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Gentzen Integrals

A new view on Logical Analysis?

The Mulkowski Duality Theorem Today

Will Mulkowski Duality influence the decisions of bankers world-wide?

Recent Discoveries about the Unit Circle

What to expect, what to fear, and what it‘s all about

Mulk Press International is an alias of:

Matthias Benkard
Kapellenwiese 6
82377 Penzberg
Electronic Mail: schottenschneider@mail.matthias.benkard.de
Web: http://matthias.benkard.de/

Dear Reader,

Prof. Ignatius Schottenschneider teaches transfinite probability logic at LMU München.

An exciting year has come to an end. Impressive discoveries both in algebraic and topological probability logic have moved the world, as new fields of study continue to emerge.

The Mulkowski Probability Theorem, for instance, has had wide-reaching consequences for the way business is managed today.

The well-definedness of the Raiffmeisen functional has finally been proven by the use of the most powerful Lisp Machines in existence.

And finally, there's nothing like the beautiful proof of the Third Binomi Theorem.

But let's not dwell on last year, as an even more promising one is just starting.

In this issue alone, we explore radical new approaches to logical analysis in an exclusive interview with one of the most prominent of authorities on analytical probability logic, Mr. Balduin Forstenholz (TU München/LMU München).

If that doesn‘t get you excited, Prof. Schottenschneider (LMU München) has written an intriguing piece on the way recent results from categorical probability logic, a field of study started only 40 years ago with the discovery of the equivalence between categorical and probability-algebraic structures by Mulkowski, may influence bankers‘ decisions throughout the world.

All in all, we think (and hope) that you will have plenty to keep you entertained.

Happy 2010!

The Editor

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Bankers in a Brave New World

The Mulkowski Duality Theorem Today

While the world is still struggling with the effects of the financial crisis, a new, radical approach for predicting success or failure of startups might be the clue needed for stabilising the world economy.

by Prof. Dr. Ignatius Schottenschneider

The world is in crisis. This time, it's not a war fought with weapons that makes people all over the world hold their breath, but a war fought with the power of the financial system. Indeed, this war has been going on for over a hundred years, and still, no peace treaty is in sight.

By focusing on the immediate effects of financial crises, the world has consistently overlooked the real problem: While third- and second-world states are trying to catch up with the industrial might of the West, the developed nations have continued to expand their economies in an amazing pace. Ironically, the typical Western has not profited that much from the prosperity of their nation's economic system, while the rest of the world continues to suffer from famine and hardship. Indeed, in most Western countries, a 40-hour work week is still prevalent, a figure that far exceeds typical work hours from the European Middle Ages. In the process, the industrialised West's marvellous productivity is a threat not only to economic peace, but also to the health of nature, consuming resources in amounts indescribable.

There is much debate about how to stop this insanity. One approach put forward by various groups is the idea of "Basic Income". The mathematics surrounding this idea has not yet been largely verified or tested in practice, although it certainly shows promise and may be a viable procedure that is reasonably easy to implement.

More recent research, however, puts another possible approach onto the table: that of machine-aided assignment of jobs based on Mulkowski Duality. Here is how this works: First, for each individual X not currently assigned a job, define a strictly increasing, exact sequence of probability-topological spaces

$$T_0 \xrightarrow{\phi_0} T_1 \xrightarrow{\phi_1} T_2 \xrightarrow{\phi_2} \cdots,$$

where each of the T_n corresponds naturally with previous income coefficients of person X. Then, compute the bounded limit T of the sequence. As per the Groshirn Equivalence Theorem, there is a probability ring P in Prob that corresponds canonically to T in ProbTop. Now apply Mulkowski Duality. The resulting small category $C(X)$ can be extended to include all Raiffmeisen assertions A for which $f(A)$ = true, where f is the deterministic Gentzen functor.

This is where the financial system comes into play. A banker needs to review $f(A)$ for all applicable Raiffmeisen assertions A so as to maximise Raiffmeisen profitability for both the employee and the employer while taking into account the class of all $C(X)$ for every individual X considered (for example, every customer of the bank whose income and wealth are known). This procedure will naturally determine a healthy number of working hours as well as creating demand for just as many workers as are available and filling all available jobs as long as there are enough potential workers available.

Of course, what we are assuming here is that banks are interested in maximising wealth and well-being of all employees, which is clearly naive. But there is more to the theory than what is shown above. Indeed, we can augment the theory so as to make it extremely desirable for banks to follow its advice.

