

## CURRICULUM VITAE

[19.05.2019]

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**1. DEGREES**

- 2010 Title of Docent (Habilitation), Theoretical Philosophy, University of Helsinki (16.2.2010)
- 2005 Doctor of Philosophy, Ph.D., Department of Philosophy, Theoretical Philosophy, University of Helsinki. The title of the thesis: *Models as Epistemic Artefacts: Towards a Non-Representationalist Account of Scientific Representation* (20.12.2005)
- 2001 Master of Social Sciences, M.Soc.Sc., Social and Moral Philosophy, University of Helsinki (19.11.2001)
- 1991 Master of Economic Sciences, M.Sc. (Econ.), Economics, Helsinki School of Economics (15.2.1991)

**2. OTHER EDUCATION**

The Doctoral Programme on Developmental Work Research and Adult Education DWRAE (a subprogramme of Finnish Graduate School in Education and Learning FiGSEL): 40 compulsory ECTS credits and an additional 40 ECTS credits of foreign and domestic intensive courses.

**3. LANGUAGE PROFICIENCY**

Finnish (mother language)

English (Proficient C2 in listening, reading, writing and spoken interaction and production)

Swedish (Proficient C2 in listening and reading, proficient C1 in writing and spoken interaction)

French (Independent user B2 in reading, basic interaction skills)

Italian (Independent user B2 in reading, basic interaction skills)

**4. CURRENT EMPLOYMENT**

2018 – Professor of Philosophy of Science, University of Vienna (01.08.2018 – )

## 5. PROFESSIONAL EXPERIENCE

### *Academic full-time posts and positions*

- 2013-2018 Associate professor (tenured), University of South Carolina (10.6.2013 – 15.5.2018)
- 2011-2014 Fellow, Helsinki Collegium for Advanced Studies, University of Helsinki (1.8.2011 – 31.7.2014)
- 2010-2011 University researcher, The Department of Philosophy, History, Culture and Art Studies, University of Helsinki. (1.6.2010 – 31.7.2011)
- 2009-2010 Research visit to California Institute of Technology (1.9.2009 – 31.5.2010)
- 2007-2009 Postdoctoral researcher, Academy of Finland (tutkijatohtori), Department of Philosophy, University of Helsinki. (1.1.2007 – 31.12.2009)
- 2006 Postdoctoral researcher, Department of Social and Moral Philosophy, University of Helsinki. (1.9.2006 – 31.12.2006)
- 2006 Postdoctoral researcher, Department of Philosophy, University of Helsinki. (1.1.2006 – 31.8.2006)
- 2005 Researcher, Institute of Art Research, University of Helsinki. (1.1.2005 – 31.1.2005; 1.5.2005 – 31.12.2005)
- 2003 Researcher, Center for Activity Theory and Developmental Work Research, University of Helsinki. (1.1.2003 – 31.12.2003)
- 1999-2002 Ph.D. student, Department of Education, University of Helsinki. (1.1.1999 – 31.12.2002)

### *Non-academic posts and positions*

- 1988-1999 Accounting, auditing and financial management of various profit and non-profit organizations on a free-lance basis 1988-1999.
- 1986-1987 Financial statements analyses in The State Guarantee Fund (Finland).
- 1985 Monitoring the foreign investments of Finnish firms in the Bank of Finland.

## 6. RESEARCH FUNDING AND LEADING EXPERIENCE

### ***Projects (PI):***

*Possible Life: The Philosophical Significance of Extending Biology* (LIFEMODE). ERC Consolidator Grant (1,999,566 €, 1.6.2019 - 31.5.2024).

*Understanding by Engineering: Modeling, Experimentation and Engineering in the Emerging Field of Synthetic Biology*. Academy of Finland, Research Fellowship (434,485 €, 1.9.2015 – 31.8.2020).

*Biological Knowledge through Modeling and Engineering* (SYNBIOMODE) (566,465 €, 1.9.2013-

31.8.2017). Academy of Finland, Research Programme on Synthetic Biology (FinSynBio).

*Models and Modelling: A Philosophical Study of the Role and Significance of Models and Computer Simulations in Scientific Inquiry.* (201,600 €, 1.1.2007-31.12.2009) Postdoctoral researcher's project funded by the Academy of Finland.

*KULTA – Modeling the changing consumer needs* (100,000 €, 1.8.2006 – 30.04.2008) (Project leader, Department of Philosophy, University of Helsinki). The project was part of MASI-programme funded by TEKES – The Finnish Funding Agency for Technology and Innovation. The consortium included the *Laboratory of Computer and Information Science* (Helsinki University of Technology) and the *National Consumer Research Center*.

### **Grants:**

2001	Finnish Konkordia Fund: travel grant
2002	National Science Foundation (USA): travel grant
2003	Finnish Cultural Foundation: one-year scholarship for doctoral studies
2004	National Science Foundation (USA): travel grant
2005	University of Helsinki: grant for finishing doctoral dissertation
2006	Ella and Georg Ehrnrooth foundation: scholarship for post-doctoral studies
2008	Academy of Finland: research abroad
2009	Finnish Cultural Foundation: research abroad
2009	ASLA-Fulbright Research Grant for a Junior Scholar

## **7. SCIENTIFIC EXPERT POSITIONS**

Editor-in-Chief:

- *Science & Technology Studies* (EASST, Official journal of the European Association for the Study of Science and Technology)  
(Editor-in-Chief: 1.1.2007 – 30.6.2010, Member of the Editorial Board 1.7.2010 - )

Referee (journals):

- *British Journal for the Philosophy of Science,*
- *Erkenntnis,*
- *European Journal for Philosophy of Science*
- *History and Philosophy of the Life Sciences*
- *International Studies in the Philosophy of Science,*
- *Journal of Economic Methodology,*
- *Neural Networks,*
- *Outlines: Critical Social Studies.*
- *Philosophical Studies,*
- *Philosophy of Science,*
- *Philosophy of the Social Sciences,*
- *Studies in History and Philosophy of Biological and Biomedical Sciences,*
- *Studies in History and Philosophy of Science,*

- *Synthese*.

Referee (grants):

- *Swiss National Science Foundation*.
- *The Finnish Cultural Foundation*,

Memberships in organizing and program committees (selected):

- *Models and Simulations 8 (MS8)*, Columbia, SC, USA, March 15-17, 2018.
- *25th Biennial Meeting of the Philosophy of Science Association*, Atlanta, GA, USA, November 3-6, 2016.
- *(Re)Engineering Biology: The Emerging Engineering Paradigm in Biomedical Engineering, Systems Biology, and Synthetic Biology*. Center for Philosophy of Science, University of Pittsburgh, USA, April 15-16, 2016
- *5th Conference of the European Philosophy of Science Association (epsa2015)*, Düsseldorf, Germany, September 23-36, 2015.
- *3rd Meeting of the Nordic Network for Philosophy of Science*, Helsinki, Finland, April 23-24, 2015.
- *4th Conference of the European Philosophy of Science Association (epsa2013)*, Helsinki, Finland, August 28-31, 2013.
- *Models and Simulations 5 (MS5)*, University of Helsinki, Finland, June 14-16, 2012.
- *Models and Mechanisms: Special Focus on Cognitive Science*, Tilburg, NL, December 6-7, 2012.
- *14th International Congress of Logic, Methodology and Philosophy of Science (LMPS)* Nancy, France, July 19-26, 2011.
- *33rd Annual Conference of the Cognitive Science Society (CogSci 2011)*, Boston, Massachusetts, USA, July 20-23, 2011
- *Models and Simulations 4 conference (MS4 2010)*, The Institute for the History and Philosophy of Science and Technology at the University of Toronto, May 7-9, 2010.
- *The 2nd Conference of the European Philosophy of Science Association (epsa2009)*, Amsterdam, The Netherlands, October 21-24, 2009.
- *The Second Biennial Conference of the Society of Philosophy of Science in Practice (SPSP 2009)*, University of Minnesota, Minneapolis, USA, June 18-20, 2009.
- *International Joint Conference on Neural Networks (IJCNN 2007)*, Florida, USA, August 12-17, 2007.
- *Applying Peirce* conference, Helsinki, Finland, June 11-13, 2007.
- *9th World Congress of the International Association for Semiotic Studies*, Helsinki/Imatra, Finland, June 11-17, 2007.
- *AMKLC's Symposium on Adaptive Models on Knowledge, Language and Cognition*, Helsinki, Finland, June 15-17, 2005.

