

**Sixth Young Researchers Days in
Logic, Philosophy of Science and
History of Science
(Brussels, Royal Academy of Science)**

Programme Sixth Young Researchers Days in Logic, Philosophy of Science and History of Science

Royal Academy of Science, Hertogsstraat 1 rue Ducale, 1000 Brussels

Ockeghemzaal

Thursday September 20 2018

9h-10h:

Chair: Steffen Ducheyne

Sylvia Pauw, *Lambert on the mathematical method: The connection between postulates and abstraction*

Andrew Morris, *John Smeaton's contribution to the debate over the conservation of motive force*

10h-11h: Plenary lecture of keynote speaker

Chair: Steven Vanden Broecke

Nick Hopwood (University of Cambridge), *Proof and publicity: Claims to human in vitro fertilization*

11h: Coffee break

11h30-13h:

Chair: Geert Vanpaemel

Tine Claes, *(Un)wanted pregnancies and the reimbursement of IVF in Belgium, ca. 1983-2003*

Jolien Gijbels, *Physicians' religious beliefs: the Belgian medical debate about the caesarean section (1840-1914)*

Reinhout Vander Hulst, *The persona of the Catholic physician: The Belgian Society of Saint-Luc (1922-1965)*

13h: Lunch break

14h-15h30:

Chair: Peter Verdée

Sam Rijken, *Is logical empirical?*

Leander Vignero, *The perfect surprise*

Philemon Kongo Muanda, *Feasibility of Yombe paremias in non-monotonic logic*

15h30: Coffee break

16h-17h: Plenary lecture of keynote speaker

Chair: Peter Verdée

Hans van Ditmarsch (Laboratoire lorrain de recherche en informatique et ses applications), *Lying and logic*

17h-18h:

Chair: Alexandre Guay

Massimiliano Simons, *Two models of science, two models of falsification*

Koen Lefever, *Distances between formal theories*

Friday September 21 2018

9h-10h:

Chair: Kenneth Bertrams

Maarten Langhendries, *The body and the soul: Catholic legitimation of medical aid in the Belgian Congo (1925-1939)*

Dietline Wouters, *Epistemic injustices and truth commissions*

10h-11h: Plenary lecture of keynote speaker

Chair: Steffen Ducheyne

Cristina Chimisso (The Open University), *The impure object of Georges Canguilhem's historical epistemology*

11h: Coffee break

11h30-13h:

Chair: Hans van Ditmarsch

Stéphanie Ponsar, *Confronting historical to current requirements of mathematical foundations to highlight their common features*

Wim Vanrie, *How can Frege reject the theory of types?*

Takashi Oki, *Simple necessity in Aristotle's Physics II.9*

13h: Lunch break

14h-15h30:

Chair: Koen Lefever

Stef Frijters, *Non-utilitarian deontic stit logic*

Nathan G. Wood, *Formalizing the ethics of war*

Sofie Avery, *When learning to construct proofs with Logicalice, help helps*

15h30: Coffee break

16h-17h:

Chair: Maarten Van Dyck

Sven Delarivière, *Collective Understanding: A conceptual defence for groups as epistemic agents*

Aleksandra Samonek, *Formal learning theory and rationality in learning the natural language*

Abstracts (in alphabetical order)

When learning to construct proofs with Logicalice, help helps

Sofie Avery (MA student, UGent)

Logic teachers have long been faced with full classrooms and even lecture halls. The reason for this is not logic's great popularity, but the fact that basic skills in logic are expected from students in many different disciplines. Today, the challenge remains of teaching logic to large groups without the possibility of individual guidance for each student. At Ghent University, as at many other universities, this challenge was met with a computer programme designed to help students learn and practice logic.

What distinguishes the Ghent programme is its breadth (it covers all basic skills for propositional and predicate logic, and even for some non-classical logics), its multilayeredness (exercises are structured in learning paths and learning trajectories), and its adaptiveness (it follows the progress of individual students). The first version of this programme was developed in the 80s by Diderik Batens and it has since been used as a supplement to logic courses for freshmen. Recently, Joke Meheus and Kris Coolsaet have set out to reimplement this teaching tool into a web application, provisionally called Logicalice. Besides a renewed interface, for which the new learning environment Alice was developed, Logicalice contains additional features aimed at optimizing the teaching process.

