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Abstract

Modules in Metaphors – Le Corbusier, OOP and the Bolognese – Metaphors in Modules – A Framework of World-Models – Evaluation of Modules

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Paradoxes of postmodern education

1. Modules in Metaphors

Without doubt, I like Spaghetti Bolognese. Especially, the Bolognese between the [spaghetti](#). Even more, I like the [Bologna Reform](#), which is unifying European education. As we had to learn, spaghetti in their chaotic wildness are not supporting the desires of clean decomposability and reusability, needed for real-time control and surveillance. Like it happened with [Ravioli](#) [1], the Bologna Reform invented the *modularity* of knowledge for university education. Each topic has to be framed by its [module](#)[2]. Each module is cleanly separated from the other modules. Like ravioli, which are coupled only loosely and are building, ideally, a cluster, each module has its own content, structured hierarchically into topics, sections and paragraphs, enabling its specific taste and evaluation.

[A full-fledged theory of the *Pasta Strategies* is available at the complete [Pasta Theory](#) of Software Development. The present text about *Noodles* will be published at *Moodle*.]

But ravioli are nothing without their sauce! That's obvious and natural for the people of Bologna. But hard to understand north of the Alps.

What are we doing with the sauce? Is it simply another module? But how can the *in-betweenness* of modules in a modular system be itself a module? This contradicts academic logic; it maneuvers you immediately into headaches of logical paradoxes. If the module between the modules is itself a module, what is the in-betweenness between this conglomerate of modules, such a *meta*-module, and the original modules themselves? A meta-meta-module or simply nothing? Or is it the *para*-module of fluidness and fuzziness, defined Water Logic? Do we need a *proto*-module to manage this new *inter*- and *trans*-modular wilderness?

What happens if the sauce between the ravioli becomes a [sausage](#)? Is the sausage an *ultra*-module? It belongs to the modular system exactly if it doesn't belong to the modular system. The sausage is a module exactly if it is a ravioli and at the same time it is a ravioli if it is a sausage. And by the way: Is the *logic* of this argumentation itself a module or is it superior or prior to all modules? Is it a [deviant](#) module with its own subversive logic or simply a *pseudo*-module?

There are not many chances left to solve this paradoxical problem. One radical strategy tells you: *Eat* the sausage and forget the problem! Yes, but what are we doing with a ravioli Bolognese without sauce? We simply could smash the dry ravioli into the *bin* (cf. 4.1) All problems solved!

But there is another solution too: Mediate the ravioli and the sausage with a brand new sauce, well mixed, half ravioli and half sausage. This strategy has a safe legitimation and is best evaluated by the tools of [Fuzzy Logic](#).

Unfortunately, the Fuzzy Strategy is of short reliance as it is demonstrated in my [Warentest paper](#), which is probably the very first evaluation of the reliance of logical systems for interactive devices in commercial telecommunication.

Ok, the game has to go on. Why not introduce, just for academic reasons, a new mega-sausage between the ravioli and the first sausage and the ravioli and the mixed – fuzzy based – sauce consisting of ravioli and sausages between the real ravioli and the real sauce Bolognese? But what's real in such an administrative intervention? The sauce, the ravioli, the sausage or the content in the ravioli or the European administrators of the ravioli complot?

* <http://www.thinkartlab.com/pkl/media/transMODULE/transMODULE.htm>



Figure 1: Ravioli à la Bolognese



Figure 2: Cluster of Ravioli
bp3.blogger.com/.../s320/IMG_7925.jpg
"Image may be scaled down and subject to copyright."

Even worse, a good Bolognese is not a homogenous module, it is in itself full of well-balanced differences of overlapping interactions of different strength.

Hence, the interplay between ravioli is not modular but *sub*-modular. Ravioli are building 3-dimensional clusters, and only a few of them are showing a flat hierarchical order of composition.

It is more than clear, that the content of a single ravioli Bolognese is of no interest at all. What is of interest is the clear cut distinction between the shape and the content of each ravioli and the disjunctive separation from other ravioli.

Nevertheless, each single ravioli has to pass a general test of quality: measure, weight, taste, design, originality. The evaluation is general because each ravioli is tested by strict scientific and objective quantificational methods. There are surely differences in the general cluster, there are ravioli for the beginner, ravioli for the advanced and ravioli for the post-docs and ravioli for the tester and ravioli for the administration, etc. And all are fitting well into the European ontology of modularized knowledge taxonomies and ontologies and the qualifications of the generalized European user.

Life before Bologna was much more fun. Great ideas had been in the air. Stop hierarchical thinking and writing, just now! Go inter-disciplinary! Go further, [Anything goes!](#) Go [trans-disciplinary!](#) Cross the borders! Enjoy your Bolognese! Give up your script, melody and rhythms! Not easy to realize today in a restored world of departments, professorial kingdoms and busy lecturers and a flat pizza culture.

The [Humboldt](#)[3] approach to education and research was German, and is still influencing the world-leading US American universities. The Bologna Model is giving up nearly everything reasonable of Humboldt's idea of a university culture.

Even before the Web was popular, surfing in the grid of knowledge was well elaborated and possible even against many obstacles.

2. Le Corbusier, OOP and the Bolognese

2.1 *Le Modular*

The Modulo Man

Like each modern trend, also Modularism has its own new man: the man of the Golden Ratio, the *mudulo man*.

In 1887 Charles-Adored Generate (later called *Le Corbusier*) was born. He first studied with *Charles L'Eplattenier*, who always stressed nature. His first job was with Beret where he worked from 1908 to 1909 in Paris. During that time he also probably made many trips to Notre Dame. Notre Dame fascinated him especially the way in which they used the Golden ratio in it. After he decided to take a trip across Europe. His first stop was in Germany where he took with Peter Barrens who probably taught him many of the workbench fundamentals of which consisted of the Golden Ratio, more that likely it was this influence that first introduced this great proportion to him which he based so many things on.

