Research Program

THALIS –UoA

Aspects and Prospects of Realism in the Philosophy of Science and Mathematics (APRePoSMa)

(MIS 375791)

Final Progress Report

Compiled by Stathis Psillos

November 2015

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1. Outline—Key objectives of the Project[1]

This project aimed to investigate the philosophical and conceptual presuppositions of the modern scientific worldview. The core of the project was the issue of scientific realism. Research covered all aspects of the scientific realism debate, including the metaphysics of scientific realism and its epistemology. Emphasis was given to the following:

- The sceptical challenges to the claim that science offers knowledge of the deep structure of the world.
- The broader metaphysical commitments concerning the fundamental structure of reality that follow from current scientific theories (laws, necessity, nature of properties, causation).
- The philosophical consequences of modern theories concerning the relation between the subject and the world.
- The status of models and in particular their representational content.
- The objectivity and rationality of scientific method and the special role that experiment plays as a key to ontological commitment.
- The problem of conceptual change and its implications for scientific progress and convergent realism
- The theories of confirmation and explanation and the framework within which the relation between science and truth can be understood.
- The relations of the modern worldview with the Aristotelian conception of nature.
- The consequences of the use of mathematics in scientific theories vis-à-vis the reality of abstract objects and the nominalisation of scientific theories.

All these lines of research aimed to converge to the development of a broad and general framework within which the scientific realism debate should be conducted. The three research groups that collaborated on this project comprise an already existing and research active critical mass of researchers with expertise in the philosophy of science and especially in the issue of scientific realism. Several younger researchers both at the post-doctoral and doctoral level as well as a number of the leading experts on scientific realism and the philosophy of science from around the world were part of the research team. Apart from the publication of high quality research papers and monographs, another goal of the project

[1] As stated in the proposal that got funded.

was the organization of specially targeted workshops on an annual basis, which discuss the several dimensions of the research.

1.1 Work-packages

The project is divided into ten work-packages:

1. The epistemic phase of the debate around scientific realism: problems and prospects
2. Realism and the metaphysics of science
3. Realism and modern physics
4. The roots of modern debate in Aristotle's thought
5. New approaches to the problem of method and theories of confirmation
6. The structure of scientific models and the problem of representation.
7. Conceptual change and the role of experiment in science
8. Theories of truth and scientific realism
9. The role of mathematics in scientific theories
10. Final evaluation

The first research group (PHS, University of Athens) lead work-packages 1, 2, 3, 6, 7, 8, 9, 10

The second research group (Philosophy, Aristotle University of Thessaloniki) will lead work-package 4.

The third research team (Humanities, National and Technical University of Athens) will lead work-package 5.

Part of the 10th work-package is the evaluation of the project by an outside expert.

1.2 Expected output[2]

By the end of the project, it is anticipated that there will be three doctoral dissertations in key aspects of scientific realism. There will also be over thirty publications in the form of monographs, or papers in journals and collections. Members of the research team will have

[2] As stated in the proposal that got funded.

had the opportunity to attend and present papers to a number of international congresses and symposia. Foreign academics—who are members of the team—will have come to the participating departments to work with staff and students, enhancing the research skills and the education of the latter.

By the end of the research period, there will be a sustainable network of excellence in the area of philosophy of science in Greece with an important role in the generation of innovative philosophical thought and solid relations of co-operations capable to attract the attention of researchers from around the world. When it comes to scientific realism, Greece will be one of the best places in the world to do research in this area. The network will be able to extend its research into areas that will require and foster collaboration with scientists. A number of research students will have been trained to do serious philosophical research. Post-doctoral researchers will have the opportunity to enhance their research profile and compete for high-level jobs. There will also be a platform for the dissemination of the results of the research to society, developing the scientific conscience among the public and the students. Potential benefits of the research can be found in science education at all levels.