The vastness of Logicalice poses the problem of how to categorize the web application. At face value, Logicalice might be taken for an Intelligent Tutoring System (ITS). As characterized in [3], an ITS has two major loops: an outer loop providing new tasks and an inner loop offering feedback and hints on steps within a task. Because of the layered nature of the application, this conceptual framework does not suffice to describe the structure and operation of Logicalice. Rather, I will refer to Logicalice as an Intelligent Mentoring System (IMS) and argue that it functions as a mentor, guiding its mentee through an adaptive curriculum aimed at learning.

Logicalice provides the student with a curriculum consisting of modules (syntax, semantics, formalising sentences, ...). These modules are divided into assignments (wffs, inference rules, proofs, tableaux, ...) and each assignment is run by a tool which meets the criteria of an ITS. This means that for *each* individual assignment there is an inner loop as well as an outer loop. Assignments are made up of multiple tasks for the student to complete, for instance a specific proof to construct, in an order the outer loop decides on.

This talk aims at clarifying the advantages of Logicalice as an IMS over existing ITSs for logic, through demonstration of the mentoring tool's operation and structure. In this demonstration, I will pay special attention to the module concerning the syntax of propositional logic, and more specifically to the tool for constructing proofs, since it allows me to illustrate the richness of both the inner and outer loop of this particular ITS. I shall show that, as is the case for the tool proposed in [2], feedback and hints are layered in multiple levels of abstraction (from general to more specific) and argue that because of this layering *and* the embedding of the ITS in a broader IMS, the concerns from [1] regarding help are met. As a result, when using Logicalice, help does help.

References

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- [2] Serge Autexier, Dominik Dietrich, and Marvin Schiller. Towards an intelligent tutor for mathematical proofs. In: Pedro Quaresma and Ralph-Johan Back, editors, *Proceedings First Workshop on CTP Components for Educational Software, THedu'11*, volume 79 of EPTCS, pp. 1-28, 2011.
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(Un)wanted pregnancies and the reimbursement of IVF in Belgium, ca. 1983-2003

Tinne Claes (postdoc, KU Leuven)

In 1983 the first Belgian ‘test-tube baby’ was born. Still, IVF for a long time remained the privilege of the lucky few. Full reimbursement for the costs of infertility treatments was established as late as 2003 (compared to 1978 in France, see Cahen 2017). In existing research, this late reimbursement of assisted reproduction has been linked to the dominance of the Catholic Church, both in politics and in society at large (Nys 2016; Schiffino and Varone 2003). In this paper, I will posit that this argument, though valuable, misses an essential aspect. Building on both archival research and oral history, I will argue that the reimbursement of IVF not coincidentally became a public and political issue in the wake of the de-criminalization of abortion in 1990.

They tell us, adopt

But there are no unwanted children to adopt anymore

Adoption had long been viewed as the preferable solution for involuntary childlessness, as it enabled couples to steer clear from moral dilemmas and since abandoned children could leave (state-funded) institutions. Yet as a result of the growing acceptance of contraception methods and ‘illegitimate’ children, the number of adoptable babies had decreased. In the 1990s, involuntary childless couples feared that the legalization of abortion would further worsen their situation. How could they start a family when the number of unwanted children continued to drop dramatically? I will show that this question of ‘supply and demand’ became an important argument in the debate on the reimbursement of IVF. While it may seem counter-intuitive at first, it appears that abortion made life more precious. As the number of unwanted pregnancies diminished, the value of ‘wanted’ children became increasingly recognized.

Collective Understanding: A conceptual defence for groups as epistemic agents

Sven Delarivière (PhD student, VUB)

The aim of this presentation is to contribute to a fruitful explication on the notion of an epistemic subject with a special focus on group understanding and its link to epistemic agency.

Traditionally, philosophers have taken for granted that the relevant epistemic subject (i.e. entity ascribable with understanding, knowledge,...) must always be individual humans. However, if we start from an ability-oriented conception of understanding and demarcate the understanding subject according to the system that implements those abilities then epistemic subjects can extend beyond, or be entirely different from, human individual. Allowing such unconventional subjects does require further justification because understanding is a cognitive ability which we want to ascribe to an epistemic agent. But what warrants being an epistemic agent? My contention is that such an agent is no more or less than a successful target of what I call the epistemic stance (very much in line with Dennett’s intentional stance). The epistemic

stance is successful if ascribing an entity with epistemic properties (e.g. beliefs, goals, problem-solving tactics) has explanatory or predictive power. This brings up the question of whether groups could be a useful target of the epistemic stance or whether we should keep our focus on its individual members only.