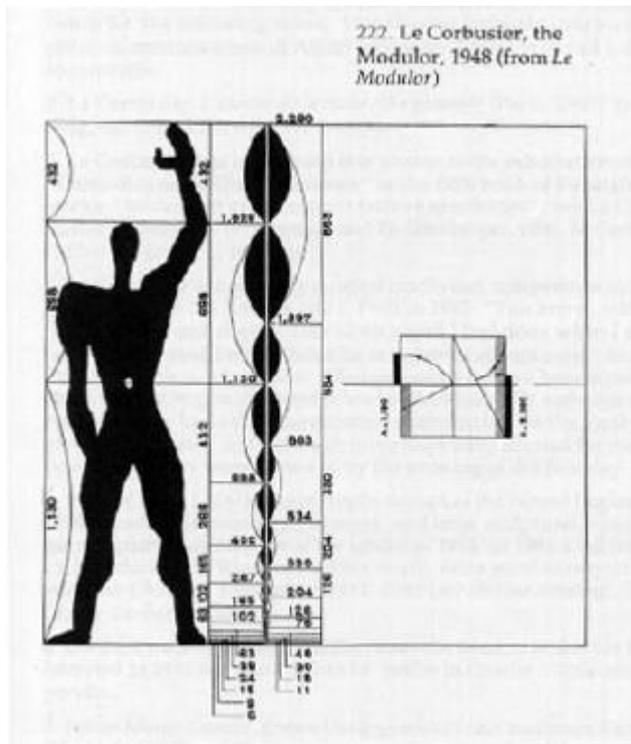


Figure 3: Le Corbusier

The LEGO MAN

But there is also the LEGO MAN. He has given up to be ruled by the *golden ratio*, he prefers a clever modular mix of the “*Automatic Binding Bricks*” rules and the robotic *MINDSTORMS* strategies to organize his complexions of modules. Lego rules are defined by $\lambda\epsilon\gamma\omega$ (lego). Also LEGO is an international experience, it has with its *Eurobricks* a specific European representation, which is responsible for control and evaluation of the LEGO EMPIRE. The lego-approach shouldn't be underestimated in its philosophical and technological profoundness. The most important philosopher of the 20th century, Martin Heidegger, explains thinking as *gathering*, which is the meaning of the Greek $\lambda\epsilon\gamma\epsilon\iota\nu$ (*legein*). Hence, he declares: “*Thinking demands...that we engage ourselves with what at first sight does not go together at all.*” (M. Heidegger, *Discourse on Thinking*, trans. J.M. Anderson and E.H. Freund (New York: Harper & Row, 1962))

2.2 Modules in OOP

In Object-Oriented Programming (OOP), everything is modular and hence reusable. More, everything in OOP is an object. Without any loss we also can state: Everything in OOP is a module. But on top of everything in OOP is the class Class. Is this Class a class, an object, a module? It is the ultimate Class, which allows all classes to be classes. Without surprise, the whole OOP system is neatly organized as a hierarchical system with the class Class on top.

Object-orientation is not only a strategy to organize programming, it is applied successfully on nearly all kind of knowledge systems. Hence, knowledge organization, like the Bologna Model, should acknowledge the efforts and results of OOP.

Odeon Café

In fact, the movement of modularization didn't start in Bologna. After the well-structured hierarchical approach invented in Zürich was exhausted, the *maître chef* introduced his new menu, replacing Pascal with Modula, and later with *Modula-2*. The real fun was celebrated in Zürich with a visit to the opera, where *Oberon* was on the program. Le maître Niklaus surprised the world with the finest chips for his operating system and programming languages. The feminists never understood that Wirth was one of their pioneers. I remember that his machine, running on his brain-child *Lilith*, was on all levels of design revolutionary, well styled and of superb elegance.

But even in programming this hierarchical organization is not as natural as it is declared to be. So, because of the growing complexity and complication of computational systems an additional axis had to be introduced: a diametral, horizontal, heterarchical organization, called *Aspects*. This is developed in Aspect-Oriented Programming, AOP.

Hence, hierarchic modularity is not doing the job. AOP is needed. But AOP is not an approach in isolation, it works together with OOP. Therefore, the new approach, at the time, is an interactional system incorporating OOP and AOP. Both, OOP and AOP are in an interactional cooperation.

But such an interactional and mediating third system is, as such, not yet part of [conceptual programming](#) efforts. Hence, AOP appears, in the classic setting of programming, as a queer module of OOP.

The concept of modules in OOP

This is standard knowledge, thus we could cite the topics from *Bertrand Meyer, Object-oriented Software Construction (1988)*, and today (2008): [Touch of Class](#) , where OOP is introduced as a specification of modules. Historical materials and the underlying philosophical concepts of OOP with extensive explanations are assembled at my "Actors, Objects, Contextures, Morphograms".

So, what does modularity mean for software systems and in general for the organization of knowledge? The need for a modular organization of software systems is best summarized by Meyer (1988):

- *Correctness* is the ability of software products to exactly perform their tasks, as defined by requirements and specification.
- *Robustness* is the ability of software systems to function even in abnormal conditions.
- *Extendibility* is the ease with which products may be adapted to changes of specifications.
- *Reusability* is the ability of software systems to be reused, in whole or in part, for new applications.
- *Compatibility* is the ease with which software products may be combined with others.

Secondary qualities are: Efficiency, Portability, Verifiability, Integrity and Ease of use.

To check if a knowledge system is a modular system, Meyer proposes 5 criteria:

modular *decomposibility*,
modular *composibility*,
modular *understandability*
modular *continuity*,
modular *protection*.

The concept of aspects in AOP

Aspect-oriented programming is complementary to OOP. is still quite new and has not yet influenced general knowledge organization strategies and techniques.

"The only problem with OO programming is that it is essentially static, and a change in requirements can have a profound impact on development timelines. Aspect-Oriented Programming (AOP) complements OO programming by allowing the developer to dynamically modify the static OO model to create a system that can grow to meet new requirements. Just as objects in the real world can change their states during their lifecycles, an application can adopt new characteristics as it develops." (Graham O'Regan)

AOP complements the static and hierarchical organization of modularized knowledge by *horizontal* interactions between modules. AOP is delivering the conceptual framework and techniques to deal with such complementary situations. Its main concept is *crosscutting*, which is conceived as a trans-modular interaction, crosscutting the barriers of OOP modularism.

"Aspect-oriented programming (AOP) grew out of a recognition that typical programs often exhibit behavior that does not fit naturally into a single program module, or even several closely related program modules. Aspect pioneers termed this type of behavior **crosscutting** because it cut across the typical divisions of responsibility in a given programming model.

In object-oriented programming, for instance, the natural unit of modularity is the class, and a crosscutting concern is a concern that spans multiple classes. Typical crosscutting concerns include logging, context-sensitive error handling, performance optimization, and design patterns."

<ftp://www6.software.ibm.com/software/developer/library/j-aspectj.pdf>

Metaphors to AOP are *horizontal* or *heterarchical* organization. Other labels are given by *lateral*, *transversal* and *orthogonal* thinking. Google-It!

The concept of an interplay between OOP and AOP

A first step to an *interactional* and *reflectional* interplay of OOP- and AOP-strategies, which conceptualizes and formalizes hierarchical and horizontal structurations as chiasmic interplay, is sketched in my paper.

"The idea behind a mapping of AOP or OOP onto the proemial matrix PM is inspired by the possibility of a chiasmic dynamization of the main concepts of AOP in the play and their distribution along the dimension of reflectionality and interactionality of mediated systems. Thus, a heterarchic cut is deliberating the main concepts from their hierarchy and is involving them into chiasmic interplay. Between objects, classes, aspects, domains, viewpoints, etc., hierarchies are established only as temporary frozen chiasms.

The whole game is played as an interplay of heterarchy and hierarchy."

2.3 The Bolognese

The **bolognese** is what is accompanying you through your whole life. It is in fact a friendly affair and easy to handle. Intelligent, playful and not too stressful. Its a cosy experience, well represented in Great Britain and lasts long enough to learn to handle its hyper-allergenic behavior. The bolognese certification procedure is transparent and internationally well recognized.

3. Metaphors in Modules

Even if today the possibility of surfing between and through disciplines, topics and modules is highly restricted for university students, some theoretical distinction could be of help to organize the so called chaotic information flow of academic broadcasting and the Internet. It also could help to navigate between disciplines and supporting one of the main interests of the Bologna approach: mobility. Mobility means: to navigate in a pre-given navigational topology of knowledge. In fact, to be able to move up and down the hierarchies, while abstracting from the place and location of the knowledge hubs. Locality of knowledge is reduced to provinciality, supporting the myth of an abstract identity as European.