Organization of international and national scientific symposia:

- International workshop and Winter School: *Varieties of Modeling in Technoscience: The Case of Synthetic Biology* (in collaboration with Alfred Nordmann, Compugene) Darmstadt, Germany, March 5-10, 2017.
- International workshop: *Models, Mechanisms and Algorithms: Symposium on Philosophical Perspectives on Synthetic Biology*, University of Helsinki, Helsinki, Finland, May 2-3, 2011.
- International workshop: *Modeling, Simulation and Computational Science: Perspectives*

*from different sciences*, University of Helsinki, Helsinki, Finland, 29-30 November, 2007.

- The annual *Days of Semiotics* organized by the Semiotic Society of Finland and the Department of Semiotics in the University of Helsinki (2001- 2006). (National)

Member of the national expert group:

- Academy of Finland, Research programme proposal on Synthetic biology (2011)

## 8. SCIENTIFIC POSITIONS OF TRUST AND ADMINISTRATION

*Member of the executive board:*

- Helsinki Collegium for Advanced Studies, University of Helsinki (2013-2014)
- The National Committee on Philosophy of Science in Finland (2011 - 2014)
- The Finnish Society for Science and Technology Studies (2007 - 2010)
- The Semiotic Society of Finland (2001 - 2009)

*Auditor:*

- The Finnish Society for Science and Technology Studies (2001 – 2006)
- The Semiotic Society of Finland (1998 - 2000)

*Service in the department:*

Department of Philosophy, University of South Carolina:

- Job search committee for assistant professor (2014)
- Graduate Studies Committee (2014 – 2017)
- Undergraduate Studies Committee (2017 - )

Department of Philosophy, University of Helsinki:

- Management group, deputy member (2007 - 2009)
- Member of the group for developing teaching and supervision (2008 – 2009)

## 9. RESEARCH VISITS

- California Institute of Technology 1.9.2009 – 31.5.2010
- Department of Philosophy, University of Bern 1 – 30.11.2017
- Munich Center for Mathematical Philosophy – LMU Munich 16 – 31.10.2017

## 10. PUBLICATIONS

### A REFEREED SCIENTIFIC ARTICLES

#### A1 ORIGINAL JOURNAL ARTICLES (refereed)

1. Knuuttila, Tarja and Mary S. Morgan (2019, in press). "De-idealization – No Easy Reversals." *Philosophy of Science*.
2. Knuuttila, Tarja and Vivette García-Deister (2018). "Modelling Gene Regulation: (De)compositional and Template-based Strategies". *Studies in History and Philosophy of Science*. doi: 10.1016/j.shpsa.2017.11.002
3. Knuuttila, Tarja (2017). "Imagination Extended and Embedded: Artifactual and Fictional Accounts of Models". *Synthese*. doi: 10.1007/s11229-017-1545-2
4. Knuuttila, Tarja and Andrea Loettgers (2017). "What are Definitions of Life Good For? Transdisciplinary and Other Definitions in Astrobiology". *Biology and Philosophy* 32(6): 1185-1203.
5. Knuuttila, Tarja and Andrea Loettgers (2016). "Model Templates Within and Between Disciplines; From Magnets to Gases—and Socio-economic Systems." *European Journal for Philosophy of Science* 6(3): 377-400.
6. Knuuttila, Tarja and Andrea Loettgers (2016). "Modelling as Indirect Representation? The Lotka-Volterra Model Revisited." *The British Journal for the Philosophy of Science* 68(4): 1007-1036.
7. Knuuttila, Tarja and Andrea Loettgers (2014). "Varieties of Noise: Analogical Reasoning in Synthetic Biology." *Studies in History and Philosophy of Science* 48:76-88.
8. Knuuttila, Tarja and Andrea Loettgers (2014). "Magnets, Spins, and Neurons: The Dissemination of Model Templates across Disciplines." *The Monist* 97: 280–300.
9. Knuuttila, Tarja and Andrea Loettgers (2013). "Synthetic Modeling and the Mechanistic Account: Material Recombination and Beyond." *Philosophy of Science* 80: 874–885.
10. Knuuttila, Tarja and Andrea Loettgers (2013). "Basic Science through Engineering: Synthetic Modeling and the Idea of Biology-inspired Engineering." *Studies in History and Philosophy of Biological and Biomedical Sciences* 44: 158–169.
11. Evans, M.R., Grimm, V. Johst, K., Knuuttila, T., de Langhe, R., Lessels, K., Merz, M., O'Malley, M.A., Orzack, S., Weisberg, M., Wilkinson, D., Wolkenhauer, O., and Benton, T.G. (2013). "Do Simple Models Lead to Generality in Ecology." *Trends in Ecology & Evolution* 28: 578–583.
12. Knuuttila, Tarja (2013). "Science in a New Mode: Good Old (Theoretical) Science vs. Brave New (Commodified) Science?" *Science & Education* 22: 2443–2461.
13. Knuuttila, Tarja (2012). "Contradictions of Commercialization: Revealing the Norms of Science?" *Philosophy of Science* 79: 833–844.
14. Knuuttila, Tarja and Mieke Boon (2011). "How Do Models Give Us Knowledge? The Case of Carnot's Ideal Heat Engine." *European Journal for Philosophy of Science* 1(3): 309–334.
15. Knuuttila, Tarja and Andrea Loettgers (2011). "Causal Isolation Robustness Analysis: The Combinatorial Strategy in Synthetic Biology." *Biology and Philosophy* 26(5): 773–791.

16. Knuuttila, Tarja (2011). "Modeling and Representing: An Artefactual Approach." *Studies in History and Philosophy of Science* 42: 262–271.
17. Knuuttila, Tarja (2009). "Isolating Representations vs. Credible Constructions? Economic Modelling in Theory and Practice." *Erkenntnis* 70: 59–80.
18. Tuunainen, Juha and Tarja Knuuttila (2009). "Intermingling Academic and Business Activities – A New Direction for Science and Universities?" *Science, Technology & Human Values* 34: 684–704.
19. Knuuttila, Tarja (2008). "Vain perimmäisillä rakenteilla on merkitystä? Tieteelliset mallit representaatioina ja tiedollisina artefakteina" [Only underlying structures matter? Scientific models as representations and epistemic artefacts] *Ajatus* 65: 201–225.
20. Knuuttila, Tarja (2006). "From Representation to Production: Parsers and Parsing in Language Technology." *Sociology of the Sciences* 25: 41–55.
21. Knuuttila, Tarja, Martina Merz and Erika Mattila (2006). "Computer Models and Simulations in Scientific Practice." *Science and Technology Studies* 19: 3–11.
22. Tuunainen, Juha and Tarja Knuuttila (2006). "Akateeminen työ ja tutkimustulosten kaupallistaminen – mahdoton yhtälö?" [Academic Work and Commercialization of Research Results – An Impossible Equation?] *Tiedepolitiikka* 2006(3): 27–36.
23. Knuuttila, Tarja (2005). "Models, Representation, and Mediation." *Philosophy of Science* 72: 1260–1271.
24. Knuuttila, Tarja and Atro Voutilainen (2003). "A Parser as an Epistemic Artefact: A Material View on Models." *Philosophy of Science* 70: 1484–1495. \*
25. Knuuttila, Tarja (2003). "Is Representation Really in Crisis?" *Semiotica* 143: 95–111.
26. Knuuttila, Tarja (2002). "Signing for Reflexivity: Constructionist Rhetorics and Its Reflexive Critique in Science and Technology Studies" [52 paragraphs]. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research* 3(3).