To explore the epistemic stance and its application to groups, I consider what I think are (a) the least and (b) the most plausible case of group understanding: From (a) a non-cooperating and random collection of people, in which case the group is no more than a shorthand for the aggregation of individual abilities, to (b) a complex dynamic of individual interaction that is isomorphic to the brain of an understander (e.g. Block's Chinese Nation), in which case the group-abilities can't be reduced to the abilities of its members (even though they are realised by them). Using these two extremes, I extract what I believe are the subject-changing factors that differentiates them: First, the degree of complexity in the group's working parts, which makes it desirable to bypass that complexity by referring to a macro-level instead (i.e. the group-level). Second, the possibility to discern the appropriate systematicities at this macro-level (i.e. epistemically relevant behaviour from the group), which makes employing an epistemic stance towards the group an efficient thing to do. And third, the macro-systematicities being emergent, which means the group properties are not reducible to the member properties. If the group is realized through the complex interaction between its members, there is no straightforward mapping-relation between the group macro-level and the member micro-level that implements it, which means those macro-systematicities are conceptually tied to that macro-level only, and one must change the subject to the group to talk about them.

Non-utilitarian deontic stit logic

Stef Frijters (PhD student, UGent)

Belnap et al. have developed a formal treatment of action known as stit (seeing to it that) semantics [1]. This is based on a framework of indeterministic branching time. John Horty uses this to develop deontic stit logic [3]. Horty introduces the operator $O[\alpha \text{ estit}: \varphi]$ to formalise the central notion of 'ought-to-do'. This operator is to be read as ' α ought to see to it that φ '. Horty's deontic logic is, however, limited to modelling utilitarian moral reasoning.

In contrast Dietrich and List give a choice-theoretic formalisation of many moral theories (including utilitarianism) [2]. In their approach one specifies for a moral theory (1) which properties of the options matter in a given context, and (2) how they matter. (1) is formalised using a function that assigns normatively relevant properties to each context. For (2) a 'better than' relation is defined over sets of properties. Together (1) and (2) define a rightness function. This rightness function outputs the 'right' (or permissible) options given a specific moral theory and a specific context.

In this talk I will present a family of deontic stit logics, each modelling a moral theory. These logics are based on the logic presented by Horty, but with two major differences. First, for each logic in this family the Value-function in Horty's models is replaced by a mapping from moments to propositions (i.e. from contexts to normatively relevant properties) and a set of betterness relations at moments (cf. [2]).

Secondly, the semantic clause for $O[\alpha \text{ estit}: \varphi]$ is different. Temkin argues that the 'better than' relation is non-transitive [4]. I therefore want to model both moral theories with a transitive and a non-transitive betterness relation. To achieve this I introduce a new semantic clause inspired by Van De Putte and Straßer's work on non-smooth preference relations [5].

References

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Physicians' religious beliefs: the Belgian medical debate about the caesarean section (1840-1914)

Jolien Gijbels (PhD student, KU Leuven)

This paper discusses how Belgian doctors dealt with religious beliefs in their medical practice in the nineteenth century, using the medical discussion of the caesarean section as a case study. In this period obstetricians in Belgium and abroad faced a dilemma as caesareans were highly mortal for women and other alternative operations – medical abortion and craniotomy – had fatal consequences for the unborn. Surgery to remove the foetus was especially controversial in the eyes of doctrinal Catholic physicians who attached particular importance to Catholic doctrine about the beginning of human life. Whereas many Catholic physicians preferred the caesarean section, liberal practitioners often saw no harm in sacrificing the unborn foetus – “the lesser of two evils” – in order to save the mother.

Until today, historical understandings of the ways in which physicians dealt with religious concerns in the medical profession remain limited. In the past years medical historians showed how mutual interactions between the fields of religion and medicine stimulated new doctrines and practices, yet the role of Catholic and liberal physicians' religious beliefs within that medical field awaits research. The debate about the caesarean section is particularly revealing on this point, because the absence of a clear-cut scientific solution for obstructed labour exposed the ideological fault lines between Catholic and liberal doctors.