1.3 Members of the Project

Professor Stathis Psillos, UOA, Principal Investigator

A. Main Research Team (consisting of three groups)

First research group: Dept. of Philosophy and History of Science, University of Athens

Team Leader: Stathis Psillos, Professor
Theodore Arabatzis, Professor
Costas Dimitracopoulos, Professor
Vassilios Karakostas, Associate Professor
Yiannis Stephanou, Assistant Professor
Eleni Manolakaki, Assistant Professor (replaced A. Baltas)
Invited post-doctoral fellow: Ioannis Votsis, University of Dusseldorf

Second Research Group: Aristotle University of Thessaloniki (AUTH)

Team Leader: Demetra Sfendoni-Mentzou, Emeritus Professor
Aristides Gogoussis, Professor in Alexander Technological Educational Institute of Thessaloniki.

Third Research Group: Department of Humanities, NTUA

Team Leader: Aristidis Arageorgis. Assistant Professor
Aristophanes Koutoungos, Emeritus Professor
Aristides Baltas, Emeritus Professor of Philosophy, (resigned in January 2015 because he was appointed Minister of Education)

B. The following researchers were employed in the project

Post-Doctoral Researchers

UOA Team
Antigone Nounou
Vassilis Livanios
Pandora Hantzidaki
Aspassia Kanellou
Kostas Papadopoulos
Maria Panagiotatou
Elina Pechlivanidi
Stavros Ioannidis
Nikos Bisketzis

AUTH team
Christina Papachristou
Christos Pechlivanidis
Elena Lappa (contract ended before the end of the project)

NTUA Team
Chrisovalantis Stergiou

Graduate Students

UOA Team
Demetris Koilakos
Despoina Ioannidou
Irini Goudarouli

AUTH Team
Demetra Balla
Maria Kechagia

NTUA Team
Spyros Stelios
Simoni Iliadi
Alexandros Apostolides
Zacharias Flouris

C. Unpaid researchers

UOA Team
Philippos Georgiadis
Vassilis Sakellariou
Demetra Christopoulou
Panagiotis Oulis (deceased)
Athena Xenikou

NTUA Team
Petros Stefaneas

D. External Collaborators
(not all of them took part in the project—highlighted those who took part)

UOA Team
Demetris Portides
Michel Bitbol
Michael Esfeld
Steven French
John Worrall
Michel Ghins
Mauro Dorato
Alexander Bird
Hanne Andersen
Hasok Chang
Friedrich Steinle
Richard Boyd
Howard Sankey
Robert Nola

AUTH Team
James G. Lennox
Richard D. McKirahan

Bas van Fraassen,
Abraham P. Bos
Lambros Couloubaritsis
Stavros Avgoloupis

NTUA Team
Kevin Kelly
Sebastian Sequoiah-Grayson

E. Managing Team of the Project

S. Psillos, A, Nounou, E. Goudarouli, E. Pechlivanidi, S. Ioannidis

2. Overall Assessment of the Project

2.1 Planned deliverables

The planned deliverables were specified as follows:

- 25 papers in learned journals and edited collections
- 3 doctoral dissertations
- 2 books
- 8 workshops

2.2 Deliverables

A. Concluded Deliverables

- 40 papers in journals and edited peer reviewed volumes
- 7 book reviews
- 3 doctoral dissertations
- 3 Master Theses
- 1 edited special issue of journal
- 5 workshops (23 invited speakers)

- *workshops*

1. International Workshop 'The Metaphysics of Scientific Realism', 1-2 March 2013, Athens, UOA.

2. International Workshop 'Philosophy and Science in the 17th Century: the Problem of Method', 24 May 2013, Athens, UOA
3. International Workshop 'Model Theory, Weak Arithmetic and the Role of Mathematics in Scientific Theories , 24 – 26 June 2013, Athens UOA
4. International Workshop 'Experimentation, Conceptual Change, and Scientific Realism', 2-3 May 2014, Athens UOA
5. International Workshop on 'Induction, abduction, belief revision, and realism", NTUA, Athens, December 15-16, 2014