#### A2 REVIEW ARTICLES (commissioned)

27. Knuuttila, Tarja (2017). Review on Axel Gelfert: 'How to Do Science with Models: A Philosophical Primer'. *The British Journal for the Philosophy of Science* (online)
28. Knuuttila, Tarja (2010). "Scientific Models in Philosophy of Science." *International Studies in the Philosophy of Science* 24: 437–440.
29. Tarja Knuuttila (2007). "Review on Roger E. Backhouse and Bradley W. Bateman (eds.) 'The Cambridge Companion to Keynes'" *Notre Dame Philosophical Reviews*. <http://ndpr.nd.edu/review.cfm?id=9224>

#### A3 BOOK SECTIONS (refereed)

30. Knuuttila, Tarja and Andrea Loettgers (2019). "Magnetized Memories: Analogies and Templates in Model Transfer", in Sune Holm (ed.) *Living Machines? Philosophical Perspectives on the Engineering Approach in Biology*. Routledge.
31. Knuuttila, Tarja and Andrea Loettgers (2018). "Models as Experimental Objects: Mathematical and Synthetic Modeling in the Study of Genetic Circuits", in Bas van

- Fraassen, and Isabelle Peschard (eds.) *The Experimental Side of Modeling*. University of Minnesota Press, 118-147.
32. Knuuttila, Tarja and Andrea Loettgers (2017). “Mathematization in Synthetic Biology: Analogies, Templates and Fictions”, in Martin Carrier, and Johannes Lenhard (eds.) *Mathematics as a Tool*. Boston Studies in the Philosophy of Science, Springer, 37-56.
  33. Knuuttila, Tarja and Andrea Loettgers (2016). “Contrasting Cases: The Lotka-Volterra Model Three Times”, in Tilman Sauer and Raphael Scholl (eds.) *The Philosophy of Historical Case Studies*. Boston Studies in the Philosophy of Science, Springer, 151-178.
  34. Boon, Mieke and Knuuttila Tarja (2014). “Bruch mit dem Epochenbruch. Der Fall der Ingenieurwissenschaften”, in Alfred Nordmann, Hans Radder, and Gregor Schieman (eds.) *Strukturwandel der Wissenschaft. Positionen zum Epochenbruch*. Velbrueck Wissenschaft, 82-96.
  35. Knuuttila, Tarja (2014). “Reflexivity, Representation, and the Possibility of Constructivist Realism”, in Maria Carla Galavotti, Stephan Hartmann, Marcel Weber, Wenceslao Gonzalez, Dennis Dieks, and Thomas Uebel (eds.) *New Directions in the Philosophy of Science*. Dordrecht: Springer, 297-312.
  36. Knuuttila, Tarja and Andrea Loettgers (2013). “Synthetic Biology as an Engineering Science? Analogical Reasoning, Synthetic Modeling, and Integration”, in Hanne Andersen, Dennis Dieks, Wenceslao J. Gonzalez, Thomas Uebel, and Gregory Wheeler (eds.) *New Challenges to Philosophy of Science*. The Philosophy of Science in a European Perspective, Vol 4. Dordrecht: Springer, 163–177.
  37. Knuuttila, Tarja (2013). “Metamorphoses of Meaning: The Concept of the Ideal from a Semiotic Perspective”, in Alex Levant and Vesa Oittinen (eds.) *Dialectics of the Ideal: Evald Ilyenkov and Creative Soviet Marxism*. Leiden: Brill, 145–164.
  38. Knuuttila, Tarja (2013). “Kaupallistuneen tieteen normit” [The norms of commodified science], in Ilkka Niiniluoto, Jaakko Kuorikoski and Risto Vilkkko (eds.) *Talous*. Helsinki: Gaudemus, 168–185.
  39. Knuuttila, Tarja and Andrea Loettgers (2012). “The Productive Tension: Mechanisms vs. Templates in Modeling the Phenomena”, in Paul Humphreys and Cyrille Imbert (eds.), *Representations, Models, and Simulations*. New York: Routledge, 3–24.
  40. Morgan, Mary S. and Tarja Knuuttila (2012). “Models and Modelling in Economics”, in Uskali Mäki (ed.) *Philosophy of Economics*, Handbook of the Philosophy of Science (general editors Dov M. Gabbay, Paul Thagard, and John Woods) Elsevier Science, 49–87.
  41. Knuuttila, Tarja (2011). “In the Grey Area: University Research and Commercial Activity – The Case of Language Technology”, in James Dzisah and Henry Etzkowitz (eds.), *The Age of Knowledge: The Dynamics of Universities, Knowledge and Society*. Studies in Critical Social Sciences. Brill, 289–310.
  42. Knuuttila, Tarja and Jaakko Kuorikoski (2011). “Idealized Representations, Inferential Devices and Cross-Disciplinary Tools: Theoretical Models in Social Sciences”, in Ian Jarvie and Jesus Zamora Bonilla (eds.) *The Sage Handbook of the Philosophy of Social Science*. Bodmin: Sage, 530–550.
  43. Boon, Mieke and Tarja Knuuttila (2011). “Breaking up with Epochal Break: The Case of Engineering Sciences”, in Alfred Nordmann, Hans Radder and Gregor Schieman



- (eds.): *Science Transformed: Debating Claims of an Epochal Break*. Pittsburgh: University of Pittsburgh Press, 66–79.
44. Knuuttila, Tarja and Aki Lehtinen (2010). ”Johdanto: Representaatio – Tiedon kivijalasta tieteiden työkaluksi” [Introduction], in Tarja Knuuttila and Aki Lehtinen (eds.), *Representaatio: Tiedon kivijalasta tieteiden työkaluksi*. Helsinki: Gaudeamus, 7–34.
  45. Knuuttila, Tarja (2010). ”Totuudenmukaisia esityksiä vai monikäyttöisiä välineitä? Mallit tieteellisinä representaatioina” [Truthful representations or versatile tools? Models as scientific representations], in Tarja Knuuttila and Aki Lehtinen (eds.), *Representaatio: Tiedon kivijalasta tieteiden työkaluksi*. Helsinki: Gaudeamus, 331–350.
  46. Knuuttila, Tarja (2009). “Representation, Idealization, and Fiction in Economics: From the Assumptions Issue to the Epistemology of Modelling”, in Mauricio Suárez (ed.), *Fictions in Science: Philosophical Essays on Modeling and Idealization*. New York & London: Routledge, 205–231.
  47. Boon, Mieke and Tarja Knuuttila (2009). “Models as Epistemic Tools in Engineering Sciences: A Pragmatic Approach”, in Anthonie Meijers (ed.) *Philosophy of Technology and Engineering Sciences*, Handbook of the Philosophy of Science (general eds. Dov M. Gabbay, Paul Thagard, and John Woods). Amsterdam: Elsevier Science, 693–726. \*
  48. Knuuttila, Tarja and Martina Merz (2009). “Understanding by Modeling: An Objectual Approach”, in Henk de Regt, Sabina Leonelli and Karl Eigner (eds.) *Scientific Understanding: Philosophical Perspectives*. Pittsburgh: University of Pittsburgh Press, 146–168.
  49. Knuuttila, Tarja (2008). ”Models and modeling ”, in Darity, William A., Jr. (ed.) *International Encyclopedia of the Social Sciences*, 2nd edition. 9 vols. Detroit: Macmillan Reference, 224–226.
  50. Tuunainen, Juha and Tarja Knuuttila (2008). “Determining the Norms of Science: From Epistemological Criteria to Local Struggle on Organizational Rules?”, in Jussi Välimaa and Oili-Helena Ylijoki (eds.) *Cultural Dimensions on Higher Education*, Springer Verlag, 138–153.
  51. Knuuttila, Tarja (2007). “Language Technological Models as Epistemic Artefacts: The Case of Constraint Grammar Parser”, in Gordana Dodig Crnkovic and Susan Stuart (eds.), *Computation, Information, Cognition: The Nexus and the Liminal*. Newcastle: Cambridge Scholar’s Publishing, 280–289.
  52. Knuuttila, Tarja and Honkela, Timo (2006). “Questioning External and Internal Representation: The Case of Scientific Models”, in Lorenzo Magnani and Riccardo Dossena (eds.), *Computing, Philosophy, and Cognition*. Texts in Philosophy vol. 4. London: King’s College Publishing, 209–226.
  53. Veivo, Harri, and Tarja Knuuttila (2005). “Modelling, Theorizing and Interpretation in Cognitive Literary Studies”, in Harri Veivo, Bo Pettersson and Merja Polvinen (eds.), *Cognition and Literary Interpretation in Practice*. Helsinki: Helsinki University Press, 283–306.
  54. Tarja Knuuttila (2005). “Is Representation Really in Crisis?”, in Michael Gane and Nicholas Gane (eds.), *Umberto Eco*. London: SAGE (Masters in Modern Social Thought Series), 113–129.