3.1 Some scholastics for multi-modular systems

As many terms, transdisciplinarity can be used and abused as a fashion term for holistic speculations; it also can be confused with a lot of other terms, like inter-disciplinarity. The same happens with the term polycontextuality which is confused by some sociologists with pluri-centralism. Sometimes it isn't stupid to define terms as much as possible and to use the definitions as guiding tools to orient in a confusing world of science and opinions.

3.1.1 Transdisciplinarity in a post-modern world?

Wolfgang Hofkirchner, ICTS AND SOCIETY: THE SALZBURG APPROACH TOWARDS A THEORY FOR, ABOUT, AND BY MEANS OF THE INFORMATION SOCIETY, 2007

My own paper from 1986 is written in German and elaborates in a quasi-scholastic way the differences of multi-/inter-/trans-disciplinarity in a mono-/poly-/dis-/trans-contextual setting. This study is not only differentiating terms but giving an operative outlook how to realize those organizational devices on the base of polycontextual logics and arithmetic. At this time, about 1986, there was not yet anything like the Bologna ECTS controlling system landing on the campus, nevertheless there had been some discussions in the air about a new understanding of disciplinarity, inter and trans.

I'm not in the mood to translate my own paper – in fact, I can't find it, so, is the original lost? – but I feel free to use Hofkirchner's translation of my early definitions.

Modules have to be evaluated and the first question surely is: Is this text a [plagiat](#)? Yes or no! Or, to which degree? So, in plagiarizing a text an other scientist plagiarized from my text, am I plagiarizing? Is there something like a second-order plagiarism? Or is the plagiat of a plagiat the original? Even when the original is lost? By the way, does an original in fact ever exist? Was there ever a chance for an original to be an original and not a copy of a copy, a clone of a paraphrase or a paraphrase of a copy or a citation of a copy, etc.?

Disclaimer

I'm not accusing Hofkirchner of plagiarism at all!

Disclaimer of the disclaimer

This, i.e., "a. Disclaimer: I'm not accusing Hofkirchner of plagiarism at all!", is not a joke!

Is this a joke or isn't this a joke? How could I know?

I'm just enjoying my new computer and my intriguing new program.



To decide this crucial question, we could use one of the tools, which are supplementing the Bologna approach to university knowledge management: [Turnitin](#). Unfortunately, this service would cost me GBP 200.-. as the UK manager for Turnitin told me. And I would only be qualified to buy and to use it if I could proof my universitarian affiliation as a lecturer. Nevertheless, plagiarism, with or without iThenticate, remains a tricky business, [intriguing](#) for both sides, the originator and the plagiarator.

The Bologna Model

To sum it up: The Bologna Model or Process has 3 super-modules (*Modularization*, *Examination* and *Evaluation*) plus additional modules like [Turnitin](#) or [iThenticate](#).

Another supplement might be the eLearning, i.e., an Open Source "course management platform" [Moodle](#).

The main strategic modules of the Bologna Model are: *Modularization*, *Examination* and *Evaluation* (ECTS).[4]The aim is academic, educational structures for students and lecturers within [Europe](#) [5] and additionally, computerized *verification* and *control* of content[6] to fight intentional and unintentional [plagiarism](#).

As one of many consequences, the Bologna Process is aimed to deny regional and local differences in favor of an abstract European identity of their subjects. Globalism, even in this restricted European frame, is blind for the chiasitic interplay of local and global realities and developments. Modern students and lecturers have, first of all, to be or to become Europeans alla Bologna. As much as the food has to be normed by European criteria, the knowledge business has to be adjusted to the abstract phantasms of European bureaucrats.

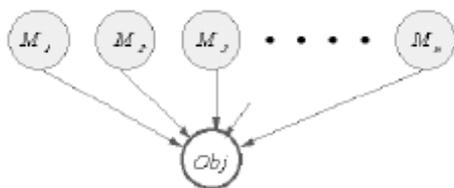
3.1.2 Transdisciplinarity in Technology and Education

(Eberhard von Goldammer, Rudolf Kaehr, 1987)

This internet version seems to be a clone from a much older German hard-copy version I have proposed 1986 at an intra-disciplinary workshop about different concepts and models of general disciplinarity.

Figure I: Interdisciplinarity: $\{M_1, \dots, M_n; \text{"Obj"}\}$

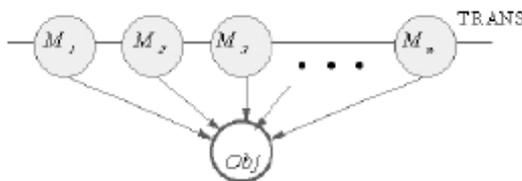
Interdisciplinarity: one common object domain ("Obj") of interest, but different methods of research (M_1, \dots, M_n).



This seems to be the diagram for the multi-disciplinary approach. That is, a multitude of different isolated methods studying a "common" object-system.

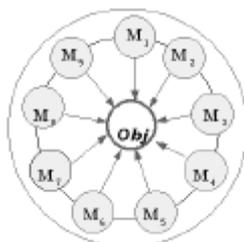
Figure II: Transdisciplinarity: $\{ "M"; \text{Obj}_1, \text{Obj}_2, \dots, \text{Obj}_n \}$

Transdisciplinarity: crossing the involved methods ("M") as a common general rationality of methods, i.e., despite the different methods ("M") and different common object domains, a common general rationality of methods (logic, arithmetic, etc.) is accepted.



3.1.3 Figure III: Mediation of inter- and transdisciplinarity

This looks like a mediation of inter- and trans-disciplinary approaches, with a kind of connections, interaction, and even reflections between the multi-disciplinary methods towards the common complex multi-domain object-system. This pictures obviously is an abbreviation of the possible complexity, only.



More about the notion of [transdisciplinarity](#) in Second-Order Cybernetics form the "[American Society for Cybernetics](#)" (1983): "*Cybernetics is a way of thinking, not a collection of facts.*"

3.1.4 Citations from Salzburg

Multidisciplinary

"*Multidisciplinarity* is a pluralistic worldview, the result of a dualistic Two-Cultures thinking. Binary thinking has resulted in a fragmentation into various disciplines and institutes. The sum of several disciplines, where each discipline uses its own objectives, objects, methods and theories is according to Eberhard von Goldammer and Rudolf Kaehr called multidisciplinary (see Goldammer and Kaehr 1996, [online](#)). There is no interaction between disciplines, they are fragmented and have nothing in common. Each branch tries to solve problems within its natural, i.e. historical grown, boundary by using its own methods and speaking its own disciplinary language. In multidisciplinary research projects scientists from different disciplines are trying to find a solution to the same problem, but their research is fragmented and not integrated in one joint project, they are not working cooperatively, but in coexistence only (see Raffl 2006, 321)."

Interdisciplinary

"While multidisciplinary means to add one discipline to another, each of them solving the problem from another standpoint, or "washing their own laundry" as John Brockman tends to call it popularly (Brockman 1995, 19), interdisciplinarity means to solve one specific problem in a joint project, but by still using methods and theories and speaking the language of different disciplines. There is also an accumulation of many disciplines that exist independently from another; there is not much interaction of researchers with diverse backgrounds. Researchers from different disciplines are working on one shared common problem by using their "home-methods" and theories. When the project is finished (and in the best case the problem is solved), scientists go back to the institutes they originally came from. There are no durable effects of such a type of research."

