual ... corporeal" or social.
http://www.qut.edu.au/edu/cpol/foucault/heterology.html

A much more radical heterological thinking and writing can be found in the work of Levinas and Derrida.

15 Naturalness: The Ultimate Reduction Proof

Why are all these attempts to enlarge the scope of formal systems, logic and arithmetics, condemned to fail? And why is the only winner is the one and only one Universal logic; whatever it means? And why is there no Multi-versal Poly-Logic, at all?

Maybe you made a similar experience at your university as I made it decades ago. You visit a class about the trichotomic-mathematics of the American logician Charles Sanders Peirce at your philosophy department. Quite hard stuff, but highly inspiring. And you just decided to do some serious work on it. Then you go to your mathematics department and you tell your excitement to your professor for logic. He will be very sorry of you. You obviously haven't learned the lessons of Norbert Wiener and Kuratowski, o.k., they worked after Peirce's great ideas, that you easily can reduce all n-ary relations to binary relations and this even without any loss. Perhaps you remember that Peirce has written Ernst Schröder that he likes his monograph about binary relations, but that he is not in love with binary relations at all. But since then we have all sorts of axiomatic set theories, and all are implementing the ingenious definitions of ordered pairs by Kuratowski and Wiener. With this definition of ordered pair you always can reduce a more complex situation to a binary one. The recent example can be found in the interesting paper of Abramski about game theory in computer science.



15.1 Multi-agent systems in another world

But the big question which still remains without an answer is to what extent fibring, when applied to modal logics, extends the results we presented for fusion and independent combination. In other words, is there a way to specify ***interaction between the logics in the fibred logic****, or is it just another way to define fusion? How do interactions between the logics translate into restrictions of the fibring function? To my knowledge these hard questions have* ***not been answered yet****. What we can notice is that it is sometimes possible to recognise some existing combined systems as fibrings or dovetailings but difficulties arise when the combination is not a simple fusion, but an interaction between the components is present.*

Alessio Lomuscio, Knowledge Sharing among Ideal Agents
http://www.cs.ucl.ac.uk/staff/A.Lomuscio/

Fibred logics vs. logical fibre bundles

In contrast, and without modal logics, but polycontextural systems, we learn:

The concept of logical fiberings offers a natural approach to assign a system of distributed logics to a multiagent system (MAS), where the basic modeling principle is the idea to attach an individual logical fiber to every agent which models the local logical state space of an agent. The entire logical fiber bundle forms the global logical state space of the whole MAS.

Pfalzgraf: http://racefyn.insde.es/Publicaciones/racsam/art%C3%ADculos/racsam%2098_1/2004-pfalzgraf.pdf
J. Edtmayr. Logische Modellierung von Multiagentensystemen mit dem Konzept der Logischen Faserungen. Diploma Thesis, University of Salzburg, 2003.

15.2 Remember: Norbert Wiener's ordered pairs

5. [Pairs] Norbert Wiener first showed that ordered pairs can be defined in terms of sets. His definition was

(x,y) := {{{x}, Ø}, {y}}

Show that this is a good definition of a pair, i.e. that if we have

```
For all x,y,a,b: if (x,y) = (a,b) then x = a and y = b.
```

http://ovid.cs.depaul.edu/Classes/MAT372-S04/hw1.htm

With this in mind we can again visualize our stuff.

Question: Is a n-ary tree more powerful than a binary tree?

The reduction methods show that what you can do with a n-ary tree can be done equally (in principle) with a binary tree.

Therefore, there is no escape from reductionism.

On the other hand, there is no reason to accept this definition of an ordered pair. It has even to be questioned to be a proper definition. It presuppose what it wants to define. At most it is a *convention*, and it is an elegant transposition of the idea of ordered pairs unto the terminology of set theory. It has a strategic motivation, to reduce relational concepts to extensional set theoretic concepts. But today we don't need to accept this strategy. There are many other approaches to do mathematics.

Another approach to reduce many-place functions was introduced by Moses Schönfinkel.

Without doubt, reductions are important strategies in mathematics. A quite old one was introduced by Leibniz with his binary number system which does the same calculations as the ternary or decimal system or any other n-ary arithmetical system. A newer one is the reduction of multi-head and multi-tape Turing machines to single head and single tape ones.

So what can we learn? First, there is no proven necessity which could force us to accept the reduction principle for once and ever. This opens up the chance to look for new possibilities of thinking about relations without being ridiculed by the folk of ordinary academics. Second, and this is surly the hard one, we have to develop or at least to try to construct something like a new way of dealing with multitudes. Without this second step, there is nothing like a polylogic or a polycontextural logic at all. It is surly not enough simply to label some work polylogical without having tried to give a strict construction of it.

Today it seems, that the reduction principle is becoming a problem in itself more denying progress in dealing with complex multitudes in an operative and mathematical way than being helpful as it was nearly100 years ago for mathematics and later for computer science and technology.