- *Invited Speakers to the Workshops*

Michael Andreas Esfeld, University of Lausanne
Steven French, Leeds University
Michel Ghins, Catholic University of Louvain
Mauro Dorato, University of Rome III
Dimitris Portides, University of Cyprus
Athanassios Raftopoulos, University of Cyprus
Peter Anstey, University of Sydney
Dan Garber, Princeton University
Angus Macintyre, Queen Mary College, London
Tin Lok Wong, University of Ghent
Ali Enayat, University of Gothenburg
Michal Garlik, Charles University, Prague
Henri-Alex Esbelin, University Blaise Pascal, Clermont-Ferrand
Jan Pich, Charles University, Prague
Y. Moschovakis, UCLA
Hasok Chang, University of Cambridge
Hanne Andersen, University of Aarhus
Robert Nola, University of Auckland
Uljana Feest, University of Hannover
Friedrich Steinle, Technical University of Berlin
Illka Niiniluoto, University of Helsinki
Nicola Angius, University of Sassari
Kevin Kelly, Carnegie Mellon University

- Though the number of papers presented in conferences, workshops and seminars was not specified as a deliverable, it had been part of the objective of the research project that

"Members of the research team will have had the opportunity to attend and present papers to a number of international congresses and symposia". The number of such talks has been **150** in universities around the world and in international and national conferences and congresses.

In the output of the project, we should include the following:

- The creation of a network of research excellence in philosophy of science in Greece.
- The enhancement of the international status of the Greek philosophy of science community.
- The creation of a cohesive group of younger scholars with growing international reputation.
- The training of postdoctoral and doctoral researchers and the establishment of a publication culture.
- The particular emphasis that was given in the participation in the research network of women.

B. Deliverables in progress

- 1 doctoral dissertation (WP6, submitted; to be examined on the 4th of December 2015).
- 2 books (WP4, WP9)
- 15 papers (8 in WP2, 1 in WP4, 1 in WP5, 4 in WP7, 1 in WP9)
- 1 book review (WP2)
- Final evaluations

2.3 Deliverables per Work-package

WP 1 "The epistemic phase of the debate around scientific realism: problems and prospects". [Team UOA]

Planned Deliverables: 3 papers, 1 workshop.
Deliverables concluded: 7 papers, 1 workshop.

Papers

1. Psillos S., "Broken Structuralism", *Metascience* (2015), forthcoming DOI 10.1007/s11016-015-0030-0

2. Votsis, I., (2015a) "Perception and Observation Unladened", *Philosophical Studies*, vol. 172(3): 563-585.

3. Votsis, I., (2015b) 'Unification: Not Just a Thing of Beauty', *Theoria: An International Journal for Theory, History and Foundations of Science,* vol. 30(1): 97-114*.*

4. Psillos S., 'The View from Within and the View from Above: Looking at van Fraassen's Perrin" in GONZALEZ, W. J. (ed), *Representation and Models in Science: Bas van Fraassen's Approach*, Synthese Library, Springer, Dordrecht, 2014, 143-166.

5. Votsis, I., (2014) 'Objectivity in Confirmation: Post-Hoc Monsters and Novel Predictions', *Studies* in *History and Philosophy of Science*, vol. 45(1): 70-78.

6. Georgiadis P., "Henri Poincaré: Structure, Convention and History", Nefsis 2014 (in Greek).

7. Psillos, S.: "Semirealism *or* Neo-Aristotelianism?", *Erkenntnis*, 78: 29-38, 2013

Talks

1. Psillos, S.: 'Scientific Realism as an Historical Thesis', In: Scientific Realism in the Light of the History of Science, University of Durham, September 2012
2. Psillos, S: 'Scientific realism as an Historical Thesis', Congress of Società Italiana di Logica e Filosofia della Scienza (SILFS), Milan, November 2012
3. Psillos, S: 'Making contact with Molecules: On Perrin's argument for realism', Munich Center for Mathematical Philosophy, Munich December 2012
4. Psillos, S: 'Scientific Realism as an Historical Thesis' London School of Economics, February 2013
5. Psillos, S: 'This House Believes Too Much Trust is Placed in Science' Cambridge Union Society, University of Cambridge, February 2013.
6. Psillos, S: 'Varieties of Empiricism in the Philosophy of Science', Mercier Lectures in Philosophy—Part I, Universite Catholique de Louvain, March 2013
7. Psillos, S: 'Truth-tracking Explanations and realism', In 'Explanation in the Sciences', Universite Catholique de Louvain, May 2013
8. Psillos, S: 'Varieties of Empiricism in the Philosophy of Science', Mercier Lectures in Philosophy, Universite Catholique de Louvain, part II, May 2013