Transdisciplinary

"While there is a lasting trend towards transdisciplinarity in theorising the complexity of science and technology in the information age, empirical research in that field so far seems to make use of a mixture of multiple approaches which is characteristic of a multi- or interdisciplinary stage of evolution."

"Though as with the terms multi- and interdisciplinarity no unified understanding of transdisciplinarity can be found in scientific literature, it makes sense to make a distinction. For Jeremy Hunsinger "transdisciplinary research attempts to approach the object of study beyond and across disciplinary and interdisciplinary perspectives" (Hunsinger 2005, 277). Transdisciplinarity increases the chance of a dialogue – and mutual understanding, as well as an exchange of knowledge and information. Furthermore "a transdisciplinary field is one defined by the globality of its object of study, combined with the complex, emergent, and changing nature of that object". (Hunsinger 2005, 277)."

"Transdisciplinarity does not mean to dissolve disciplinary competences: "Transdisciplinary research is an additional type within the spectrum of research and coexists with traditional monodisciplinary research" (Häberli and Thompson Klein 2002, 4)."

"According to Juergen Mittelstraß transdisciplinarity means longterm cooperation that changes disciplinary orientations. Transdisciplinarity is an integrative, but not a holistic concept. Disciplinary isolations are therefore suspended on a higher methodological level, as transdisciplinarity goes beyond specialization, but without substituting disciplines."

- Some further Salzburger citations about transdisciplinarity

"Stakeholders play a very important role also in this new perspective of scientific research and cooperation: "Transdisciplinary knowledge, because it has been recontextualized for the broader audience of multiple disciplines, is more accessible and interpretable" (Hunsinger 2005, 278). For Charles Kleiber, transdisciplinarity means the "pooling of disciplinary knowledge and information,

technological revolutions, and the creation of networks and new forms of knowledge” (Kleiber 2002, 56)."

"Helga Nowotny and Michael Gibbons point out that because “knowledge is transgressive, [...] transdisciplinarity does not respect institutional boundaries“ (Gibbons and Nowotny 2002, 70)."

"Furthermore transdisciplinarity crosses national boundaries, it is a transnational concept. Hence transdisciplinarity means more than just a sum of researchers from different disciplines working together, as within multi- or interdisciplinarity. Transdisciplinarity crosses academic boundaries in order to solve real-world problems."

After all those Salzburger citations, can we say we learned something of practical use for an orientational approach to a complex world of disciplines and the notion of disciplinarity?

First observation. Everything said by the author(s) has to be verified by citations from other authors. Hence, nothing new or illuminating should be said. But what is said? It is said that transdisciplinary *crosses* boundaries (national, academic, disciplinary). The term “trans” just means “across”, like the Trans-Siberian Express, so transdisciplinarity is defined by “transdisciplinary”; *trans* is explained by crossing and *crossing* is explained by “trans”.

"Trans is a Latin noun or prefix, meaning "across, beyond" or "on the opposite side [of]". It is the opposite of *cis*, which means "on the same side [of]". " Wiki

This reminds me of Jacques Prevert’s poetique definition of the philosophical term “transcendence”: *La tranche sans danse est la danse sans tranche.*

Second observation. Nothing conceptually too complicated or even systematically developed should be elaborated to elude the complex situation. “*Everything said is said by an observer*”, which is observing what other observers are observing. With that, everything is save and no borders have to be crossed. The whole taxonomy of multi-/inter-/trans-disciplinary appears as mono-disciplinary and hierarchical.

Recall Humberto Maturana’s Observer

"Indeed, everything said is said by an observer to another observer that could be him- or herself."

"My starting point is our use of language: Everything said is said by an observer to another observer that could be himself. We are observers and living systems, and as living systems we are observers. Whatever applies to living systems applies to us. Therefore, my task is to use language to describe living systems and to show how they may develop a language and become observers that may make descriptions as we do, and in the process use cognition to analyze cognition. I shall proceed accordingly." (Maturana, Cognition, 1978)

Original, i.e., first version works well without gender distinction.

The Observer

"Anything said is said by an observer. In his discourse an observer speaks to another observer who could be himself, and whatever applies to one applies to the other as well. "

Maturana, H.R. 1970, "Neurophysiology of cognition", in Garvin, P. (ed.) 1970, Cognition: A multiple view, New York/Washington, 3-23, p. 4

- Additional question

Does the (late) gender difference in the observer terminology forces any differences in the genuine observer theory? This is not a **joke!** But it opens another open question: What is lost if language is perceived as an instrument? For him, for her, for it, the theory? And what does it mean that “*Anything said...*” is said and is not written as “*Anything written*”?

3.1.5 Trans/disciplinarity in the Appendix

"According to **Erich Jantsch** (1972), the terms interdisciplinary or trans-disciplinary etc. should be applied as follows:

- Pluri-disciplinary *means a common research topic or problem area spanning several, cognitively largely varied disciplines, which can, however, still make use of their own, traditional disciplinary methods, heuristics, and theories in thematic analyses.*
- Inter-disciplinary *comprises common languages of observation, common forms of description, measurement operations or methodologies in different disciplines, which – as a minimum requirement – have to be situated across the natural, social, or cultural sciences.*
- Trans-disciplinary *means the application of theories, models, or patterns in different disciplinary fields, which – again, as a minimum requirement – have to be anchored in the natural, social, or cultural sciences.*" (Karl H. Müller)

Heinz von Foerster:

"I don't know where my expertise is; my expertise is no disciplines. I would recommend to drop disciplinarity wherever one can. Disciplines are an outgrowth of academia." [Interview](#)

But there are other strong voices too. The desire for an unification of disciplines of knowledge is still alive.

Une nouvelle [vision du monde](#) : La transdisciplinarité

"Le Centre International de Recherches et Études Transdisciplinaires (CIRET) est une association régie par la loi de 1901, fondée en 1987. Le but de notre association est de développer l'activité de recherche dans une nouvelle approche scientifique et culturelle – la transdisciplinarité – dans sa tentative de prendre en compte les conséquences d'un flux d'information circulant d'une branche de connaissance à une autre et de créer un lieu privilégié de rencontre et de dialogue entre les spécialistes des différentes sciences et ceux des autres domaines d'activité, en particulier, les spécialistes de l'Éducation. Le but de l'association est pleinement précisé dans son projet moral."

The Transdisciplinary Evolution of the . Condition for Sustainable Development "La transdisciplinarité *concerne, comme le préfixe "trans" l'indique, ce qui est à la fois entre les disciplines, à travers les différentes disciplines et au-delà de toute discipline. Sa finalité est la compréhension du monde présent, dont un des impératifs est l'unité de la connaissance.*" Basarab Nicolescu (1997)

Interestingly, there is no Hof in the Church for a Basar with Nicole! Poor Salzburg!

Next to un/intended plagiarism there is also an established market for un/intended *copyright*. Isn't it?

And don't forget the profound work of our friend [Edgar Morin](#) ! Unfortunately, I have passed the limit-number of allowed words for this paper :-)!

