Prosjekt: **Humanities in science: Philosophical perspectives in empirical and formal research**

Fagmiljø: **filosofi**

Kontaktperson: **Ingrid Lossius Falkum**

Humanities in science

Differences in methods, assumptions, representations, explanations, understanding and communication create divisions and tensions between scientific disciplines. They also pose challenges for successful integration of science with broader societal concerns. Various parts of the humanities study human understanding, representations and communication. Key examples are research on conceptual and cognitive capacities, on scientific explanation, causation, mathematical representations and structures, and on language acquisition and conceptual development. Collaboration between science and the humanities is thus called for to investigate these aspects across scientific and other contexts, and to find ways in which they can be developed and improved.

There are currently researchers, projects and teaching activities at HF (IFIKK, ILOS, ILN) that answer to this ambition along three key dimensions. (1) The study of linguistic and pragmatic development using experimental methods; (2) the study of scientific representations, explanations and models in philosophy of science, and (3) the philosophical study of mathematics and computational methods. This initiative seeks to bring these approaches together and strengthen their interdisciplinary aspects.

Group

      Ingrid Lossius Falkum, Researcher and project leader (RCN funded project), IFIKK.
      Sebastian Watzl, Associate professor and project leader (RCN funded project), IFIKK.
      Gry Oftedal, Researcher and project leader (RCN funded project), IFIKK.
      Carsten Hansen, Professor (core group CSMN), IFIKK.
      Øystein Linnebo, Professor, IFIKK.
      Rachel Sterken, Associate Professor, IFIKK.
      Nicholas Elwyn Allott, Senior Lecturer, ILOS.
      Janne Bondi Johannessen, Professor (core group MultiLing), ILN.
      (Bergljot Behrens, Professor, ILOS. [Interested, wants to meet next week to discuss])
      Franziska Köder, post-doctoral researcher (RCN funded project), IFIKK.
      Anders Strand, Researcher, IFIKK. Strand coordinates the initiative.

Current potential at the Faculty of Humanities and UiO

At present, there is a unique potential for this kind of approach at HF. The CSMN is now closing down as a centre of excellence, but has had a strong focus on naturalistic accounts of normativity and mentality. Several ongoing externally funded research projects initiated and led by young researchers from the present initiative substantiate this approach: Ingrid Lossius Falkum's project on language acquisition and children's understanding of figurative meaning, Sebastian Watzl's project on the nature of attention, and Gry Oftedal and Anders Strand's project on causal representation and explanation in the study of biological complexity. In the spring 2017, we initiated the "Philosophy and Life Science Research Group" at IFIKK. This is a research group focusing on the interface between philosophy and life sciences broadly construed.

      IFIKK hosts the Toppforsk project Conceptlab, which focuses on how philosophy can account for, and contribute to, conceptual change, engineering and development. The present initiative is complementary to the approach of Conceptlab, and Linnebo provides a natural link between the two. Rather than focusing on concepts, we are interested in other kinds and aspects of representational devices. We focus more heavily on how humanistic perspectives on representation can contribute to

- and learn from - scientific understanding and development, and on how this can facilitate and improve research communication and science-society interaction.

Many additional collaborations and activities are ongoing and interdisciplinary project applications are under review for external funding. Allott and Hansen arrange the popular and interdisciplinary *Norwegian Summer Institute on Language and Mind*. Several of these projects, collaborations and initiatives stem from young researchers in temporary research positions. It is important to secure and strengthen these approaches by making them less dependent on fragmented external funding, and achieve a better integration of this approach in teaching.

Teaching

The present initiative would enable the involved researchers and teachers to make long term plans for the integration of teaching and research in these areas. We strongly believe in the benefits of strengthening collaborative and interdisciplinary teaching at bachelor, master and PhD levels. Our initiative will enable courses with great potential for attracting students, and that integrate different perspectives in a novel but required way. The positions applied for should facilitate, organize and teach parts of these offerings. There are also some limited budget allocations to involve existing national expertise to supplement teaching in these areas. We will:

(1) Establish a set of bachelor courses (støttegruppe, name?) of interdisciplinary and science oriented courses. This will consist of four new courses that will be open for students from other disciplines:

- **Cognitive and conceptual development** collaboration between philosophy, linguistics and psychology.
- **Climate change: scientific, normative and institutional aspects** collaboration between philosophy, climate science and social science.
- **Challenges in medicine and health research** collaboration between philosophy, medicine, economics/political science.
- **The political and scientific importance of generics** [to be decided]

Supplemented by existing courses:

- **Philosophy of biology** Watzl
- **FIL2405 - Philosophical logic and the philosophy of mathematics** Linnebo.
- **The Social Animal: Evolution, Altruism, and Morality** Watzl.