In Belgium, the nineteenth-century medical field was marked by ideology, yet diversity of opinion did not necessarily imply conflict. Most physicians were looking for a general scientific compromise that suited every medical practitioner. By analysing the arguments and codes of conduct in the debate about the caesarean section, I will firstly highlight religion's room for manoeuvre in the medical field, secondly I will show how doctors succeeded in reaching agreement despite ideological diversity.

Feasibility of Yombe paremias in non-monotonic logic

Philemon Kongo Muanda (postdoc, UCL)

In this paper, I talk about Yombe paremias, sentences that express sayings and proverbs, which embody a special sort of logical reasoning in African culture. Paremias are particular sentences of the arguments of common sense, used in a dialectic procedure, according to a number of contemporary logicians. In non-monotonic logic, one type of paremical reasoning can be analyzed as feasible reasoning, although it seems to be a rigid and indexical formula yielded by abductive inference. First of all, my analysis is focused on Yombe paremical inference, named the inference- κ , and on its modality giving to the reasoning a special structure as *engraved*

formula once and for all. Then, I propose an interesting constitutive theory for feasible *paremical* reasoning in non-monotonic logic, relying on McCarthy's circumscription theory adapted by Lifschitz to the arguments of common sense through the minimization-based approaches. Finally, I intend to show the fecundity of my method throughout some examples, proving by this way that, as a special form of reasoning, Yombe paremias can be treated by the McCarthy approach of circumscription via Lifschitz adaptation.

The body and the soul: Catholic legitimation of medical aid in the Belgian Congo (1925-1939)

Maarten Langhendries (PhD student, KU Leuven)

Historians of the colonial era have long abandoned the idea of the colonial project as something purely political or economic. The last decades, it has become clear that science, hence also medicine, was deeply intertwined with the colonial endeavour. Also in the Belgian Congo, medical aid served as a justification for the Belgian presence. Alongside the state, the Catholic church also participated in medical work in the colony. But the motivation of religiously inspired doctors was clearly different from that of their non-religious counterparts, and can be described as an entanglement of medical, moral and religious arguments.

Humanitarianism and medical aid was a first legitimation for their interference in local societies. But the role these Catholic doctors envisioned for themselves went beyond sheer medical intervention. Specifically in the discussion on reproductive health, it is clear that doctors also claimed to have a moral duty. Medical counselling of pregnant women and young mothers created a space in which Catholic doctors could undermine not only Congolese visions on motherhood and the authority of native healers, but also non-medical local traditions and beliefs. Through his public religious life, the doctor would also set an example and influence the Congolese people in embracing Catholicism. This way, the doctor stood together with the missionary as an agent of Catholicism and civilization.

Of course, this vision of a shared medical and religious project is an idealization. For a lot of doctors, this became painfully clear as the 1930s gave rise to more and more tensions within the colonial ranks. In my paper, I will examine this interplay of medical and moral arguments in the legitimization of Catholic medical work in the Belgian Congo, and confront idealizations of this interplay with the reality of the colony. Using both Catholic propaganda and personal documents of doctors, I will shed some light on how Catholic doctors perceived both themselves and their work, thus offering more insight in the motivations of Belgian religious colonial agents and their legitimation of the colonial project.

Distances between formal theories

Koen Lefever (postdoc, VUB)

In the last few decades, the concept of equivalence between theories has become important for studying the connections between formal theories. In the literature, there have been several methods and definitions for working out if two theories are 'equivalent' (essentially the same) or not. Many interesting results have been derived from investigating such equivalence.

We can also look at the question starting from non-equivalence. Given two non-equivalent theories (according to any chosen definition of theory-equivalence), some natural questions arise: (1) Can these theories be modified into equivalent theories (in a non-trivial way)? (2) If this can be done, can we do it in finitely many steps? In other words, what is the degree of their non-equivalence?

In order to investigate some ways to measure how far two theories are from each other; we introduce a framework that can give a qualitative and quantitative analysis of the connections between formal theories. We focus on formal theories that are formulated in any of the following logical systems: sentential logic, ordinary first order logic (FOL), finite variables fragments of FOL and/or infinitary versions of FOL. We develop several notions for distances between theories, we discuss these notions and we make comparisons between them.

We provide means to measure distances (and explore connections) between formal theories. We introduce two main notions for such distances. The first one is that of *axiomatic distance*, but we argue that it might be of limited interest. The more interesting and widely applicable notion is that of *conceptual distance* which measures the minimum number of concepts that distinguish two theories. For instance, we use conceptual distance to show that relativistic and classical kinematics are distinguished by one concept only. We also develop further notions of distance, and we include a number of suggestions for applying and extending our project.