4. A Framework of World-Models

4.1 World-Model I: One Logic/One World

Based on the difference logic/world or rationality/reality, subjectivity/objectivity, syntactic/semantics, etc. a 4-fold distinction can be developed by applying the [Diamond Strategies](#) onto the difference. This might serve a start to develop the *modules* of the "Framework of the World-Models". Before discussing topics like plagiarism, disciplinarity and modularity it should be made clear which are the basic epistemological presuppositions involved. The framework of the 4 world-models might offer a general guideline for epistemological, logical and ontological orientation. Plagiarism in world-model I is easy to understand. The first is the origin and the origin is the first.

Everything else is secondarily. There is the inventor, the patent and the *Patentamt* (patent office) guaranteeing the legal ownership of the invention to its inventor.

There is no ambiguity in the notion of ownership, the identity relation between inventor/patent/patent-office is logically and ontologically strict. Plagiarism, i.e., intellectual property (IP) theft, is strictly identifiable.

Identification happens here on the levels of attributes. If the attributes of two objects (products) are the same, coincide, then the objects are identical. This narrow ontological approach might be extended to functional criteria: if two machines (chemical, plants) behave in all parts the same then they are identical.

Hence, if the German train Transrapid appears in Shanghai as a Chinese invention, the German companies are forced to check the Chinese invention of patent-theft. The Chinese train may look the same, function the same, even based on the same physical and engineering principles, etc., therefore, there is a high possibility of intellectual property theft. But following this kind of comparison, there is still a limit in comparison. There will probably be no access to all the parts and procedures of the whole train to allow a final decision. Hence, a *one-to-one* comparison as presumed in world-model I, is not always accessible in concreto.

We might think that this argument is producing a pseudo-problem, simply, because the legal matters are ruled and controlled in written form by the patent office of the involved countries. But, again, not much has changed. The problems of translations of the *crucial terms* (4.3), like “patent of invention”, between different cultures, remains.

Obviously, there are even in world-model I some structural limitations for the business of comparison and decision. But why should the Chinese culture think and act in the sense of this identity related world-model I?

Because of the one-to-one constitution of world-model I, there are no constellations allowed, which could disturb logical tautologies and decidability. Hence, no self-referential constructions, which are domesticated in the other world-models, are legitimately occurring in world-model I. Obviously, paradoxes are strictly excluded from the very beginning of the game.

Epistemology: Objects (things, thoughts) are identical.

: *The case can be objectively decided.*

4.2 World-Model II: One Logic/Many Worlds

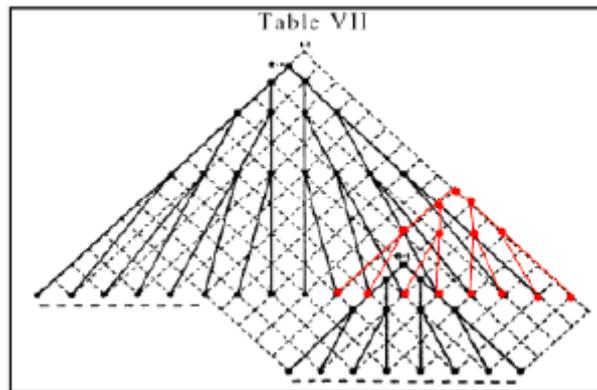
Plagiarism in world-model II demands for some distinctions, which are not easily be codified in Western culture and law. The problems of law in post-modern societies, which are playing in world-model II, can be understood as the problems of a transition of the strict *private/public* dichotomy to a complex and interactional chiasm of the terms.

"My argument starts with the obvious observation that the public/private distinction is an oversimplified account of contemporary society. More controversially, my argument continues that any idea of a fusion of the public and private spheres is equally inadequate. As an alternative conceptualisation, I propose that the public/private divide should be replaced by polycontextuality.

The claim is this: Contemporary social practices can no longer be analysed by a single binary distinction; the fragmentation of society into a multitude of social sectors requires a multitude of perspectives of self-description. Consequently, the simple distinction of state/society which translates into law as public law vs. private law needs to be substituted by a multiplicity of social perspectives which are simultaneously reflected in the law." (Günther Teubner)

If everybody has his/her “*model of the world*”, then comparison of inventions demands for a *many-to-one* procedure of translation. That is, if two taxonomies (term trees) share the same knots (terms) there is no guarantee that their meaning is the same. As the diagram shows, the origin of the taxon-

omies might be different, hence, the meaning of a term, which is defined by the position of the term in a tree, will be different.



<http://www.thinkartlab.com/CCR/2007/03/chinese-centralism.html>

Interactions between different term-trees, as they are needed for translations, are involving some new operators not known in logic-based theories. One such operator is mentioned by Luhmann as tranjunction. Transjunctions had been introduced by [Gotthard Günther](#) in his famous paper “[Cybernetic ontology and transjunctional operators](#)” (§ 3: Logic with Transjunctions). Further formalizations are proposed at [PolyLogics](#), (§ C.1.6)

In polycontextural systems, *transjunctions* are logical operators, which are beyond (trans) junctions, like conjunctions and disjunctions, this mainly because they are *rejecting* the logical values offered by the logic in which they are positioned. Junctions, in contrary, are always accepting the offered values. Hence, in a polycontextural interpretation, transjunction are bridging different logical contexts (systems). Junctions are behaving by definition intra-contexturally, transjunctions are interacting between contexts, hence transcontexturally.

Also this is known since the early 60s, it would be naive to think that it had any influence on a theory of transdisciplinarity.

What we can read, again and again, is the mantra “*modern society is a polycentric (pluri-centric) system*”. This seems to be the great message of the second-order system theorists.

“Modern society is a polycentric, polycontextural system. (...) Consequently there must be transjunctional operations, which make it possible to go from one contextuality into another, still marking which differentiation is accepted or rejected for specific operations.” (Luhmann 1996).

Interestingly, the terms “pluri-” or “polycentric” are mostly followed by the term “polycontextural” as if this term would demonstrate the “*non plus ultra*”-state of their theory – see: Luhmann, Teubner, Baecker, Fuchs, Qvortrup, etc.,.

There is no surprise, that not only no logical formulas are in the game but that the complex terminology of Gunther’s theory of polycontextuality is reduced to 1 or 2 terms: polycontextural and transjunction. Terms, like intra-, inter-, trans-, dis-, elementary/compound, etc. are not part of the references.

The possible IP theft involved in such a writing production is quite harmless. Not much would be changed in their texts if the term “polycontextural” would be replaced at all its occurrences by the much more appropriate terms “polycentric” or “pluri-centric”. Thus, it is more reasonable, especially in the case of Luhmann, to think of a friendly carriage case. In his citations (Zettelkasten), Luhmann is carrying the torch of “polycontextuality” through some hostile times of German academia.

Nevertheless, the consequences from polycentrism for international law systems are dramatic. Gunther Teubner gives a big picture of the destiny of law in a post-modern society in his: [The king's many bodies: The self-deconstruction of Law's hierarchy](#).

“Law's constructed identities change chameleon-like with the change of observation posts, each of which has an equally valid claim to truth. There is no stable predefined identity to the legal system but rather a multiplicity of conflicting identities that are constructed in different contexts of observation. Law is the same and it is not the same. So what's the difference between constructing and deconstructing legal systems?” (Günther Teubner)

4.2.1 Limitations of the idea polycentrism

Lars Qvortrup, following Luhmann, has sketched the situation of postmodernism in his [“The Hypercomplex Society”](#).