(2) Continue existing and develop new joint master and PhD courses focused on theoretical, normative and societal aspects of science, and on humanistic approaches involving empirical and computational methods.

- **Development of representational devices in science** (Linnebo, Strand, Oftedal in collaboration with ConceptLab, held first time 2016)
- **Conceptual development** (planned PhD course, Falkum and Köder)
- **Bumps at the crossroad between real science and popular science. 'Biology', 'Culture' and the Human Condition"** (Watzl)

(3) Secure the continuation of the *Norwegian Summer Institute on Language and Mind* (Hansen and Allott) http://www.hf.uio.no/csmn/english/research/news-and-events/events/summer-institute-on-language-and-mind-2017.html

(4) Collaborate with Centre for Computing in Science Education (CCSE) lead by Prof. Anders Malthe Sørensen: http://www.mn.uio.no/ccse/english/about/aims-and-vision.html
CCSE seeks to integrate computational methods in courses across different scientific disciplines. This collaboration provides potential for a joint course related to both digital humanities and/or the role of mathematical modelling for philosophy and theory of science. The post-doctoral position applied for will be aimed at the use of computational and mathematical methods in philosophy of science and/or in humanities research. It will include 25% teaching, and it will be natural to allocate responsibility for such a course to the post-doc.

Research
In the following sections we provide extracts and examples of research themes and ambitions along the three dimensions, and examples of overarching themes and how they integrate the dimensions.

Research 1: The study of linguistic and pragmatic development using experimental methods
At the interface between philosophy, linguistics and psychology different perspectives on cognition, communication and language acquisition join efforts. Experimental methods are crucial in this work, and eye-tracking techniques are of particular importance. Eye-tracking equipment has recently been acquired by three different departments at the Faculty of Humanities: IFIKK, MultiLing and ILOS, but there is at present little interaction between the research groups involved. Establishing a HF LAB environment, where equipment and competence can be shared and developed will contribute to further strengthen this interdisciplinary approach at the faculty.
        The research conducted as part of (1) adds to the understanding of our conceptual capacitates, for example how deeply cognitively entrenched concepts are, and how this affects reasoning, communication and interpretation. These themes provide an important interface with topics in Research 2 and 3.

Research 2: The study of scientific representations, explanations and models in philosophy of science
Related to the recently initiated *Philosophy and Life Science Research Group*, we will strengthen the collaboration with the life sciences, in particular by the suggested joint position between IFIKK and UiO:Life Science.
        Research themes include: The normativity of scientific classification: The molecular and genetic focus in recent cancer research and personalized medicine has given cancer categorizations in terms of genetic and molecular characteristics, with a goal to target the sub-types differently, for examples by binding to cancer specific receptors.

Research 3: The Philosophical study of mathematics and computational methods
In the philosophy of mathematics we find accounts of how core mathematical concepts, like SET and INFINITY develop, and on the mechanisms and constraints that play into these developments.
        The centrality of mathematical modelling and computational methods in contemporary science provides new possibilities and challenges when it comes to communicating insights, estimating risks and uncertainty, and judging the relevance of evidence.

Research: Overarching themes and integration
Improved communication of scientific knowledge is crucial for dealing with the grand societal challenges. This is particularly evident in the cases of climate change and health challenges.

Humanities research described above can be used to improve communication by making sources of miscommunication explicit, and by assessing how scientific use of concepts squares with deeply entrenched concepts and reasoning patterns. For example by revealing how cognitive heuristics may affect interpretation of causal and generic statements.

A proper account of the semantics of causal and concepts and the nature of explanations should facilitate the communication of causal knowledge across specialized research contexts, and between research, policymaking and the professions. Recent developments in the philosophy of causation have emphasized the role of defaults in causal inference and explanation (Halpern, Halpern and Hitchcock, Strand and Oftedal forthcoming). These developments provide a framework for analysing how norms, values and implicit assumptions affect reasoning, and can be studied from linguistic-psychological, philosophical and historical perspectives. In addition, such a framework provides resources to analyse some of the controversies concerning the relation between causal explanation of behaviour in psychological, sociological and biological terms.