Combining logics, today, if it would work properly, should therefore be reducible to single and universal logic, and, bad enough, there should also be nothing involved like super-additivity in this process of combining logics. In other words, what you can do with combined logics, you always can do it without it, that is with non-combined logics. The advantages lies somewhere else and that's for ESPRIT (?) is financially supporting this approach. (Examples for industrial applications of a more polycontextural approach to fibred logics, cf. J. Pfalzgraf)

15.3 Panalogy, super-addivity and reduction

Remember Marvin Minsky's p-analogy of multiple ways of thinking. Does it really make sense if everything can be reduced to mono-contexturality, that is to one-way thinking, to one-thematic ontology and to one-truth logic?

Diagramm 15 **Marvin Minsky's Switching Game**

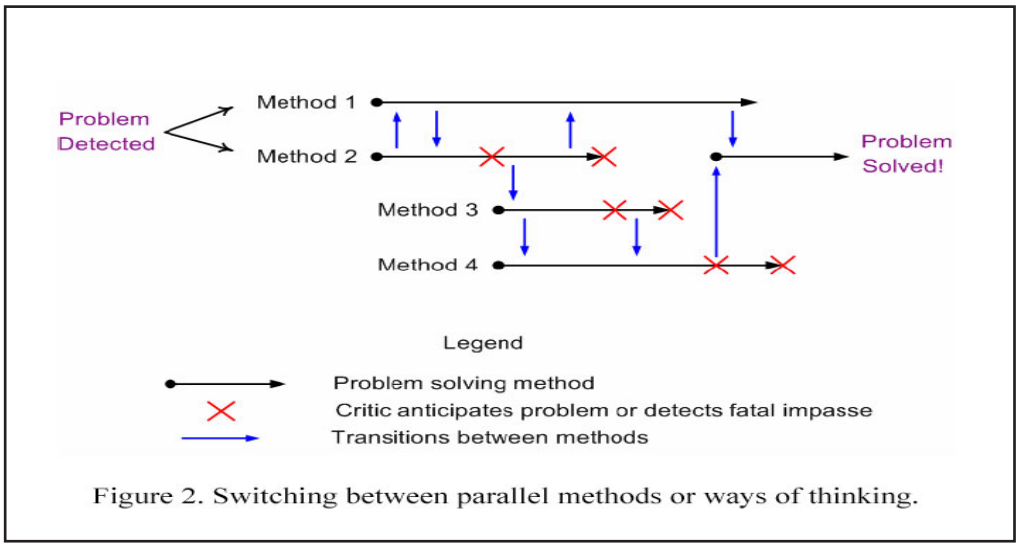
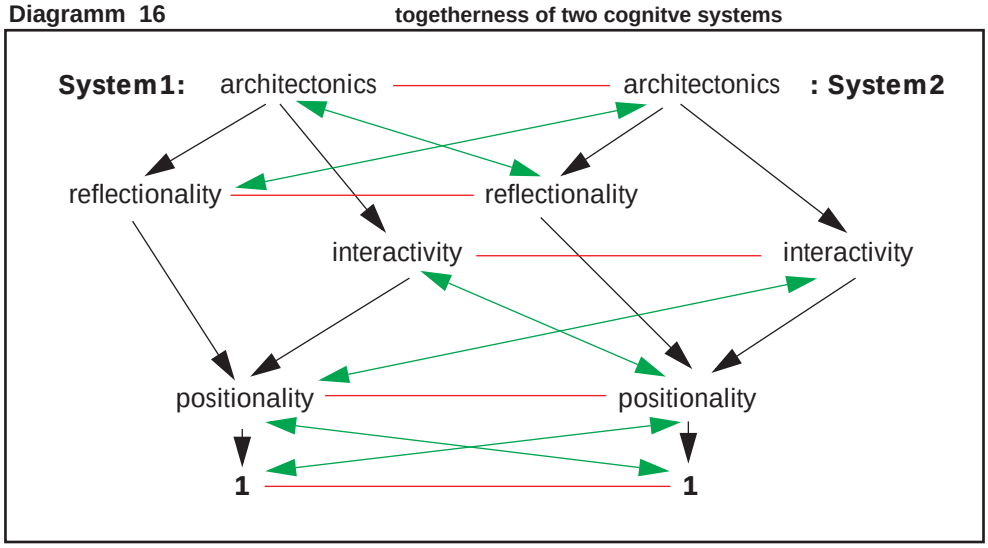


Figure 2. Switching between parallel methods or ways of thinking.

DERRIDA'S MACHINES is proposing a general model of MAS. Interactivity in poly-contextural and kenogrammatic systems is based on the fundamental situation of *to-getherness*. MAS as information processing systems, with or without modal logics or fibrings, will not cover interactivity and co-creativity between autonomous beings.

Diagramm 16 **togetherness of two cognitve systems**



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Obviously there is a serious conflict between the Crystal of Ultimate Computing and the ambiguity, complexity, dynamics and metamorphosis of disseminated Fluids of Real World Events of our Multi-verse.

This, truly, is not the end of the picture but maybe I simply will stop here, at least at the moment; and will begin somewhere else,...again. Sailor Moon