## A4 CONFERENCE PROCEEDINGS (refereed)

55. Knuuttila, Tarja (2010). "Some Consequences of the Pragmatic Approach to Representation", in Mauricio Suárez, Mauro Dorato, and Miklós Rédei (eds.) *EPSA Epistemology and Methodology of Science: Launch of the European Philosophy of Science Association*, Vol I: Epistemology and Methodology of Science. Dordrecht: Springer, 139–149.
56. Knuuttila, Tarja (2010). "Not Just Underlying Structures: Towards a Semiotic Approach to Scientific Representation", in Mats Bergman, Sami Paavola, Ahti-Veikko Pietarinen and Henrik Rydenfelt (eds.), *Ideas in Action: Proceedings of the Applying Peirce Conference*. Nordic Pragmatism Network. Helsinki, 190–199.
57. Knuuttila, Tarja, Anna-Mari Rusanen and Timo Honkela (2007). "Self-Organizing Maps as Travelling Computational Templates". *Proceedings of IJCNN 2007, International Joint Conference on Neural Networks*, Orlando, Florida, Aug. 12–17, 1231–1236.
58. Honkela, Timo, Tarja Knuuttila and Kevin Hynna (2003). "Framework for Modelling Partial Conceptual Autonomy of Adaptive and Communicative Agents", in Richard Alterman and Davide Kirsch *Proceedings of the 25<sup>th</sup> Annual Meeting of the Cognitive Science Society 2003*. Boston, MA, 569–574.

## B UNREFEREED SCIENTIFIC WRITINGS

## B1 JOURNAL ARTICLES

59. Knuuttila, Tarja (2003). "Transsendenssi. Nyt: Naturalisoitua ja historiallistettua transsendentaalifilosofiaa". *Synteesi* 4/2003: 77–80.
60. Knuuttila, Tarja (2002). "Vesinokkaeläimen transsendenssi." *Synteesi* 1/2002: 103–105.
61. Knuuttila, Tarja and Max Rynänen (2002). "Ecoistin elämää" [Life of an Ecoist]. *Synteesi* 1/2002: 80.
62. Knuuttila, Tarja (2002). "Ideologian loput ja alut: Ideologian mahdollisuus/mahdottomuus postmodernissa teoriassa" [The ends and beginnings of ideology: The possibility of ideology in postmodern theory]. *Synteesi* 2/2002: 3–11.

## B2 BOOK SECTIONS

63. Koskinen, Rami and Tarja Knuuttila (2017). "Elämä ja mahdollinen elämä – filosofisia näkökulmia" [Life and possible life – philosophical perspectives], in Kari Enqvist, Ilari Hetemäki and Teija Tiilikainen (eds.) *Kaikki vapaudesta*. Helsinki: Gaudeamus, 247–263.
64. Knuuttila, Tarja and Hanna Johansson (2013). "Homage à Holmberg/ Pédofil of Boa Vista: Representation, Laboratory and Field Studies", in Laura Beloff, Erich Berger and Terike Haapoja (eds.) *Field Notes – From Landscape to Laboratory*. Finnish Bioart Society, 18–33.
65. Johansson, Hanna and Tarja Knuuttila (2008). "Mitä vitriinissä oikein tapahtuu? *Homage à Holmberg* tieteellisen ja taiteellisen representaation jäljillä" [Whatever happens in a showcase: *Homage à Holmberg* on the trail of scientific and artistic

- representation], in Hanna Johansson: *Hommage à Lauri Anttila*. Helsinki: Kuvataideakatemia/ Finnish Academy of Fine Arts, 40–76.
66. Tarja Knuuttila (2007). ”Rahan tarjonta ja inflation kausaatio: Kausaalinen prioriteetti taloustieteellisessä esimerkkitapauksessa” [The supply of money and causation of inflation: A case study on causal priority], in Heta Gylling, Ilkka Niiniluoto ja Risto Vilkkonen (eds.), *Syy*. Helsinki: Gaudeamus, 175–188.
67. Knuuttila, Tarja (2006). ”Realismi ja representaatio kansantaloustieteessä: Oletusten realistisuudesta mallinnuksen epistemologiaan” [Realism and representation in economics: From the realism of assumptions issue to the epistemology of modelling], in Kakkuri-Knuuttila, Marja-Liisa, Kristiina Rolin & Elina Henttonen (eds.): *Soveltava yhteiskuntatiede ja filosofia*. Helsinki: Gaudeamus, 241–267.
68. Hynnä, Kevin I., Mathias Creutz, Tarja Knuuttila and Timo Honkela (2005). ”On Representation of Action within Real-World Situations”, in Timo Honkela, Kevin I. Hynnä, Kevin, Krista Lagus and Jaakko Särelä (eds.) *Adaptive and Statistical Approaches in Conceptual Modelling*. Helsinki University of Technology. Department of Computer Science and Engineering, Laboratory of Computer and Information Science. Report A75, 56–70.
69. Knuuttila, Tarja (2005). ”Kulttuurin koodista semiosiksen sarastukseen: Umberto Eco semiootikkona”, in Tarja Knuuttila and Max Ryyänen (eds.): *Umberto Eco: Teräsmies, James Joyce ja vesinokkaeläin*. Helsinki: Yliopistopaino, 19–54.
70. Knuuttila Tarja (2005). ”Subjekti, halu ja Edellisen päivän saari”, in Tarja Knuuttila and Max Ryyänen (eds.): *Umberto Eco: Teräsmies, James Joyce ja vesinokkaeläin*. Helsinki: Yliopistopaino, 201–229.
71. Knuuttila, Tarja and Ryyänen, Max (2005). ”Ainakin neljä Ecoa”, in Knuuttila, Tarja and Ryyänen, Max (eds.): *Umberto Eco: Teräsmies, James Joyce ja vesinokkaeläin*. Helsinki: Yliopistopaino, 7–18.
72. Knuuttila, Tarja (2003). ”The Encyclopedia and Semiosis: An Artifactual Perspective”, in Eero Tarasti (ed.): *Understanding/Misunderstanding. Contributions to the Study of the Hermeneutics of Signs*. Imatra: International Semiotics Institute (Acta Semiotica Fennica XVI), 92–102.
73. Knuuttila, Tarja (2000). ”Semiosis and the Concept of the Ideal”, in Vesa Oittinen (ed.), *Evald Ilyenkov's Philosophy Revisited*, Helsinki: Kikumora Publications, 189–204.
74. Knuuttila, Tarja (2000). ”Alter Eco – Toisen teema Umberto Econ romaanissa ‘Edellisen päivän saari’” [Alter eco – The theme of Other in Umberto Eco’s novel ‘The island of the day before’] in Eero Tarasti (ed.) *Ymmärtämisen merkit. Samuuden ja toiseuden ikoneja suomalaisessa kulttuurissa*, Helsinki: Acta Semiotica Fennica VIII. ISI, 210–226.