Operationalizing mental concepts is needed for scientific investigation into cognitive capacities, but it is a notoriously difficult task. At the interface between Research 1 and 2 this task can be approached with the joint resources from different disciplines. For example, intelligence might be operationalized in terms of task responses, while still be understood as conceptually distinct from those responses, and eligible for causally explaining such responses. This, however, is in tension with independence conditions on causal *relata*, formulated in terms of the *Causal Markow* condition in the mathematical causal modelling literature (research 3).

The focus on mathematical modelling and computational methods in the life sciences shows close links between this dimension and research 2. In addition, there are exciting prospects for an increased use of computational methods in humanities research.

Innovative potential

We believe that important innovations in the humanities will be found on the intersection between the humanities and empirical sciences. Humanities research on such interfaces will be able to address important questions not previously attended to, and thereby contribute novel and societally important perspectives.

Potential for attracting external funding

The associate professor positions for which we apply for funding will all include a responsibility to develop projects and apply for external funding. Due to the track record of the group (see below) and the range of potential sources of funding in this interdisciplinary area, we see huge potential for significantly expanding the initiative. External funding will be used to recruit additional PhDs and post-docs, which will strengthen the approach considerably. The track record of the group when it comes to attracting HF external funding is:

Allott: **Reflective Mind** research project (FRIHUMSAM 213068, 2012-2016), project leader Eline Busck Gundersen.
Hansen: Core group member and applicant for **CSMN**, Centre of Excellence, NFR.
Linnebo: **ConceptLab**, TOPPFORSK project, NFR, **Plurals, Predicates and Paradox** ERC Starting Grants Research Project
Falkum: **Acquiring Figurative Meanings** young research talent project (FRIHUMSAM 240324, 2015-2019), **Metonymy in Context and Communication,** personal postdoctoral research fellowship (FRIHUM XXXX, 2011-2015)

Oftedal: **Programmable Cell-like Compartments** convergence environment project UiO: Life Science, project leader Irep Gözen, **Conceptualizing Genetic Information and Genetic Causation in a Systems Biology Framework** post-doc (HUM 177651, 2007-2012)

Oftedal and Strand: **Causation and Reduction in Systems Biology** young research talent project (FRIHUMSAM 231106, 2014-2018), **NanoRedux: Perspectives on Reduction in Nanomedicine** research project pilot (SAMANSVAR ELSA 220637, 2013-2015), **Philosophical Foundations for Systems Biology** research project (NOS-HS 212069, 2009-2015)

Watzl: **Thought and Sense** young research talent project (FRIHUMSAM 240645, 2015-2018)

The range of available funding programs for the kind of interdisciplinary approaches represented in the initiative is currently opening up. For example, several of the research themes described above are central to RRI (Responsible Research and Innovation), and this opens the range of funding sources to most life science and technology programs.

Positions and expenses

We apply for funding for:

- One full time position (AP1) as associate professor in philosophy of science, with responsibility for coordinating teaching and research aspects of the project, and to initiate and facilitate applications for external funding, starting 2019 and financed by IFIKK from 2023.
- One 50/50 shared position (AP2) as associate professor, IFIKK and ILN, starting 50% 2019, full time from 2020, explicit responsibility to seek external funding and coordinate the HF lab environment.
- One 80/20 shared position as associate professor (AP3), IFIKK and UiO: Life Science, starting 2020. 20% covered by UiO: Life Science, we have an ongoing dialogue about this, but no stated commitment at this point. Explicit responsibility to seek external funding, in particular for collaborative projects between HF and UIO: Life Science.
- One four year post-doctoral position (PD) with 25% teaching focusing on computational and mathematical methods in natural science and/or humanities, starting 2019.
- One three year PhD scholarship (PhD) with focus on Life sciences and/or empirical methods in philosophy, starting 2020.
- Two three year 20% professor II positions (PII-1 and PII-2), one to strengthen the interface between philosophy and mathematics, and the other to strengthen the interface between philosophy of science and policy making, preferably from social or political science.
- A part time administrative position to facilitate initiation and coordination, 20% over the first two years.
- Other expenses, including funding for workshops, research stays, additional teaching expenses and parts of the financing for the Norwegian Summer Institute on Language and Mind. Estimated 350.000NOK per year.