9. Psillos, S: “Revisiting ‘the Bankruptcy of Science’ Controversy: lessons for Realism” Institute for the History and Philosophy of Science and Technology, University of Toronto, October 30 2013.
10. Psillos, S: “Revisiting the ‘Bankruptcy of Science’ Debate” Rotman Institute of Philosophy, January 24, 2014.
11. Psillos, S: “From the ‘Bankruptcy of Science’ to the ‘Death of Evidence’: Science and its Value, University of Ottawa, U. Ottawa ISSP Distinguished Speakers Lecture Series. April 10 2014.
12. Psillos, S: “Evidence: Wanted, Dead or Alive”, University of Toronto, April 16 2014
13. Psillos, S: “Revisiting the ‘Bankruptcy of Science’ Debate: Realism, History and the Public Image of Science”. Invited talk at Conference "Science: The Real Thing?", Lingnam University, Hong Kong May 2014.
14. Psillos, S: ‘Science and Values’, University of Crete, 20/01/2015
15. Psillos, S: ‘Varieties of Structural Realism’ Dept of Media, Cognition and Communication, University of Copenhagen, 26 February 2015
16. Psillos, S: ‘Revisiting the ‘Bankruptcy of Science’ Debate: Realism, History and the Public Image of Science’, The Edelstein Center For the History and Philosophy of Science, Technology and Medicine, Hebrew University of Jerusalem 13 May 2015
17. Psillos, S: ‘Why believe in atoms? Jean Perrin's argument for realism’, Center for Philosophy of Science of the University of Lisbon, 18 June 2015
18. Psillos, S: ‘Kinds of evidence for realism, Part of the Symposium Local vs. Global Approaches to Realism EPSA15, University of Dusseldorf, Germany, 23-26 September 2015
19. Votsis, I. July 2015 – ‘Why Immaterial Standards Matter’, The Making of Measurement Conference, Centre for Research in the Arts, Social Sciences and Humanities, University of Cambridge
20. Votsis, I. July 2015 – ‘Can Theory-Laden Effects be Removed?’, 23rd Annual Meeting of the European Society for Philosophy and Psychology, University of Tartu.
21. Votsis, I. July 2015 – ‘How to Make a Long Theory Short’, British Society for the Philosophy of Science Annual Conference, University of Manchester
22. Votsis, I. May 2015 – ‘Do you See what I See?’, IAI Academy, How the Light Gets in 2015 (Music and Philosophy Festival), Hay-on-Wye
23. Votsis, I. May 2015 – ‘Is the World a Massive Simulation?’, IAI Academy, How the Light Gets in 2015 (Music and Philosophy Festival), Hay-on-Wye
24. Votsis, I. May 2015 – ‘How to Really Win an Argument’, IAI Academy, How the Light Gets in 2015 (Music and Philosophy Festival), Hay-on-Wye

