

I begin first by presenting my fields of competence and then present those in which I am currently doing research and I am most interested in for the next years. As for the other attachments in my applications, all words like this lead to some pages on my website which specify more content and/or give proof of my statements.

## Fields of Competence

I list here the fields where I developed competence during the last years. I chose only to consider fields in which I took a considerable amount of *graduate* courses in and neglect those where my expertise is too general, not deep, or only at an undergraduate level. This clearly does not imply that I have no competence or interest in other fields like Programming, Analysis, Ethics, Political Philosophy or History of Philosophy, ecc...

### Philosophy of Mathematics & Logic

My main interest, even before entering university, and which led to the choice of obtaining degrees in both Mathematics and Philosophy, was in the Philosophy of Mathematics and Logic. This interest was sparked after reading the Oxford Handbook of Philosophy of Mathematics & Logic. I was first introduced to the more foundational topics by Leon Horsten at the University of Constance, who emphasised the importance of developing, alongside philosophical maturity, a strong level of mathematical competence, which is essential for deeply understanding the complexity of the primary debates. During my time there, I also attended Prof. Horsten's course on the Philosophy of Gödel and another on Paradoxes and Theories of Truth.

I subsequently moved to Munich, where I engaged with courses and seminars at the MCMP. These included seminars by Prof. Hannes Leitgeb, lectures by Prof. Edward Zalta, and the course *Philosophy of Logic* by Dr. Marra. I also attended *Category Theory for the Working Philosopher* by Dr. Dougherty, for which I wrote Structure on Models, engaging with the literature by Prof. Hans Halvorson.

At the ILLC in Amsterdam, I deepened my expertise through the course Philosophy of Logic by Thomas Schindler, which focused on theories of truth. I will then write my Master Thesis with the research group on Theories of Truth lead by Thomas Schindler.

### Set Theory

I first introduced myself into Set Theory during the 1st Semester of my bachelor at the University of Constance, during the 2nd Semester I then followed Advanced Set Theory and got introduced into Forcing. I then used set theory frequently in most of the essays I wrote for my B.A. Philosophy (LMU) but couldn't find the right place where to deepen my knowledge at the LMU Munich other than with some helpful discussions with Prof. Peter M. Schuster who then co-supervised my Bachelor Thesis. At the ILLC Amsterdam I will follow next semester a course in Rudiments in Set Theory (Lecture) and, more importantly, am currently following a Research Project in Forcing.

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<sup>0</sup>An updated version of each files uploaded for the application is made available here:  
<https://horreum.pages.dev/1.-Active-and-Works/Academic-Diary/2024/Attachments-to-PhD-Applications>

I have also always been very interested in the philosophical side of it, I visited the 3-days seminar in Philosophy of Set Theory in Pisa with Leon Horsten and others.

## Mathematical Logic

Other than in fields like Set Theory and Category Theory which may be regarded as parts of Mathematical Logic, I followed courses in Model Theory at the University of Constance and also Proof Theory at the ILLC together with a more general course where I got first introduced to Higher Order Logic. I will then follow next semester a second course on Model Theory by Prof. Venema.

I am generally also interested in the more applied sides of Mathematical Logic, for instance, at the LMU Munich I followed the seminar by Prof. Schwichtenberg Constructive Analysis and the use of Minlog.

## Formal Epistemology & Modal Logic

I was first introduced to epistemology and formal approaches to it by Leon Horsten at the University of Constance. At the LMU Munich, I then attended a course in pure and applied Modal Logic. My competence in the field was significantly sharpened at the ILLC Amsterdam, where I followed a course in Modal Logic with a far greater emphasis on its mathematical aspects. Additionally, I attended the course Dynamic Epistemic Logic, one on Meaning, Reference and Modality, and another on Philosophy of Cognition, where I focused on the structural approaches within Gärdenfors' Conceptual Spaces.

## Category Theory

I got first introduced into Category Theory at the MCMP at the LMU Munich by Dr. Dougherty in the course *Category Theory for the Working Philosopher* for which I wrote Structure on Models getting acquainted with the literature by Hans Halvorson. I then followed for my M.Sc. Logic (UvA) at the ILLC the lecture Category Theory and worked with Benno van den Berg on a research project deepening my knowledge on the literature applying category theory to Philosophy of Science, Categorical Foundations of Structuralism. Finally, I used categorical methods also in my Master Thesis on Translation Theory as first suggested by Johan van Benthem. Furthermore, in the next semester I plan taking three more courses relevant to Category Theory: a course in Type Theory at the ILLC taught by Benno van den Berg, and Homotopy Type Theory together with Topos Theory at MasterMath by Paige Randall North and Jaap van Oosten, Utrecht University.

## Philosophy of Science & Metaphysics

First at the University of Constance, I followed courses by Dr. Roberts on Methodology and Metaphysics, then at the LMU Munich I followed the course on Philosophy of Physics by Dr. Dougherty and the course on Axiomatic Metaphysics by Prof. Zalta. At the ILLC I worked then on the literature by Prof. Halvorson in the research project Categorical Foundations of Structuralism.

## Abstract Algebra

I first studied Algebra at the University of Constance at the start of my B.Sc. Mathematics (LMU) with the course in Linear Algebra I and then in Linear Algebra II (Lecture). I then strengthened my skills at the LMU Munich with courses such as Algebra (Lecture) and Commutative Algebra (Lecture). I am looking forward to courses in Algebraic Number Theory, or Algebraic Geometry. Most relevantly though, I am interested in fields of research that connect Algebra with Set Theory and Category Theory such as Algebraic Set Theory.

## Fields of Research

What I expose here are the fields in which I have been able to spend months in active research and in which I can consider myself familiar with the literature, I therefore do not include here fields in which I only followed courses or wrote only essays about. These are also clearly not the only fields I am interested in, many of the less specialised interests have been exposed above when mentioning the fields I feel competent in.

## Translation Theory

I first began working on Translation Theory during my Bachelor Thesis, with its introductory part submitted as a writing sample. I conceive Translation Theory as a field within Mathematical Logic with the potential to become highly influential in Mathematical Philosophy, the Philosophy of Logic, and the Foundations of Mathematics. In the complete version of my Bachelor Thesis, which unified my work in Philosophy and Mathematics, I outlined some of its possible applications.

At the ILLC, I developed a deeper competence in fields crucial for a mature development of Translation Theory. Subsequently, I worked on it within the context of various research projects, including Categorical Foundations of Structuralism, as well as other minor, related projects. The results of this ongoing research will ultimately be consolidated in my Master Thesis, which focuses on the literature by Johan van Benthem while incorporating significant contributions from Truth Theories.

## Structuralism

In recent years, since moving to the MCMP, I have developed a strong interest in Structuralism and have worked on it extensively, most recently through the research project Categorical Foundations of Structuralism. My initial engagement with Structuralism was shaped by Halvorson's categorical approach, and I later expanded my understanding through the works of Ladyman, Leitgeb, and Dougherty.

My approach to Structuralism is primarily syntactical, as I see it as the most promising framework for elucidating the deep connection between formal methods and the physical world. Moreover, I regard Structuralism as a versatile metaphysical framework with potential applications across various domains of philosophy. Some of these, like its role in the Philosophy of Mathematics, are well-established in the literature, while others, such as its application to Philosophy of Mind, were proposed in my research.

Finally, I find that Structuralism offers a broad range of applications to the mathematical side of Translation Theory, enriching it with both practical tools and significant philosophical implications.