### B3 CONFERENCE PROCEEDINGS

75. Knuuttila, Tarja (2009). ”The Absent Encyclopedia: Meaning-Making According to Umberto Eco”, *Proceedings of the 9<sup>th</sup> Congress of the International Association of Semiotic Studies*, Helsinki/Imatra June 11–17, 2007.
76. Knuuttila, Tarja (2004). ”What is a Model a Model of?” In Tarasti, Eero (ed.) *From Nature to Psyche. Proceedings from the Imatra International Congresses on Semiotics in 2001 and 2002*. Helsinki: Acta Semiotica Fennica, 182–191.

## C SCIENTIFIC MONOGRAPHS, EDITED VOLUMES

77. Gramelsberger, Gabriele, Tarja Knuuttila and Axel Gelfert (eds.) (2013). Special issue: "Philosophical Perspectives on Synthetic Biology", *Studies in History and Philosophy of Biological and Biomedical Sciences* 44(2): 119–246.
78. Knuuttila, Tarja and Lehtinen, Aki (eds.) (2010). *Representaatio: Tiedon kivijalasta tieteiden työkaluksi* [Representation: from foundation of knowledge to a tool of science]. Helsinki: Gaudeamus.
79. Knuuttila, Tarja, Martina Merz and Erika Mattila (2006). Special issue: "Computer Models and Simulations in Scientific Practice." *Science and Technology Studies* 19(1).
80. Miettinen, Reijo, Juha Tuunainen, Tarja Knuuttila and Mattila, Erika (2006). *Tieteestä tuotteeksi? Yliopistotutkimus muutosten ristipaineessa*. [From science to commodity: University research in transition]. Helsinki: Yliopistopaino.
81. Knuuttila, Tarja and Rynänen, Max (eds.) (2005). *Umberto Eco: Teräsmies, James Joyce ja vesinokkaeläin*. Helsinki: Yliopistopaino.
82. Knuuttila, Tarja and Max Rynänen (2002). Special issue on Umberto Eco: "Monta Ecoa", *Synteesi* 1/2002.

## D PUBLICATIONS INTENDED FOR PROFESSIONAL COMMUNITIES

83. Seppälä, Päivi and Tarja Knuuttila (2012). "Report on Models and Simulations 5, 14–16 June". *The Reasoner* 6(8): August 2012. <http://www.thereasoner.org/>
84. Knuuttila, Tarja (2010). "Monta tietä, sama polku: matkani taloustieteestä semiotiikan kautta tieteenfilosofiksi", in Markku Roinila (ed.), *Miten meistä tuli filosofian tohtoreita*, Helsinki: SFY, 485–491

## E PUBLICATIONS INTENDED FOR GENERAL PUBLIC, WITH CONNECTION TO THE RESEARCHER'S WORK

85. Ijäs, Tero and Tarja Knuuttila (2014). "Tarvitseeko biologia muitakin kuin biologeja? Synteettisen ja systeemibiologian näkökulmia tieteidenvälisyyteen." *Tieteessä tapahtuu* 32(4): 37–41.

## G ACADEMIC DISSERTATIONS

86. Knuuttila, Tarja (2005). *Models as Epistemic Artefacts: Toward a Non-Representationalist Account of Scientific Representation*. Ph.D. Dissertation. Philosophical Studies from the University of Helsinki.

## 11. PRESENTATIONS

## A INVITED PRESENTATIONS (LECTURES, WORKSHOPS AND SYMPOSIA)

**2019**

“Synthetic Models: Concrete and Fictional?” *Imagination and Fiction in Scientific Modeling*, York, UK, May 31, 2019.

“Mechanisms and Epistemic Artefacts: Modeling the Nerve Impulse,” (with Natalia Carrillo-Escalera), *Representation, Idealization, and Explanation in Science*, Auburn AL, USA, April 5-6, 2019.

“The Model-based Theoretical Strategy: Representations, Fictions and Artefacts,” invited lecture in Central European University, Budapest, Hungary, March 26, 2019.

“Model-Based Theoretical Strategy and the Artefactual Approach,” *Scientific Understanding and Representation (SURE)*, Bordeaux, France, February 5-6, 2019.

**2018**

“Multiple Modeling in Tackling Epistemic Opacity,” (with Andrea Loettgers), *SAS’18: Epistemic Opacity in Computer Simulation and Machine Learning*, Stuttgart, Germany, November 28-20, 2018.

“Models and Analogies in Synthetic Biology,” *Models and Templates in Science*, University of Florence, Florence, Italy, November 16, 2018.

“Exploring Genetic Regulation: Modeling in (Multiple) Materialities,” (with Andrea Loettgers) *Varieties of Experiment and Measurement in Technoscience – The Case of Synthetic Biology*, Darmstadt, Germany, September 3-7, 2018.

**2017**

“Imagination Extended and Embodied: Fictional vs. Artifactual Accounts of Modeling”, Institute of Philosophy, *University of Bern*, Switzerland, November 16, 2017.

“Scientific Representation: Strategies of Compartmentalization in Negotiating the Structuralist-Pragmatist Divide” (with Elena Castellani, University of Florence), Munich Center for Mathematical Philosophy, Ludwig Maximilian University of Munich, Germany, October 25, 2017.

“Abstract and Concrete: Fictional and Artifactual Approaches to Modeling” (invited talk), Instituto de Investigaciones Filosóficas, *National Autonomous University of Mexico*, Mexico City, Mexico, April 6, 2017.

“Models, Fictions and Languages of Science”, *Language and Scientific Research: The Role of Language in Basic Science and Applied Science*, University of A Coruña, Ferrol Campus, Spain, March 9-10, 2017.

“Models as Experimental Objects: Constructing Synthetic Genetic Circuits” (invited talk), Philosophy Department, *University of Vienna*, Austria, January 27, 2017.

**2016**

- “Imagination extended and Embedded: Fictional vs. Artefactual Accounts of Models.” Invited talk at the meeting of the *Sociedad Argentina de Análisis Filosófico*, Buenos Aires, Argentina, September 2, 2016.
- “Economic Models as Fictions and Artefacts.” Invited talk at the Centro de Investigación en *Epistemología de las Ciencias Económicas* (CIECE), University of Buenos Aires, Argentina, September 2, 2016.
- “Abstraction, Analogical Reasoning, and Big Data in Modeling Biological Systems.” Workshop on Abstraction, Models and Idealizations in Science Universidad de Valparaíso, Chile, August 29-30, 2016.
- “Abstract and Concrete: An Artefactual Account of Models”, *Idealizations, Fictions, Values in Science*, Dartmouth College, Hanover, USA, May 20-21, 2016.
- “Abstraction and Model Construction in Systems Synthetic Biology” (keynote lecture), *(Re)Engineering Biology: The Emerging Engineering Paradigm in Biomedical Engineering, Systems Biology, and Synthetic Biology*, Center for Philosophy of Science, University of Pittsburgh, <sup>[SEP]</sup>Pittsburgh, USA, April 15-16, 2016.
- “Modelling and Experimentation in the Study of Genetic Circuits” (invited talk), *Instituto de Investigaciones Filosóficas*, National Autonomous University of Mexico, Mexico City, Mexico, March 10, 2016.
- “Artefactual vs. Fictional Accounts of Models” (invited talk), *Instituto de Investigaciones Filosóficas*, National Autonomous University of Mexico, Mexico City, Mexico, March 8, 2016.