Consider a startup company (or indeed any company) Y that seeks investment from a bank. If Raiffmeisen profitability is maximised, there is an especially simple way of coming up with the optimal amount of money to lend the company. Assume Y has n employees E_k, each of current income coefficient I_k. Raiffmeisen Correspondence asserts that the sequence

$$0 \xrightarrow{\psi_0} E_1 \xrightarrow{\psi_1} E_2 \xrightarrow{\psi_2} \cdots \xrightarrow{\psi_{n-1}} E_n \xrightarrow{\psi_n} 0,$$

where ψ_k is the canonical Binomi homomorphism for each E_k and E_{k+1}, is both exact and oleomorphic. Thus, there is an oleomorphism α such that $\alpha(E_k) = C_k$ for each k, where C_k is a small category. But note that C_k is dual to $C(E)$ as defined above because of Raiffmeisen Correspondence! Therefore it follows from the Binomi Most-Prime Prime Theorem that $M_Y\, max(C_k)$ is the optimal lending amount if M_Y is the Kleene factor of company Y.

If governments were to adopt a policy that encouraged use of the theory of Mulkowski Duality as it applies to company funding, banks would therefore be highly interested in applying the same theory to labour recommendations as well. Over time, banks' labour recommendations could be used as a base for assigning jobs not only to the unemployed but also to those employed under suboptimal conditions such as a 40-hour work week or sub-par pay.

Society would be well-advised to consider Mulkowski Duality theory as a base for economic and social policy as well as a research topic worth exploring. ∎

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Logical Analysis Reviewed

Gentzen Integrals and their Role in Mathematics

Balduin Forstenholz, B.Sc., has been studying probability logic since he came in touch with it in Mongolia, where he earned his Bachelor's degree. At the moment, he is working on receiving his Master's at the chair of probability logic of the LMU München.

Interview by Prof. Dr. Ignatius Schottenschneider

1. What, in simple terms, is a Gentzen Integral?

It is a way of computing how true a formula is. This can be done in classic, Aristotelian logic or more general logics, as the Hegelian.

2. When is a probability-logical formula Gentzen-integrable?

Every finite logic formula over a valued probability ring is Gentzen-integrable. For infinite formulae and non-valued rings, there is still work to be done.

3. What is the significance of Gentzen Integrals for the study of differentiable logical formulae?

The indefinite Gentzen integral would be directly connected with them, but at the moment, there is no relation with them, unfortunately.

4. What is the significance of Gentzen Integrals for the study of Logical Analysis?

The definite Gentzen integral was a first step in what I would call "Integrative Logical Analysis". Until now, only differentiation was an area of research, and the *differentiation–integration* duality that is metamathematically established has been violated in a harsh way.

5. What is the connection between Gentzen integrability and the theory of continuous oleomorphisms? Is every continuous oleomorphism also Gentzen-integrable?

The logical lifting of the logical projection of the logical lifting of the logical projection of the logical lifting of the logical projection of the logical lifting of the logical projection of the logical lifting of the logical projection of the logical lifting of the logical projection of the logical lifting of the logical projection of an *arbitrary* (!) oleomorphism is Gentzen-integrable, but not the oleomorphism itself. Furthermore, only measurability is used, so there is no continuity required.

6. Are allomorphisms in some sense the same thing as Gentzen-integrable formulae?

No.

7. Do you believe that Gentzen Integrals will be playing a more prominent role in mathematics in the future?

They will play a role in society at large. There is no way to overestimate this, mankind is about to enter a next era: the truth value of any logical statement can be evaluated and arguments can be settled in a peaceful way.

For mathematics, this is a different question. The definite Gentzen integral will play a role in the norming of logical differential equations, but the indefinite Gentzen integral would be far more valuable.

8. What other fields of study coincide with the theory of Gentzen Integrals?

As you will read in the paper, the Gentzen integral helps in the computation of the Hausdorff-Haustorf integral, for example on locally-global compact topologies.

9. What might be future applications or extensions of the theory of Gentzen Integrals?

Gentzen integrals could usurp the whole measure and integration theory, making the Jacobi, the Haar and even the Lebesgue measure obsolete as well as special cases of the Gentzen integral. But, as Mr. Mulk already mentioned, there are some major obstacles to overcome.

10. Is there anything else you would like to add?

I am tired now.

Thank you! ∎

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Round, Round, and Round it Goes

Mysteries of the Unit Circle

The unit circle has recently proven to be one of the most interesting objects of study. We have collected some of the most intriguing facts about this mysterious object that were discovered in the last decade... and tell you why you may not want to get involved with it too closely after all.

by Prof. Dr. Ignatius Schottenschneider

The unit circle—an item of great mystery both today and in the past. Never have we understood the nature of the unit circle as well as today, and still there is undeniably a subtle fear associated with it. It is the fear of something which we believe to know well at first but which might suddenly turn out to be something completely different than what we imagined it to be just a moment (or decade, or century) ago. Indeed, the unit circle possesses quite a number of striking properties not well-known. For this article, I have tried to collect some of the more mind-bending ones. But beware, for you might not want to approach the unit circle too closely. Many a soul (like the great scientists Ludwig van Orenbrost and Helmut Kleinschuh) that has tried to uncover the mysteries of the unit circle has lost their mind in the process.