25. Votsis, I. November 2014 – 'What Makes a Hypothesis Ad Hoc?', University of Montreal
26. Votsis, I. November 2014 – 'Empiricism Unchained: Debunking the Instrument Conspiracy', University of Western Ontario.
27. Votsis, I. November 2014 – 'Methods and Universality', Symposium on: 'The Scientific Method – Revisited', Philosophy of Science Association 2014 Biennial meeting, Chicago.
28. Votsis, I. July 2014 – 'Intelligence as Portability in Problem-Solving', International Association for Computing and Philosophy 2014, Thessaloniki
29. Votsis, I. June 2014 – 'Veridical Perception and Observation', keynote lecture, Experience and Reality conference, Catholic University in Ružomberok, Slovakia
30. Votsis, I. Nov. 2013 - 'An Inferentialist Account of Confirmation', Inferentialism in Epistemology and Philosophy of Science workshop, University of Madrid.
31. Votsis, I. October 2013 – **'**Logic as Ultra-Physics', California State University Los Angeles.
32. Votsis, I. October 2013 – **'**Positivism in the 21st Century', graduate seminar, University of California Davis.
33. Votsis, I. October 2013 – **'**Empiricism Unchained', Bay Area Philosophy of Science, San Francisco State University.
34. Votsis, I. Sept. 2013 - 'Science with Artificially Intelligent Agents', 2nd Conference on the Philosophy and Theory of Artificial Intelligence (PT-AI 2013), University of Oxford.
35. Votsis, I. July 2013 – '*The* Scientific Method', British Society for the Philosophy of Science Annual Conference, University of Exeter.
36. Votsis, I. May 2013 **-** 'Objectivity in Confirmation', Philosophy of Science in a Forest, Dutch Society for the Philosophy of Science.
37. Votsis, I. April 2013 – 'Post-Hoc Monsters and the Frankenstein Theory of Confirmation', Logos Colloquium, University of Barcelona.
38. Votsis, I. March 2013 – 'The Houdini Argument for Intrinsic Properties', The Metaphysics of Scientific Realism Workshop, University of Athens.
39. Votsis, I. Nov. 2012 – 'Re-examining the role of determining factors in the Argument from Underdetermination', 2nd Panhellenic Conference for the Philosophy of Science
40. Votsis, I. Nov. 2012 – 'Universal Empiricism', Philosophy of Science Association Twenty-Third Biennial Meeting, San Diego [presented in my absence by Otavio Bueno].

Workshop

Philosophy and Science in the 17th Century: the Problem of Method, 24 May 2013, Athens UOA, Organiser: S. Psillos

WP2 "Realism and the metaphysics of science" [Team UOA]

Planned Deliverables: 2 papers, 1 workshop
Deliverables concluded: 7 papers, 1 workshop, 6 book reviews, 1 doctoral dissertation

Papers

1. Bisketzis, N. & Psillos, S. "Absences, promotions and causality", forthcoming, Deucalion (in Greek)
2. Psillos S. 'Y a-t-il des lois dans la nature ? Une réponse empiriste', In: Feltz, B., Frogneux, N., et Leyens, St., dir. de publication, La nature en éclats. Les défis d'un nouveau rapport à la nature, Academia, Louvain-la-Neuve, 2015.
3. Nounou, A. "For or against OSR? A verdict from High Energy Physics". Studies in History and Philosophy of Modern Physics 49: 84-101 (2015).
4. Psillos S.: "Counterfactual Reasoning, Qualitative: Philosophical Aspects" in James Wright (ed.) International Encyclopedia of Social and Behavioral Sciences, 2nd Edition, Elsevier, volume 4, 2015 pp. 2872–2874
5. Psillos, S. 'Regularities, Natural Patterns and Laws of Nature', Theoria, 79: vol. 29/1, 2014, 9-27
6. Livanios, V. 'The 'Constant' Threat to the Dispositional Essentialist Conception of Laws' Metaphysica 2014; 15(1): 129–155.
7. Livanios, V. "Categorical Structures and the Multiple Realisability Argument", METHODE 3(4), 2014, 141-166.

Book Reviews

1. Pechlivanidi, E., "Book Review of 'Introduction to Ontology' by Nikk Effingham: From the basics to the advanced: Your guide through ontology", Metascience,
2. Panagiotatou, M.:"Making sense of probabilities in physics", Review: of Claus Beisbart και Stephan Hartmann (eds): Probabilities in physics. Oxford:

Oxford University Press, 2011, xii + 437, Metascience, November 2014, Volume 23, Issue 3, pp 461-465

3. Goudarouli, E.," The Paradoxes of the New science", Review of Ofer Gal's and Raz Chez-Morris's Baroque Science, Metascience Volume 23, Issue 2, (July 2014), pp 361-363.
4. Ioannidis, S. (2015) 'Functions and functional explanation revisited' (Essay Review of Huneman, P. (ed.) Functions: Selection and Mechanisms), Metascience 24: 253-258.
5. Ioannidis, S. (2015) 'The philosophy of stem cells' (Book Review of Bonnie Fagan, M. Philosophy of Stem Cell Biology: Knowledge in flesh and blood), Metascience 24: 285-288.
6. Livanios, V. 'Beyond Platonism and Nominalism?', Review of An Aristotelian Realist Philosophy of Mathematics: Mathematics as the Science of Quantity and Structure, by James Franklin, Axiomathes, forthcoming, DOI 10.1007/s10516-015-9277-8, pp.1-7. 2015