## 2015

- “Small Worlds Various Embodied: the Material Dimension of Modelling” (keynote lecture), *Modelling and Representation: How to Make World(s) with Symbols*, The University of Basque Country, San Sebastián, Spain, December 10-12.
- “Counterfactual Storytelling and Fictional Modelling: Friedman vs. Tobin on the Causation of Nominal Income”, *Economic Fictions and the Methodology of Positive Economics*, Boston University, USA, November 13, 2015.
- “Synthetic biology: Turning Biology into an Engineering Discipline”, *Knowledge Transfer and Its Contexts*, Ludwig-Maximilians Universität, Munich, Germany, September 10-11, 2015.
- “What Are the Most Important Societal Challenges of Synthetic Biology?”, *Re-Designing Synthetic Biology – Towards a Constructive Critique of a Technoscience*, University of Freiburg, Germany, July 2-3, 2015.
- “Two Kinds of Modellers”, *Modeling/Modelling* symposium, The Courtauld Institute of Art, London, Great Britain, May 29-30, 2015.
- “Modelling and Engineering in the Study of Genetic Networks”, Seminar on Scientific Representation, *University of Florence*, Italy, May 22, 2015.

“Ways of Entering the Biological Organization: Mathematical Representations and Material Agency”, *Getting There and Falling Short*, Helsinki Collegium for Advanced Studies, University of Helsinki, Finland, May 18-20, 2015.

## 2014

“Modeling, Representing, and Experimenting in the Study of Genetic Circuits”, *Minnesota Center for Philosophy of Science Colloquia*, University of Minnesota, Minnesota, USA, November 21, 2014.

“Modeling/Experimenting: Constructing Synthetic Genetic Circuits” (with Andrea Loettgers), *Modeling and Experimenting*, University of Geneva, Switzerland, June 27-28, 2014.

“Models and Representation: An Artifactual Approach”, Plenary speech at *Triennial Conference of the Italian Society for Logic and Philosophy of Science*, June 18-20, 2014.

“Models as Experimental Objects: Mathematical and Synthetic Modeling in the Study of Genetic Circuits”, *Modeling and Scientific Explanation*, The Van Leer Jerusalem Institute, Israel, 8-10 June 2014.

“Abstract and Concrete: Towards and Artifactual Theory of Fiction in Science”. *Modeling/Modelling* symposium, The Courtauld Institute of Art, London, Great Britain, March 14-15, 2014.

## 2013

“The Lotka-Volterra Model Revisited” (with Andrea Loettgers), *The Philosophy of Historical Case Studies*, University of Bern, Switzerland, November 21-22, 2013.

“Fictions and Models in Economic Theorizing”, *Counterfactual Reasoning in the Sciences and the Humanities*, Université de Genève, Switzerland, July 4-5, 2013.

“Models as Experimental Objects”, Plenary speech at *Philosophy of Science in a Forest 2013: The Triannual Conference of The Dutch Society for the Philosophy of Science*, Leusden, NL, May 23-25.

“Interdisciplinarity at the Grassroots Level: The Modeling Practice of Synthetic Biology” (with Andrea Loettgers), *Philosophical and Historical Perspectives on Interdisciplinarity: Beyond the ‘Two Cultures’ Debate*, Helsinki Collegium for Advanced Studies, University of Helsinki, Finland, February 1-2, 2013.

## 2012

“The Problem of Reflexivity and the Possibility of Constructivist Realism”, *New Directions in the Philosophy of Science*, ESF *The Philosophy of Science in a European Perspective* International Conference, Bertinoro, Italy, October 17-20, 2012.

“Mathematization in Synthetic Biology: Analogies, Templates, and Fictions” (with Andrea Loettgers), *Effectiveness of Mathematization* symposium, Center for Interdisciplinary Research (ZiF), Bielefeld University, Germany, August 9-11, 2012.

“Synthetic Biology: The Combinatorial Modeling Practice” (with Andrea Loettgers). *Modeling/Modelling* symposium, California Institute of Technology, Pasadena, USA, February 23-24, 2012.

**2011**

- “Results-Oriented and Methods-Driven: The Contemporary Modeling Practice”, *Modeling in Ecology: Does Simple Always Equate to General?* And exploratory workshop funded by ESF, London, UK, September 15-16.
- “Varieties of Noise: Analogical Reasoning in Systems Biology” (with Andrea Loettgers), *ESF Philosophy of Systems Biology Workshop*, Aarhus University, Denmark, August 18-20, 2011.
- “The Combinatorial Modeling Strategy of Synthetic Biology” (with Andrea Loettgers), *Models, Mechanisms and Algorithms: Symposium on Philosophical Perspectives on Synthetic Biology*, University of Helsinki, Finland, May 2-3, 2011.
- “Synthetic Biology and the Functional Meaning of Noise” (with Andrea Loettgers), *Interdisciplinary Exchanges as the Object of Philosophical Inquiry*, Helsinki Collegium of Advanced Studies, Finland, March 3-4, 2011.
- “An Artefactual Approach to Scientific Modeling”, *Modeling/Modelling* symposium, California Institute of Technology, Pasadena, USA, January 6-7, 2011.

**2010**

- “Modeling and the Problem of Scientific Representation”, *Order of Nature or Matrix of Man* – symposium, Finnish Academy of Fine Arts, Helsinki, Finland, October 15, 2010.
- “Comment on Ismo Koponen: Models and Modelling in Physics: From Maxwell to Present Days”, *Models in Physics and Cosmology* – seminar, Tieteiden talo, Helsinki, September 27-28, 2010.
- ”Comment on Socio-Cognitive Modelling (Timo Honkela)” *Modelling in the Social Sciences: Interdisciplinary Comparison*, Helsinki Collegium of Advanced Studies, June 17-18, 2010.

**2009**

- “Modeling and Representing: An Artefactual Approach to Representation”. Guest lecture in the Department of Philosophy, University of Virginia, USA, November 11, 2009.
- “How do models give us knowledge?” (with Mieke Boon) *Science Studies Colloquium Series*. University of San Diego, USA, October 26, 2009.

**2008**

- ”How to Approach Model-Based Scientific Practice?” Workshop: *Model-Based Representation in Scientific Practice*. National University of Singapore, September 5-6, 2008.
- “Modeling and Representing: How to Approach the Model-Based Scientific Practice”, *Models/Simulations Seminar*, l'Institut d'histoire et de philosophie des sciences et des techniques Université de Paris I, France, June 9-13, 2008.
- “Representation, Idealization and Fiction in Economics: From the Assumptions Issue to the Epistemology of Modelling”, *EIPE Research Seminar*, Faculty of Philosophy, Erasmus Universiteit Rotterdam, Netherlands, May 19, 2008.



”Model, Image and Representation: Established interrelationships and possible cross-disseminations”, *The Image as a Model – Das Bild als Modell – seminar*, University of Lucerne, Switzerland, January 31 – February 1, 2008.

## 2006

“Representation and Realism in Economics: From the Assumptions Issue to the Epistemology of Modelling”. Conference on *Scientific Representation: Idealizations, Fictions, Reasons*. Universidad Complutense de Madrid, Spain, February 2-4, 2006.

## 2005

“Models, Machines, Mechanisms: Or, to Know One is to Build One?”. *Mechanisms-workshop*, University of Lund, Sweden, December 12-13, 2005.

“Philosophy of Science Meets STS: The Case of Scientific Models”. *Science, Reason and Society: A symposium on the place of philosophy in the science and technology studies*. Swiss Association for the Studies of Science, Technology and Society. Basel, Switzerland, July 7-8, 2005.