1. The Unit Circle is Continuous as a Probability Manifold

As discovered by famous probability topologist Groshirn in 1972, the unit circle, when viewed as a probability manifold, is continuously connected under the Mulkowski topology. This is curious not only by itself but also has some pretty unexpected consequences. For instance, the image of the unit circle under the Mulkowski functor is also continuously connected, and the corresponding homotopy class in Cat is isomorphic to its cohomology class. This was proven by Raiffmeisen in 1984, who used the result in his research on applying Mulkowski Duality to the economic realm (see pp. 6-7 for a quick overview).

2. The Unit Circle's Cocategory is Cohomologic over Every Finite Probability Ring

Another topological masterpiece by Groshirn (1973) was his proof that the unit circle's cocategory Circ^{op} is cohomologic over every constructible, finite probability ring. Kastenbrot successfully generalised the assertion to arbitrary finite probability rings in 1976, later known as the Lesser Kastenbrot Theorem. Kastenbrot himself refrained from any further research of the unit circle, however, claiming that "no man is supposed to meddle in the affairs of the great unit circle."

3. No Continuous Image of the Unit Circle under Raiffmeisen Correspondence

Spurned by Kastenbrot's success generalising Groshirn's results, Raiffmeisen tried to generalise the above mentioned theorem on continuous connectedness to arbitrary functors, but ultimately failed. Instead, he discovered that trying to construct functorially connected neighbourhoods of the unit circle by using Raiffmeisen Correspondence resulted in contradictions. An economist at heart, Raiffmeisen consequently directed his efforts elsewhere, but the question still remains: Is it possible to make a more general statement than the one Groshirn made in 1972? Much seems to point in this direction, but a proof is yet to be had.

4. The Unit Circle May Be the Key to the P=NP Problem

A little known fact is that the unit circle is a hot topic among computer scientists trying to solve the P=NP problem. As a matter of fact, it has long been known that the unit circle can be transformed into a cohomology class over Mulkowski space by an NP algorithm. In 1988, H. Mulk finally managed to show that the problem is indeed NP-complete. Whatever Turing may have thought about the P=NP problem—he surely didn‘t conceive of the unit circle as having much to do with it. Today, we know better.

5. Mysterious Unit-Circle Research Gone Under

From 1902 to 1912, Markus Glenzhausen, supposedly a close friend of Nikola Tesla‘s, is said to have done “forbidden research” on the unit circle. When he suddenly vanished in 1912, there was talk about a conspiracy against unit circle research in general, after which such research was widely avoided. What really happened is unclear, however. Some claim to have seen Glenzhausen in a poor district of Amsterdam between 1915 and 1930, while others seem to have uncovered secret US government papers that called Glenzhausen a threat that had to be extinguished by all means necessary. Either way, without publicly available, unambiguous documents, Glenzhausen‘s fate—and the results of his research on the unit circle—may remain a mystery forever. ∎

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The Sound of Topology

Computer-Generated Music is Taken to the Next, Optimally Silent Level

Topology has always felt like silently wading through pieces of mud. Researchers from Ulan-Bator have now developed a way of making this feeling audible by generating silence with the help of a computer.

by Prof. Dr. Ignatius Schottenschneider

If you‘re a mathematician, it‘s likely you like to have your working environment silent. But haven‘t you wondered time and again whether there might be a type of music suitable as background noise for mathematical or engineering work? Harnessing the power of computational topology, researchers from Ulan-Bator may have found the answer: Computer-Generated Silence (CGS).

“It‘s quite marvellous seeing what computers are capable of today,” says Urul Wutosk, PhD, University of Ulan-Bator. “Within a few seconds, whole symphonies can be composed at the push of a button. What‘s more, these symphonies are maximally silent and can go for as long as an hour without a single tone. Isn‘t that incredible?”

“These computer-generated symphonies are perfectly harmonic. Our algorithm guarantees that not a single dissonance will ever be generated.” Wutosk‘s PhD thesis consisted of developing the algorithm as well as proving it correct. “It was hard work, but I‘m quite proud of the results,” Wutosk adds with a smile. ∎

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Topology in A♯ Minor

Prof. Dr. Ignatius Schottenschneider
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