“Polycentrism characterizes a society that cannot observe itself or its environment from a single observational position-or, rather, from within a single observational perspective or “optics”-but has to employ a large number of positions of observation, each using its own individual observational code to manage its own social complexity. This implies that no universal point of observation can be found. Furthermore, this means that a large portion of these observations are observations of observations: of others' observations and of the observer's own observation.”

Without a *“universal point of observation”* communication between the different position has to be *mediated*, otherwise we would be forced to subsume, again, the multitude of positions under the umbrella of a unique and ultimate meta-position. In other words, a multitude of observational positions is involved with the interpretation of an unique objectivity. This is demanding for a *many-to-one* codification of the observed reality.

Because of this many-to-one constitution of world-model II, reality has to be constructed and reality-constructions are entering self-referential situations. The self-referentiality of reality-constructions are becoming more and more meta-theoretical self-descriptions of the reality-construction language. The description language is re-entering into its own description. This is producing paradoxes and hence, provokes a clear affront to the rationality of world-model I.

Codification in world-model I is highly developed and well based in the classic scientific paradigm. The rationality of world-model I has its final conceptual and operational codification in logic, formal and programming languages. Formalisms and metaphors for world-model I might be *universal algebra*; for world-model II it might be *universal co-algebra* and *modal logics* but this connection is not yet realized by postmodernist thinkers.

From a second-order cybernetic point of view, objectivity is a construction of an observer. The form of the construction is understood as a fix-point of a recursive formula. A recursion is a step-by-step iteration of the formula-scheme, including the results from the lower levels into the higher levels of the step-wise development. Independent of the complexity of the recursive function, the step-wise development of the iteration belongs to the paradigm of ‘forwards’-iterability. This is obvious, because the recursive function is solution-oriented, hence aimed to reach a final goal. The idea of a simultaneous ‘backwards’-oriented movement, in parallel to the ‘forwards’-movement of the ‘same’ movement is strictly absurd in world-model II. Polysemy occurs in world-model II only as disseminated.

A compromise was offered with the idea of a polycontextural number theory. This theory is constructed as a dissemination, i.e., distribution and mediation, of the classic systems of natural numbers over different loci in a kenomic grid. Such disseminated, different and autonomous natural number systems, might then run their numbers forwards and backwards separately and simultaneously. But this happens not for a genuine operation as such, i.e., ‘inside’ an arithmetical system, but only for the interpretation of different simultaneous operations, which remain distributed and separated over different loci. Such a restriction in the process of simultaneity and sameness of the differentness of an operation in itself will be removed in world-model IV.

Despite the big pictures of post-modernism drawn by Luhmann and his followers, there is still nothing comparable to the operational formalisms of world-model I for the world-model II. The opera-

tive terms are taken by Luhmann selectively from Gotthard Gunther's theory of *polycontextuality* and Heinz von Foerster's *recursive observer theory*, but without any attempt to further formalization. Hence, a theory of *mediation*, necessarily for an understanding of the interaction of the different observational positions, is still lacking. This, obviously, are bad news for the realization of global control and surveillance desires and phantasms. But for a functioning free society, too.

Epistemology: The same is different.

Fazit: *The case needs mediation.*

4.3 World-Model III: Many Logics/One World

Plagiarism in world-model III is very difficult to understand from the viewpoint of world-model I and II, i.e., from the Western classical, modern and post-modern culture and law.

There may be one "*observational point of view*" involved in world-model III but there exist for the same observational experience a multitude of different codes. In contrast to the world-model II, with its many-to-one codification, the world-model III is involved into a *one-to-many* codification of the interpreted and experienced reality. It seems that the situations of world-model II and III are in some sense *complementary*. Nevertheless, despite its conceptual complementarity to world-model II, there is a big obstacle to codification and formalization in world-model III.

Codification in world-model II might be conceived as a distribution and mediation of existing situations, hence a polycontextual dissemination of known theories. Complementarily, for world-model III, the multi- and trans-perspectivism of polycontextuality has to be seen as a multi- and trans-(hyper)reality. A sign might have many meanings, like in the constellation of polycontextual *polysemy*, but in world-model III, a singular meaning might have a cluster of different reality presentations.

A formal logical thematization of the epistemological situation of world-model III might have a first trial with a so-called [Grosseteste](#) logic. A second turn is risked with a more profound understanding of complementarity. It could open up the realm of morphogramatics. Morphograms are pre-semiotic patterns, which are well implementing the one-to-many approach.

The funny question if I could plagiarize myself and therefore be fined for my own plagiarism is *absurd* only if the personality of the person in question is identical with itself. But there are good reasons to not to search for one's identity, simply because it might be preferable for situations, where the self is conceived/constructed as a multi-personality. Hence, I and I are not the same. Therefore, there are two I's involved: I_1 and I_2 . And this is the *sine qua non* for punishing I_2 to have plagiarized the work of I_1 .

In other words, multi-addressability of persons opens up highly interesting constellations.

Obviously, this goes far beyond of the non-intentional self-application of the Spitzer Laws to [Eliot Spitzer](#) himself.

A proper functioning, psycho-sociologically and legally, of this strange situation of multi-personality and self-application, might force us to move to the world-model IV.

Epistemology: The different is the same.

Fazit: *The case has to be negotiated.*

The "*Patent for invention*" characters in Chinese:

发明专利

4.4 World-Model IV: Many Logics/Many Worlds

Originality and plagiarism are involved in a complex interplay, relativizing both terms at once. In world-model IV it is reasonable to think of originality as a theft, and of plagiarism as the origin of the work.

The secondary might be the original and the original the secondary. The challenge to rational and legal interactions is demanding to reject and to surpass all forms of absolute identities, like rationality and reality.

World-model I is realizing *consistency* of rationality and *coherency* of reality; excluding all kinds of *paradoxes* and *antagonisms*.

World-model II is based logically on para-consistency and ontologically on the phantasm of the unreachability of a coherent reality. It is including on the logical level, i.e., rationality, a whole bunch of self-referential constructs, re-entries, contradictions and paradoxes but it is excluding on an ontological level, i.e., reality, all kind of proto-structural antagonism.

World-model III is complementary to world-model II, hence it is ontologically based on proto-coherence, and on the logical level on the unreachability of rational consistency and para-consistency. It is including on the reality level a whole bunch of self-organization, circularities, antagonisms, struggles and emergent behaviors.

World-model IV is plurifying in itself the features of the previous world-models, which are based on the desires of unification towards a universal rationality (logic) or an ultimate reality. But because there is no save heaven left in world-model IV, neither on the rationality nor on the reality side, consistency and coherency has to be situatively co-created between logical and ontological movements. Such movements are not only *chiastic*, or in other words, *proemial*, as in polycontextural systems of world-model II, but *enantiomorph* and *antidromic*. That is, chiastic movements, logical and ontological, are at once involved with their counter-movements. Such movements, therefore, cannot be identified, named and gathered (legein) at once, neither with a para-consistent nor a proto-coherent interaction or intervention towards rationality and reality of their movements.

Hence, the second-order paradigm of a recursive construction of reality and rationality has to be completed with its complementary, antidromic paradigm of iter/alterability.

In contrast to the previous world-models, which are *descriptive*, world model IV is *scriptural*.

Epistemology: The same and the different are interacting differently as well as similarly, at once.