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John Smeaton's contribution to the debate over the conservation of motive force

Andrew Morris (PhD student, VUB)

Since the seventeenth century, natural philosophers have agreed that motive force was conserved in collisions. In this paper, I would like to give a broad overview of how this consensus was interrupted for a fairly short period at the end of the eighteenth and beginning of the nineteenth centuries. Partisans of the controversial theory of *vis viva*, or living force, claimed that motive force was lost in inelastic collisions, because, they argued, some force must be used up in changing the shape of a body. It was only in the 1840s that it was accepted that *vis viva* – which became known as energy – was not lost, but transformed into heat.

Between 1752 and 1782, British engineer John Smeaton carried out a series of experiments which showed that motive force was lost in inelastic collisions, and that this loss explained the difference in efficiency between undershot and overshot waterwheels. I will examine how this viewpoint gained traction, and how the earlier insistence on the conservation of motive force – shared by ‘Cartesians’, ‘Leibnizians’ and ‘Newtonians’ – was temporarily suspended as the new scientific and technological outlook of the industrial revolution emerged. According to this outlook, industrial productivity was predicated on the expenditure of labour, and thus motive force, in the manufacture of useful or valuable objects, thereby contradicting the claim that motive force was conserved.

Simple necessity in Aristotle's *Physics* II.9

Takashi Oki (postdoc, Nagoya University)

Aristotle discusses simple necessity in *Physics* II.9. In order to understand what he means by simple necessity (199b34-35), I examine the wall example (200a1-5) and his reply to it (200a5-15), while considering the contrast between hypothetical necessity and simple necessity. Simple necessity in the wall example has been interpreted by scholars in various ways: (S1) ‘Certain conditions *necessitate* the coming to be of the wall’ (Ross 1936); (S2) ‘The presence of the stones, etc. is *simply necessary*’ (Charles 1991); and (S3) ‘The hardness of the iron is *necessary in itself, regardless of the goal*’ (Irwin 1990). While showing that these suggestions are misguided, I argue that simple necessity in the wall example means that (S4) ‘The necessary nature that the stones, etc. have causes the wall to come to be *without the goal hypothesized*’, and explain why Aristotle thinks of (S4) as problematic. In doing so, I argue that the operation of hypothetical necessity, as contrasted with that of simple necessity in the sense of (S4), must be interpreted as forward-looking, rather than backward-looking (*pace* Ross 1936). A close examination of simple necessity in the wall example and of Aristotle’s reply to it also reveals that, in Aristotle’s view, the stones, etc. operate *as the material cause* only if the final cause is hypothesized, and that it is a mistake to think that in the wall example the material cause is said to operate alone (*pace* Cooper 1985). The material cause and the final cause work in tandem.

Lambert on the mathematical method: The connection between postulates and abstraction

Sylvia Pauw (PhD student, UGent and University of Amsterdam)

This paper argues that the postulates that Lambert deems essential to his mathematical method allow him to provide an account of the nature of general concepts that has important advantages over the one advanced by Wolff. Just like his predecessor Wolff, the Swiss mathematician and philosopher Lambert pleads for the introduction of a ‘mathematical method’ in philosophy and in all of the special sciences. Lambert criticizes Wolff’s understanding of this method. According to Wolff, a scientific discipline that is organized according to the mathematical method should deduce all of its claims from *definitions*. Lambert disagrees with this view. He points out that the real basis of Euclid’s geometry consists in his axioms and postulates, not in his definitions. Lambert argues that there are good reasons for this, and that other scientific disciplines should be grounded in axioms and postulates as well (see also Laywine (2010); Dunlop (2009); Heis (2014); cf. Wolters (1980, esp. pp. 51-54, 81-95)).

The past years, scholars have developed an increasing interest in Lambert’s account of the role of postulates. In this paper, I shed further light on this topic by placing Lambert’s views on postulates in the context of his discussion of abstraction. As Cassirer (1922 [1907], esp. pp. 534-546, 542-544; 1910, 24-26) points out (cf. Wolters 1980, 96-97), Lambert distinguishes two ways of obtaining general concepts: ‘philosophical’ abstraction, which Lambert finds in Wolff, and ‘mathematical’ abstraction, which he finds in mathematical works. Mathematical abstraction has great advantages over philosophical abstraction, in Lambert’s eyes. I argue that Wolff’s account of abstraction does indeed have problems that Lambert’s ‘mathematical’ abstraction avoids, and that Lambert’s postulates and axioms are needed to make this type of mathematical abstraction possible.