“Models as Epistemic Artefacts”. *Workshop on Models*. Centre for Philosophy of Natural and Social Science, London School of Economics and Social Science. London, UK, March 4, 2005.

## 2004

“From Representation to Production: Parsers and Parsing in Language-Technology”. *International Symposium: Computer Simulation – Practice, Epistemology, and Social Dynamics*. Institute for Science and Technology Studies, Bielefeld University, Germany, June 17-19, 2004.

“Models, representation and mediation”. *Models in science and in the philosophy of science - symposium*, University of Tartu, Estonia, April 22, 2004.

## 2000

“After the Modern: Semiotics as Postmodern Philosophy?”. *Seminar on "Four Ages of Understanding" by John Deely*, Houston. Hommage à Oscar Parland, University of Helsinki, Finland, December 1, 2000.

## B PRESENTATIONS GIVEN IN CONFERENCES AND SYMPOSIA

### 2018

“Modelling in Multiple Modalities – Triangulating Mathematical, Synthetic and Electronic Circuits,” *Multiple Models Workshop*, University of Helsinki, Helsinki, October 2, 2018.

“Synthetic Biology’s Alternative Realities – Turning Fictional Systems into Concrete Ones,” (with Rami Koskinen) *Varieties of Experiment and Measurement in Technoscience – The Case of Synthetic Biology*, Darmstadt, Germany, September 3-7, 2018.

“Simple – and Thick: Abstract Models in Economics” (with Mary S. Morgan). *Models and Simulations 8*, Columbia, USA, March 15-17, 2018.

“Macro Level Modeling of Phenomena: A Challenge to the Current Mechanistic Discussion” (with Natalia Carrillo). *Models and Simulations 8*, Columbia, USA, March 15-17, 2018.

## 2017

“Seemingly Simple: The Role of Addition in Abstraction” (with Mary S. Morgan). *What to Make of Highly Unrealistic Models?* University of Helsinki, Finland, October 12-13.

“Synthetic Biology’s Alternative Realities – Turning Fictional Systems into Concrete Ones,” (with Rami Koskinen) *What to Make of Highly Unrealistic Models?* University of Helsinki, Finland, October 12-13.

## 2016

“Definitions of life – why should we care (in astrobiology and elsewhere)?” (with Andrea Loettgers). *The Twenty-Fifth Biennial Meeting of the Philosophy of Science Association*, Atlanta, USA, November 3-5, 2016.

“De-Idealization – No Easy “Reversals” (poster with Mary Morgan). *The Twenty-Fifth Biennial Meeting of the Philosophy of Science Association*, Atlanta, USA, November 3-5, 2016.

“Imagination Extended and Embedded: An Artefactual Approach to Scientific Fiction”. *The Society for Literature, Science, and the Arts Annual Meeting*, Atlanta, USA, November 3-6, 2016.

## 2015

“What are Structures Good For? From Mapping to Ascription”, (with Elena Castellani and Francesca Pero) *5<sup>th</sup> Biennial Conference of European Philosophy of Science Association (EPSA2015)*, Duesseldorf, Germany, September 23-26, 2015.

”Representation and Reconceptualization: the role of structures”, (with Elena Castellani and Francesca Pero) *15th International Congress of Logic Methodology and Philosophy of Science, CLMPS*. Helsinki, Finland, August 3-8, 2015.

“How to Understand Abstraction in Modeling Complex Systems”, (with Andrea Loettgers) *15th International Congress of Logic Methodology and Philosophy of Science, CLMPS*. Helsinki, Finland, August 3-8, 2015.

“Fictional Modeling and Counterfactual Reasoning”, *Causality and Modelling in the Sciences*, National Distance Education University UNED, Madrid, Spain, June 29-30, 2015.

“Diagrams, Mathematical Models, and Synthetic Models in the Study of Genetic Circuits ... (Or, What are Diagrams Not Good For?)”, *Pictures and Proofs, TRiP Conference*, Columbia, SC, USA, 19-21 March, 2015.

## 2014

“Abstract and Concrete: Towards and Artifactual Theory of Fiction in Science”, *The Twenty-Fourth Biennial Meeting of the Philosophy of Science Association*, Chicago, USA, November 6-9, 2014.

“Interdisciplinarity at the Grassroots Level: The Modeling Practice of Synthetic Biology”. *Towards Philosophies of Interdisciplinarity*, University of Helsinki, Finland, August 27, 2014.

## 2013

“Concrete Fictions: Synthetic Genetic Circuits in the Study of Biological Organization”, (with Andrea Loettgers), *4<sup>th</sup> Biennial Conference of European Philosophy of Science Association (EPSA2013)*, University of Helsinki, Finland, August 28-31, 2013.

## 2012

“Synthetic Modeling and the Mechanistic Account: Material Recombination and Beyond” (with Andrea Loettgers), *The Twenty-Third Biennial Meeting of the Philosophy of Science Association*, San Diego, USA, November 15-17, 2012.

“Synthetic Modeling and the Mechanistic Account: Material Recombination and Beyond” (with Andrea Loettgers), *Models and Simulations 5 conference (MS5 2012)*, University of Helsinki, Finland, June 14-16, 2012.

## 2011

“Synthetic Biology and the Functional Meaning of Noise (with Andrea Loettgers), *Society for Philosophy of Science in Practice (SPSP) Third Biennial Conference*, University of Exeter, UK June 22-24, 2011.

“Synthetic Modeling and Functional Meaning of Noise” (with Andrea Loettgers), *Epistemology of Modeling & Simulation*, University of Pittsburgh, USA, April 1-3, 2011.

## 2010

“Contradictions of Commercialization: The Norms of Scientific Research Revealed?” *The Twenty-Second Biennial Meeting of the Philosophy of Science Association*, Montreal, Canada, November 4-6, 2010.

“Modeling and Experimenting: The Combinatorial Strategy in Synthetic Biology” (with Andrea Loettgers) *Philosophy of Scientific Experimentation: A Challenge to Philosophy of Science*. Center for Philosophy of Science, University of Pittsburgh, USA, October 15-17, 2010.

## 2009

“Templates vs. Mechanisms? The Lotka-Volterra Model Reconsidered” (with Andrea Loettgers) *Modeling the World - Perspectives from Biology and Economics*, University of Helsinki, May 28-30, 2009. <sup>[L]</sup><sub>[SEP]</sub>

“How does fiction help us understanding scientific models? The case of economic modeling” *Models and Fiction Workshop*, Helsinki Collegium of Advanced Studies, May 27, 2009.

“Templates vs. Mechanisms? The Lotka-Volterra Model Reconsidered” (with Andrea Loettgers) *Models and Simulations 3*, Charlottesville, University of Virginia, March 6-8, 2009.

## 2008

”Decoupling the Model-Target Dyad: the Thesis of Indirect Representation and Reverse Reasoning”, *The Twenty-First Biennial Meeting of the Philosophy of Science Association*, Pittsburgh, Pennsylvania, USA, November 6–8, 2008.

“Indirect Representation, Multidisciplinary Templates and Underlying Mechanisms” *Models, Mechanisms, and Interdisciplinarity workshop*, University of Helsinki, Finland, October 31 – November 1, 2008.

“Incredible Models -- Credible Inferences? Economic Modelling in Theory and Practice”, *Models as Isolating Tools or as Credible Worlds?* Workshop, Helsinki, Finland, March 10, 2008.

## 2007

“Determining the Norms of Science: From Epistemological Criteria to Local Struggle on Organizational Rules?” (with Juha Tuunainen) *ESF/COST Workshop* on “Science and Technology Research in a Knowledge-based Economy”. Katholieke Universiteit Leuven, Belgium, October 18-20, 2007.