Fazit: *The case needs computational support for negotiation, mediation and decision*. That is, interactional, reflectional and interventional computation and conversation.

Summary

World-models mapped, in respect to sameness and differentness, onto distinct general trends in mathematical logics and semantics.

	Monokontexturalität			Polykontexturalität
<i>Kosmologie</i>	1 Logik: 1 Welt	1 Logik: n Welten	n Logiken: 1 Welt	n Logiken: n Welten
Kenogrammatik	○	○	○	
Semiotik Logik Semantik	Aussagen- Prädikaten- Logik I, Stufe	Aussagenlogik WeltenSemantik	ALAL AL	
	Typentheorie Typentheorie Typentheorie	Prädikatenlogik Prädikatenlogik Prädikatenlogik	Mehrwertigkeit	Aussagenlogik Aussagenlogik Aussagenlogik
Reduzierbarkeit				
Autoren	Frege, Tarski, Scholz	Leibniz, Kripke	Hegel, Wilson Grosssettestes	Günther, Axelos, Derrida, Kaehr

4.4.1 Disciplinarity revised

As far, I have followed the traditional way of proposing the game of mono-/multi-/inter-/intra- and transdisciplinarity. One step further would have to introduce the distinctions of *proto-* and *meta-* disciplinarity. With all that we are still embroiled into the cartography of Greek terms and their topo-logic. Independently of how many terms are involved to describe the game of disciplinarity, their order remains – more or less – hierarchic and based on identity and diversity. That is, “inter” is “inter”, “trans” is not “inter” and “multi” is “multi”. But the operator “is” is not necessarily identical with itself. What’s the “trans” of the “inter” and the “inter” of the “trans”? Such duplications are necessary for a reflectional *interpretation-language*, which is thematizing and interpreting its object-domain with second-order terms. The description-language is dealing with the first-order terms directly. First-order terms are part of a mono-contextural description-language.

Hence, first-order terms are ruled by the *is-abstraction*, second-order terms by the *as-abstraction*. Therefore, the formula “mono is mono” is transformed into “mono as mono”, “mono as multi”, “mono as inter” and “mono as trans”. That is, the introduction of a multitude of different positions of description, observation and involvement enables different kinds of thematizations. Hence, to speak simply, say, of “interdisciplinarity” is an underdetermined characterization because the position of the distinction-making isn’t included into such a characterization. On the other hand, if there is a multitude of different positions included, it is more than natural that the different positions of observation and involvement are also producing different results. Therefore, what appears for one position as interdisciplinary might appear for another position as transdisciplinary.

The possible interpretations, therefore, is nothing else than a matrix of the involved terms. As a first step, we could organize the terms in a matrix instead of a tree.

Table 1. Contextual matrix for disciplinary modi

<i>modi/disciplin</i>	<i>mono</i>	<i>multi</i>	<i>inter</i>	<i>trans</i>
mono	mono/mono	mono/multi	mono/inter	mono/trans
multi	multi/mono	multi/multi	multi/inter	multi/trans
inter	inter/mono	inter/multi	inter/inter	inter/trans
trans	trans/mono	trans/multi	trans/inter	trans/trans

As a *first* step, could introduce for "mono/multi", i.e., “mono as multi”, or generally: “X as Y”, the wording : “*What appears as ‘mono’ from your position, appears as ‘multi’ from my position*”. But both positions are accepted as a simultaneous interplay from both positions or from an additional reflecting position.

A *second* step would have to specify the roles of the different positions according to the *world-models* they are involved.

A *third* step would have to consider a further specification. The formula “X as Y” is not complete, we can specify: “X as Y is Z”. Hence, what is the meaning of “Z”? “Z” represents the complex interplay between “X” and “Y” as such.

BAD NEWS: [Just lost this paragraph=cell. Therefore, where *is* the original? Only some keywords are left.]

transition/transformation/metamorphosis,
 proto/meta,
 surface/deep structure,

is-/as-abstraction,
 sociology of philosophy, philosophy of sociology, *Social Epistemology*, Steve Fuller vs epis-
 temology of sociology,
 knowledge grid,
 bologna/semantic web,
 challenge bologna/china/zhuge.

http://www.knowledgegrid.net/~H.zhuge/data/Discovery_of_Knowledge_Flow.pdf

"The way we classify the disciplines is not incidental, and a strong argument can be made that our current system of metatheory is path dependent. For example, under the Dewey Decimal system, psychology, now considered a science in the social tradition, is classified under philosophy, a decidedly humanities-oriented categorization. This conceptualization is not without consequence, and the perception of which "bins" (contain a discipline influence the production of knowledge."

<http://www.scholar-warrior.info/scholar/research/eod/index.php>

Reconstructing the original

Obviously, the *original* got lost. How can it be reconstructed? As what could such a reconstruction, say with the help of Apples Time-machine or another disk-doctor, be recognized? As a copy of the original? How could it be evaluated in the absence of its source? Would such a successful reconfiguration be a plagiat of my own, but lost, original? Would I plagiarize myself? Is this possible at all? At the time, I have to leave this question open.

5. Evaluation of Modules

5.1 Structural evaluations of modules

5.1.1 Exclude course/module chiasms!

A structural reflection on the Bologna module concept should be realized more or less independently from the specific content of the modules in question.

It shouldn't happen that a paradox situation like this happens: "What's your module is my course; and what is your course might be my module." Avoid chiasm in hierarchical systems! Respect the hierarchical order of:

Hierarchy: course ==> module ==> topic ==>section ==> paragraph

Is this reasonable within a trans-disciplinary approach? Obviously not.

A strict hierarchy of modules might be possible in a (mono)disciplinary and to some degree in a multi-disciplinary paradigm of research. Even with inter-disciplinarity, chiasmic exchanges between the whole and the part (course/module/topic) can easily and reasonably happen.

A simple **chiasm** between modules and topics might be constructed by the following diagram.

$$\left[\begin{array}{cc} \text{Position}_1 : \text{module} \Rightarrow \text{topic} & \\ & \Downarrow \quad \Downarrow \\ \text{Position}_2 : \text{topic} \Rightarrow \text{module} & \end{array} \right] \Leftrightarrow \chi(\text{mod}, \text{top}, \text{pos}_1, \text{pos}_2)$$

Such a chiasmic interplay between a whole and its parts (course/module) is reasonably realizable only within the epistemological presupposition of world-model IV.

Hence, the first and most sever violation of the Bologna rules would be to allow to play with chiasms between wholes and parts. It seems, that this violation is of such a gravity that it is not even mentioned in the guidelines of modular education in the sense of the Bologna reform.