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Confronting historical to current requirements of mathematical foundations to highlight their common features

Stéphanie Ponsar (PhD student, UCL)

The need for foundations of mathematics appeared at the end of the nineteenth, beginning of the twentieth century. At that time, mathematics was undergoing an existential crisis due to the existence of paradoxes in Frege's formulation of set theory and to the rise of abstraction mainly in geometry. To solve these issues, Hilbert proposed his program as a list of 23 problems paving the way for the future of mathematical research at that time.

Currently, a wide variety of conceptions of what foundations of mathematics should be exist amongst the community of philosophers like Landry and Marquis, McLarty, Maddy or Hellman. This is in particular illustrated in the conceptions they have of the role of category theory as a founding theory for mathematics. Indeed, category theory is proposed as a possible candidate of foundations of mathematics. However, it is not unanimously accepted as such and the question is still a matter of controversy.

The differences between the current conceptions appear in their various components: logical, semantic, ontological, epistemological and metaphysical. We propose to clarify the differences and common requirements of the current authors to provide a better understanding of what foundations of mathematics should be. These expectations of mathematical foundations will be confronted to the original requirements of the program of Hilbert. From that comparison, the common basic features of mathematical foundations will be highlighted and will be applied as complementary criteria to the case for category theory as a founding theory of mathematics.

Is logic empirical?

Sam Rijken (MSc student, Utrecht University)

In this essay, I explore the intuition that logic is not empirical. Anti-exceptionalists about logic, e.g. Priest, Williamson, and Hjortland, have recently claimed that logical theories are continuous with scientific theories, and that its method is continuous with the scientific method. Because of this, it is claimed that logical theories are revisable on the same grounds as scientific theories: the criteria that speak in favour of one theory over another should be similar in both fields. For the sake of argument, I formulate three often-mentioned virtues of scientific theories (parsimony, elegance, and adequacy) that I use to identify on what grounds logical disputes are to be settled. Firstly, then, I discuss why one's conception about the nature of logic is important for theory choice, and why different conceptions lead to different choices of logical theory. Secondly, I argue that logic is not revised on the same grounds as scientific theories because empirical evidence does not play the same role in both methodologies. Logic is not empirical in the same sense as science is. A natural counterexample to the claim that logic is not empirical is the case of quantum logic, which is often presented as a clear example of empirically

motivated theory choice in logic. But it is also essentially the only example of empirically motivated theory choice. Finally, thus, I argue that the case for quantum logic was not empirically motivated. I conclude that, if my arguments are successful, there are reasons to assume that theory choice in logic is not directly analogous to theory choice in science but that its methods need to be independently motivated and justified, and that there are no concrete cases where logic has been revised on empirical grounds. Therefore, contrary to the assumption made by the anti-exceptionalists, logic does not seem to be empirical.

Formal learning theory and rationality in learning the natural language

Aleksandra Samonek (PhD student, UCL)

Formal learning theory (FLT) allows us to study mathematically the process of convergence to true and informative beliefs. Even though FLT is concerned with representing the process of knowledge acquisition adequate for an idealized learner and not, e. g., an average human learner, various research studies like those by Waelti et al. (2001), Fletcher et al. (2001), Gläscher and Büchel (2005) have demonstrated the contribution of FLT to understanding the process of learning in humans. In this talk we shall discuss how FLT can be used to represent learning of the semantics of the natural language.

We will explain how FLT is used in representing the coordination of establishing the meaning in a linguistic community which is semantically non-uniform. The members of such a community do not rely on a shared model which indicates the reference of linguistic expressions in operation, but instead negotiate the meaning by using similar procedures of arriving at the reference. This approach to natural language semantics has been used, e. g. by Kalocinski (2016) to represent learning of natural language quantifiers, but has its roots in Barwise (1979), DeGroot (1974), Stanosz (1999) and many others.

We conclude with a proposal of how this FLT-based approach to natural language semantics can be adapted into a representation of the process of learning the conditional sentences in the natural language. Our proposal will be compared to a Bayesian approach proposed by Hartmann and Rafiee Rad (2016) in which agents can learn from conditional information by using the conditional probability assignment as a constraint on the newly obtained probability distribution while preserving the causal structure of the piece of information.