“Determining the Norms of Science: From Epistemological Criteria to Local Struggle on Organizational Rules?” (with Juha Tuunainen) *6<sup>th</sup> International Triple Helix Conference* “Emerging Models For The Entrepreneurial University: Regional Diversities Or Global Convergence”. National University of Singapore, May 16-18, 2007.

”The Absent Encyclopedia, or, How to Account for Meaning Making A”, *9<sup>th</sup> Congress of the International Association of Semiotic Studies* “Understanding/Misunderstanding”, Helsinki/Imatra, Finland, June 11-17, 2007.

“It is Not Just the Underlying Structure that Matters: Towards a Semiotic Approach to Scientific Representation”, *Applying Peirce* conference, Helsinki, Finland, June 11-13, 2007.

”Neural Networks as Computational Templates: The Dissemination of Self-Organising Maps across Disciplinary Boundaries”, *Interdisciplinary Relations in the Social and Cognitive Sciences, Inaugural Conference of TINT, sponsored by the Academy of Finland Helsinki, Finland June 15-16, 2007.*

“Self-Organizing Maps as Travelling Computational Templates” (with Anna-Mari Rusanen and Timo Honkela) *IJCNN 2007, International Joint Conference on Neural Networks*, Orlando, Florida, USA, August 12-17, 2007.

“Unrealistic models -- credible inferences? Economic modelling in theory and practice”, *First Biennial Conference of Society for Philosophy of Science in Practice SPSP*, Twente, Netherlands, August 23-25, 2007.

”Neural Networks as Cross-Disciplinary Computational Templates: the Philosophical Implications of the Dissemination of Self-Organizing Maps” (with Timo Honkela) *Models and Simulations 2*, Tilburg, Netherlands, October 11 – 13 2007

“Some Consequences of Pragmatism: Whatever Happened to the Notion of Representation in the Philosophy of Science”, *Founding Conference of European Philosophy of Science Association (EPSA)*, Madrid, Spain, November 15-17, 2007.

“Computational Templates and the Strategy of Model-Based Science”, Symposium on *Modeling, Simulation and Computational Science: Perspectives from different sciences*, Helsinki, Finland, November 29-30, 2007.

## 2006

“The Double Agenda of STS Constructivism: On the Possibility of Fruitful Dialogue between STS and Philosophy of Science”. *EASST Conference: Reviewing Humanness: Bodies, Technologies and Spaces*, Lausanne, Switzerland, August 23-26, 2006.

“Combining Academic Work and Business Activity – Squaring the Circle?” *Science Policy Research Unit (SPRU) 40th Anniversary Conference* “The Future of Science, Technology

and Innovation Policy” (with Juha Tuunainen) University of Sussex, Brighton, UK, September 11-13, 2006.

“In Praise of Purposeful ‘Misrepresentation’: Toward a Productive Understanding of Models”. *Twentieth-Biennial Meeting of the Philosophy of Science Association PSA 2006*. Vancouver, British Columbia, Canada, November 2-4, 2006.

“It is All about Adaptation? On the Dissemination of Self-Organising Maps”. *4S Conference: “Silence, Suffering and Survival”*. Vancouver, British Columbia, Canada, November 1-5, 2006.

## 2005

“Model-Based Understanding? An Objectual Approach to Scientific Understanding” (with Martina Merz) *Philosophical Perspectives on Scientific Understanding*, Amsterdam, Netherlands, August 25-27, 2005.

“Combining Academic Work and Commercialization of Research Results – Squaring the Circle?” (with Juha Tuunainen) *Consortium for Higher Education Researchers (CHER), 18th Annual Conference “Higher Education: The Cultural Dimension – Innovative Cultures, Norms and Values”*. Jyväskylä, Finland, September 1-3, 2005.

## 2004

“Questioning External and Internal Representation: The Case of Scientific Models” (with Timo Honkela) *Computing and Philosophy, E-CAP 2004*. Pavia, Italy, June 3-5, 2004.

“Modelling Language: From Representation to Productive Heuristics”. *4S & EASST Conference: Public Proofs: Science, Technology and Democracy*. Paris, France, August 25-28, 2004.

“Models, Representation and Mediation”. *The Nineteenth-Biennial Meeting of the Philosophy of Science Association PSA 2004*. Austin, Texas, USA, November 18-20, 2004.

## 2003

“Reconstructing Representation”. *25th Annual Meeting of Cognitive Science Society, (CogSci2003)*, Boston Mass., USA, July 30 - August 2, 2003.

“Causality in Economics: The Supply of Money and the Phenomenon of Inflation”, *12th International Congress of Logic Methodology and Philosophy of Science, LMPS*. Oviedo, Spain, August 7-13, 2003.

“Models as Epistemic Artefacts”, *12th International Congress of Logic Methodology and Philosophy of Science, LMPS*. Oviedo, Spain, August 7-13, 2003.

“Models, Representation and Mediation: A Two-Fold Account of Representation”. *The 27th annual 4S Conference*. Atlanta, USA, October 15-18, 2003.

“Analog Models as Epistemic Artefacts”. *Analog Seminar*, Espoo, Finland, December 11-12, 2003.

## 2002

“Causality in Economics: The Supply of Money and the Phenomenon of Inflation”. *International Congress on Causation and Explanation in Natural and Social Sciences, CENSS 2002*. Ghent, Belgium, May 15-18, 2002.

“A Practice-Oriented Approach to Models”. *Fourth European Congress for Analytical Philosophy, ECAP4*. Lund, Sweden, June 14-18, 2002.

“The Toolness of Signs, The Signnes of Tools: Activity Theory Meets Semiotics”. *Fifth Congress of the International Society for Cultural Research and Activity Theory, ISCRAT 2002*. Amsterdam, Netherlands, June 18-22, 2002.

“A Practice-Oriented Approach to Models”. *Congress of European Association for the Study of Science & Technology, EASST 2002*. York, United Kingdom, July 31 - August 3, 2002.

“A Parser as an Epistemic Artefact: A Material View on Models” (with Atro Voutilainen). *Eighteenth-Biennial Meeting of the Philosophy of Science Association, PSA 2002*. Milwaukee, Wisconsin, USA, November 7-10, 2002.

## 2001

“Modeling Language: Parser Construction and Evaluation”. *Model-Based Reasoning: Scientific Discovery, Technological Innovation, Values (MBR '01)*. Pavia, Italy, May 17-19, 2001.

“What is a Model a Model of? Modeling as a Key to Understanding Representation”. *International Summer Institute for Semiotics and Structural Studies, ISISSS*. Imatra, Finland, June 10-15, 2001.

“Modeling and Experimentation in Language Technology” (with Atro Voutilainen) *Models as mediating tools – symposium*. Helsinki, Finland, October 4-5, 2001.

## 2000

“Constructing a Parser: Language Technology in the Marchland Between Theory and Practice”. *The Society for Social Studies of Science 4S/EASST European Association for the Study of Science & Technology Conference*. Wien, Austria. September 27-30, 2000.

## 1999

“The Encyclopedia and Semiosis: On the Artefactuality of Encyclopedia”. *International Summer Institute for Semiotics and Structural Studies, ISISSS*. Imatra, Finland, June 11–18, 1999.

“Semiosis and the Concept of the Ideal”. *Symposium on Evald Ilyenkov*. Helsinki, Finland, September 7-8, 1999.

“Tools and Signs: Towards a Marxian Semiotics”. *9th International Congress of the German Society for Semiotic Studies: ”Machines and History”*. Dresden, Germany, October 3-6, 1999.

“On the Concept of the Encyclopedia: An Absent Encyclopedia?” *7th International Congress of the International Association for Semiotic Studies (IASS/AIS): ”Sign Processes in Complex Systems”*. Dresden, Germany, October 6-11, 1999.