In words, the formula says : *For all modules Mod: If Mod is an element of a chiasm χ , then Mod doesn't exist.*

$\forall \text{Mod} : \text{If } \text{Mod} \in \chi(\text{mod}, \text{top}, \text{pos}_1, \text{pos}_2), \text{ then } \text{Mod} \notin \text{Mod}.$

The more explicit formula in bracket form as a procedure to decide modularity :

$$\left[\begin{array}{l} \forall \text{mod}_{i,j}, \text{top}_{i,j} \in \text{MOD}, \\ i, j \in \text{Compl}(\text{MOD}) \\ \left[\begin{array}{l} \text{IF} \\ \left[\begin{array}{l} \text{MOD} \\ \left[\begin{array}{l} \chi(\text{mod}, \text{top}, \text{pos}_1, \text{pos}_2) \\ \left[\begin{array}{l} \text{THEN} \\ \left[\begin{array}{l} \text{equal} \\ [(\text{mod}_i, \text{mod}_j), (\text{top}_i, \text{top}_j)] \\ \text{ELSE} \\ [\text{mod}_{i,j}, \text{top}_{i,j} \notin \text{MOD}] \end{array} \right] \end{array} \right] \end{array} \right] \end{array} \right] \end{array} \right] \end{array} \right]$$

5.1.2 Content disjunctness of modules

Two modules shouldn't coincide in content. Or, two topics of different modules shouldn't overlap. This presumes strict context independence of content. That is, the same content in two different modules is identical in respect to its content. It may differ in meaning and significance, but there are no criteria given to separate and determine such semantic and pragmatic differences between contents.

The content of a module is semantically defined by the module; and the semantics of the module is defined by its content.

$$\forall x, y: x, y \in C: x \in M_1 \cap y \in M_2 = \emptyset$$

How is “*sameness*” of contents of modules defined? Could it be possible that the exactly same content has a strictly different *meaning* and *significance* in another module? Content surveillance systems (CSS) are not checking content, they are checking *syntactical structures* of texts. Hence, the identical syntactical constellation can have a strict different meaning and significance. Nevertheless, such a difference in meaning with identical syntax would be taxed by a CSS as equal and therefore tagged as a copy. With that, the text model of such CSS is build along the phantasm of a “*Protokollatz*” (basic sentence) in the sense of the positivist understanding of linguistics of the pre-war time in Vienna. A protocol sentence is an unambiguous, context-free true sentence. Like, *the herring is red*.

Content surveillance on the base of syntactic equality of texts is generally useless. It works only in a context of very restricted correlations between syntactic and semantic structures. It is best realized in a codified mono-disciplinary setting of a course and its modules. The whole approach is denying the fact and naturality of [polysemy](#) in meaningful contexts.

5.1.3 Hierarchical mobility as an exclusion of creativity

In contrast to the aims of the Bologna reform, the mobility and flexibility supported is restricted to a hierarchical up and down the hill of the well prepared mountain of knowledge. It is a strict repro-

ductive educational knowledge acquisition program, disallowing any queer connections between courses and modules.

For the students, the modules are pre-given. There is no supported program to develop, creatively and by invention, surprise or insight, new modules and new courses. Inter- and trans-disciplinary studies are excluded, simply because they cannot be measured by the Bologna criteria of ECTS. Hence, who is taken responsibility for the content of the modules? The lecturer is free only in the frame given by the Bologna criteria. Like the students, he/she is controlled. The business of the marks is pre-given. But the students don't have even any saying about the contents of the modules. The hierarchy is perfect. There is no escape, it has to be realized to compare objectively the quality of different courses, departments and universities.

Such a strategy is best realized in World-Model I, which is guaranteeing *inter-subjectivity* and *inter-objectivity* for the general user of pre-existing knowledge. Its technical realization is a so-called Expert system.

5.2 Content related analysis

5.2.1 UNDO: Proof of the Pudding

The main reason why the project of UNDO, an ArtPhil dissertation, could be successfully finished, qualified and certified was not because of the Bologna criteria but despite those criteria because the academic staff has taken its own scientific responsibility to qualify the difficult inter- and trans-disciplinary PhD dissertation and the corresponding art work, which didn't fit into any of those pre-given administrative restrictions. But a new generation of lecturers will not anymore be trained to take such a responsibility and risk as scientists and lecturers of a university and they will be happy to relay on objective criteria and measurability by service programs on which they don't have any influence.

Notes

[1] "**Ravioli code** is a type of program structure, characterized by a number of small and (ideally) loosely-coupled software components. The term is in comparison with spaghetti code, comparing program structure to pasta; with ravioli (small pasta pouches containing cheese, meat, or vegetables) being analogous to objects (which ideally are encapsulated modules consisting of both code and data).

Some consider ravioli code to be a good design methodology, especially when the components used are modular, highly interchangeable, well-encapsulated, and providing well-defined interfaces and behavior. Others consider ravioli code to be an anti-pattern. In poorly-designed object-oriented systems, with deep inheritance hierarchies and multiple layers of virtual functions overriding each other, it can become very difficult to discern (without use of a debugger) exactly what the behavior of the program is, as it is often unclear how virtual function calls are resolved."

<http://encyclopedia.thefreedictionary.com/Ravioli+code>

[2] "**modularisation**" is a concept for which no European reference documents exist (for example, standard forms, "key features", users' guides). Therefore a huge variety of interpretations of the concept can be found, ranging from defining each single unit (lecture, seminar, etc.) as a module to full-fledged and very elaborate modular systems with interdisciplinary elements.

[3] "Here **Humboldt** states that 'the ultimate task of our existence is to give the fullest possible content to the concept of humanity in our own person [...] through the impact of actions in our own lives'. This task 'can only be implemented through the links established between ourselves as individuals and the world around us' (GS, I, p. 283). Humboldt's concept of education does not lend itself solely to individualistic interpretation. It is true that he always recognized the importance of the organization of individual life and the 'development of a wealth of individual forms' (GS, III, p. 358), but he stressed the fact that 'self-education can only be continued [...] in the wider context of development of the world' (GS, VII, p. 33). In other words, the individual is not only entitled, but also obliged, to play his part in shaping the world around him. Humboldt's educational ideal was entirely coloured by social considerations. He never believed that the 'human race could culminate in the attainment of a general perfection conceived in abstract terms'. In 1789, he wrote in his diary that 'the education of the individual requires his incorporation into society and involves his links with society at large' (GS, XIV, p. 155)."

http://en.wikipedia.org/wiki/Wilhelm_von_Humboldt#Minister_of_Education

[4] **Promoting mobility within Europe**

This should provide a further boost to student mobility. The mutual recognition of coursework in particular will make it easier to study abroad or transfer schools. The following measures are intended to achieve this:

Program modularization:

A module refers to a group of lectures, lab classes, practical work or seminars of related content. The contents of each module are stipulated by its module description. In this way, requirements for coursework become more transparent, enabling students to plan classes more effectively. In addition, this makes it easier for coursework to be recognized when studying abroad or transferring schools.

Accompanying exams:

At the end of each module comes an accompanying module completion exam. This avoids examination blocks at the end of studies, thereby spreading the workload more evenly across the whole period. This also offers you as a student a way to monitor your progress each semester.

Introduction of a credit system:

Points in accordance with the European Credit Transfer System (ECTS) are awarded for each module passed. ECTS points describe the workload required for each module. A bachelor's degree requires a total of 180 ECTS points, which breaks down to a share of 30 ECTS points per semester.

http://www.en.physik.lmu.de/programs/ba_ma/bologna/index.html

- [5] "Not all cultures take the same view of plagiarism. The Western notion that "ideas" can be the property of individuals may actually seem absurd to those with different views on what constitutes shared information or public discourse."
- [6] Widespread access to the Internet and other digital resources has made protecting your intellectual property harder than ever before. Now there is a solution. iThenticate is a revolutionary web-based system that uses sophisticated textual searches to verify document originality and quickly and easily identify infringement of digital intellectual property when and wherever it occurs.