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Two models of science, two models of falsification

Massimiliano Simons (PhD student, KU Leuven)

Within philosophy of science the notion of falsification, as popularized by Karl Popper, has proven to be enormously influential. Although there were earlier candidates, it is often seen as the clearest example of a normative criterion in the philosophy of science. Good science is science that can be falsified. However, from the 1960s on, the notion has been fiercely criticized. Authors such as Thomas Kuhn or Paul Feyerabend argued that falsification as a criterion for good science fails once confronted with the history of science.

A fresh restart for the debate surrounding falsification could be found, however, within recent Francophone philosophy of science. Linked to authors such as Isabelle Stengers and Vinciane Despret, a different type of a normative criterion, developed from the 1990s on, can be fleshed out. Their notion comes close to that of falsification, but differs in significant ways. Stengers, for instance, uses the normative principle of ‘risky science’ and Despret applies this similarly to the field of ethology and psychology. Good and risky science refers to scientific practices that allow for the possibility that the questions and identity of the subject, the scientist, can be redefined by the object of research. The scientist has to run the risk of being redefined during his or her research. Bad science, however, merely imposes its questions on the object, receiving expected answers and allows for no possibility of a redefinition of the subject.

The main question that will be asked is how this new notion of falsification relates to the Popperian one and whether or not it succeeds in escaping the problems associated with this traditional notion. Two elements will be stressed. Firstly that, within the work of these authors the focus is not a falsification of a specific hypothesis, as it was for Popper, but rather a falsification of what one could call a ‘regime of articulation’. Secondly, and contrary to the model of Popper, it is also more deeply informed by a historical perspective on science, since the authors are linked in a critical way to the tradition of French historical epistemology.

The persona of the Catholic physician: The Belgian Society of Saint-Luc (1922-1965)

Reinhout Vander Hulst (PhD student, KU Leuven)

The historiography of Belgian medicine indicates that the Catholic world had an ambiguous attitude towards medicine. On the one hand, the church intelligentsia was reluctant to embrace science as an essential characteristic of modern medicine. On the other hand, Catholic physicians saw their complete devotion to the sick as an expression of their faith in God. In the aftermath of World War I political Catholicism in Belgium was in relative decline. As a reaction to this evolution, so-called Catholic Action organisations sprung up in all spheres of Belgian society. These organizations worked under the auspices of the church establishment and their main aim was to rechristen society through a specific emphasises on youth mobilisation. In this way a number of physicians founded *the Société Médicale Belge de Saint-Luc* in 1922. This medical association had an outspoken Catholic profile and argued more than ever that medicine and religion were highly complementary. The society saw itself as essential in the battle against moral decay. The Catholic physician perceived his medical activities more as a vocation akin to that of the priest than as a profession. By analyzing the journals of the society and building on the medical vocation concept introduced by Guillemain (2009), I will consider how these Catholic physicians balanced their professional and religious identities.

References

How can Frege reject the theory of types?

Wim Vanrie (PhD student, UGent)

I present a puzzle concerning Frege's rejection of Russell's theory of types. At first sight, Frege provides some clear reasons for this rejection: the theory of types is committed to a denial of the law of excluded middle, and undermines the absolute generality of logic, crucial to Frege's own philosophy. I argue, however, that it is harder to make sense of Frege's objections than first appearances might suggest. The problem is at least two-fold. First, from the logical point of view of the theory of types, Frege's objections are confused. Once the type distinctions advanced by the theory of types are taken seriously, no sense can be made of the idea that the theory of types is committed to a denial of the law of excluded middle, nor of the idea that it undermines the absolute generality of logic. Second, it is not clear how to make sense, from within Frege's own logical point of view, of the very idea that one can understand and meaningfully discuss an alternative logical system. Frege's own logical system, initially advanced in his *Begriffsschrift* and further developed in his later works, presents a symbolic framework wherein all meaningful thoughts can be expressed. What does not find expression in the system, must be regarded as nonsensical. But this is exactly the faith that befalls the theory of types: its type-distinctions cannot be expressed in Frege's logical system. Therefore, it is not even clear how Frege's remarks about the theory of types can be construed as meaningful to begin with, from his own logical point of view. By his own lights, it is not clear what Frege is doing, exactly, when discussing and rejecting the theory of types.

The perfect surprise

Leander Vignero (PhD student, KU Leuven)

In this talk, I explore the familiar phenomenon of surprise. Much has been said about this phenomenon in cognitive science and computer science, yet philosophers have largely ignored it. I argue that this neglect is unwarranted. Indeed, surprise is as legitimate a topic of epistemological study as knowledge itself, since it clearly helps us deal with real-life epistemic situations. Understanding surprise is not merely of epistemological importance, other fields might also benefit from this research: computer science, cognitive science, ... The main goal of this work is threefold. First, I want to criticise the existing literature in computer science and logic for failing to give a good descriptive account of what surprise is. Moreover, I show that this failure shines through empirically. Secondly, I will give an apt philosophical account of surprise, highlighting its epistemic significance. This will also clarify some of the empirical issues faced by the current literature. Finally, I give a formal framework to think about surprise. More specifically, I develop a probabilistic dynamic epistemic logic called *SURPRISE!* that succeeds at formalizing the relevant philosophical concepts. As an added bonus, the added expressive power allows us to capture a richer variety of scenarios.

Formalizing the ethics of war

Nathan G. Wood (PhD student, UGent)

In the first four chapters of my PhD dissertation, I discuss the theoretical underpinnings of the Just War principles of *necessity* and *proportionality*, in order to lay the foundations for a formal treatment of those concepts. Then, using these basic understandings, I develop a *stit*-like account of what it means to carry out an action which is both necessary and proportionate (in the Just War Theoretic sense of these terms). This formal ethical account is important to develop as the concepts can issue widely divergent permissions and obligations depending on variations in time, ability, or others' actions (to name just a few), and a structural formal account can allow us to more easily clarify these complicating factors and better understand how they impinge on the morality of certain courses of action in dynamic decision-making scenarios.

In developing the formalizations of *necessity* and *proportionality*, I begin with a basic notion of *seeing to it that* something is the case (hereafter, *stit*) to explore what outcomes "belong" to which agents. *Stit* theory already has a working minimal representation of the changing abilities of agents over time, represented by a vertically branching tree denoting histories that the agent's actions can make possible or impossible at given moments, and with this it is possible to model the most important aspect of *necessity* and *proportionality*, namely their sensitivity to agents' abilities at particular moments. From this minimal single-agent *stit* model of the principles, I then explore how multi-agent models might be constructed, how interaction between agents might affect the formalizations of the principles, and whether the end results still track to our intuitive understandings of *necessity* and *proportionality*. This is all still work-in-progress, and many findings are preliminary only, but the formalizations being developed mark an important contribution of formal philosophy to moral theorizing.

Epistemic injustices and truth commissions

Dietlinde Wouters (PhD student, UGent)

Governments of countries in political transition after a period of severe violence, such as a dictatorship or a civil war, have to make important decisions about how to deal with the violent events of the past. The form of justice associated with these periods of political change is called transitional justice (Teitel, 2003, p. 69). Since the '80s, truth commissions have been a popular mechanism in contexts of transitional justice. A truth commission can be defined as:

[...] an ad hoc, autonomous, and victim-centered commission of inquiry set up in and authorized by a state for the primary purpose of (1) investigating and reporting on the principal causes and consequences of broad and relatively recent patterns of severe violence or repression that occurred in the state during determinate periods of abusive rule or conflict, and (2) making recommendations for their redress and future prevention. (Freeman, 2006, p. 18)

In my talk, I will analyse the practice of truth commissions by means of social epistemologist Miranda Fricker's notion of epistemic Injustice. In her book *Epistemic Injustice, power and the ethics of knowing*, epistemic injustices are defined as wrongs done to someone specifically in their capacity as a knower. I will discuss which epistemic injustices occur during the period of violence and oppression preceding a truth commission. Then, I will show how the notion of epistemic injustices can be used to emphasize the epistemic value of testimony in truth commissions. The establishment of a truth commission can be seen as an answer to many epistemic injustices, however, its organisation does not eliminate all epistemic injustices. Some

existing injustices are difficult to eradicate, and some new forms of epistemic injustices emerge.

References

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Venue

The conference venue is Royal Academy of Science, Hertogstraat 1 rue Ducale, B-1000 Brussels, Belgium, Ockeghemzaal (<http://www.kvab.be/nl/zalen/ockeghemzaal>).