Doctoral Dissertation

Goudarouli, I. 'The Formation of the Concept of Force in Natural Philosophy in Mid-17th Century England. An Interdisciplinary Approach Based on the Convergence of History of Science and History of Concepts", (Supervisor: T. Arabatzis)

Talks

1. Bisketzis, N. "The properties of causation in the frame of probabilistic causality" 3rd National Conference of Philosophy of Science, Athens 27-29 / 11 /2014
2. Livanios, V. 'Metaphysical Possibility and Science in Metaphysics', 3o PanHellenic Philosophy of Science Conference, Athens, November 2014.
3. Livanios, V. 'Categorical Structures and the Multiple Realisability Argument', workshop on Metaphysics of Scientific Realism, Athens, March 2013.
4. Nounou, A. "Scientific understanding with and without explanation", with F.A. Muller, EPSA15, Düsseldorf, 23-26 September 2015.

5. Nounou, A. “Properties: Quantum variations of classical themes”, with Harris Anastopoulos, 3rd Pan-Hellenic Conference in Philosophy of Science, Athens, 27-29 November 2014.

6. Nounou, A. Properties Are …”, with Harris Anastopoulos. Interdisciplinary workshop on “The quantum/classical divide”, Spring Conference of the German Physical Society (DPG), Berlin, March 17-21 2014.

7. Nounou, A. “Objects Are …”, European Philosophy of Science Association 2013 meeting, Helsinki, 28-31 August 2013.

8. Nounou, A. “Objects of Physics and Objects of the World”, 2nd Pan-Hellenic Conference in Philosophy of Science, Athens, 29 November – 1 December 2012.

9. Nounou, A. PSA12, 15-17 November 2012, San Diego, Symposium “Symmetries, Objecthood, and Fundamentality: Cross-sectioning Fundamental Physics” tile of talk “Irreducible Representations, Constitution of Objects and the Question of Fundamentality”.

10. Pechlivanidi, E. Antecedent Strengthening test and Causal Necessitarianism, Graduate Students Seminar, University of Bristol, February 2013.

11. Pechlivanidi, E. Causal powers and Scientific practice (an overview), Western University, London Ontario, October 2014.

12. Pechlivanidi, E. Dispositions and intrinsic interference, 3rd Panhellenic Conference of Philosophy of Science, Department of Philosophy and History of Science , University of Athens, November 2014.

13. Pechlivanidi, E. Three options for the modality of causal relations, Rotman Institute of Philosophy, Research Seminar, Western University, London Ontario, April 2015.

14. Pechlivanidi, E. Powers are not vectors, Rotman Institute of Philosophy, Research Seminar, Western University, London Ontario, October 2015

15. Panagiotatou, M. 25/04/2013, Ceremony Hall of the Faculty of Philosophy of the Aristotle University of Thessaloniki. Talk with title “Quantum Mechanics and Scientific Realism: restoring a misconceived relation”.

16. Panagiotatou, M. 8/8/2015, presentation at the 15th Congress on Logic, Methodology, and Philosophy of Science 2015 (CLMPS 2015, University of Helsinki 3-8 August 2015) with title: “Quantum Mechanics and Scientific Realism: restoring a misconceived relation”.

17. Goudarouli, I. "The concept of Action at a Distance and the Proper Philosophical Language in the late 17th century England", British Society for the History of Science Annual Conference, University of St. Andrews, UK, 3-6 July, 2014.

18. Goudarouli, I. "A Case Study from the History of Science: Discussion on the Concept of Incorporeality in the Middle 17th Century England", The 16th International Conference on the History of Concepts, University of Bilbao, Spain, 29–31 August 2013.

19. Ioannidis, S. 'Development and Evolutionary Causation', *2nd Panhellenic Conference in Philosophy of Science,* Department of History and Philosophy of Science, University of Athens, Athens, November 2012

20. Ioannidis, S. 'Evolutionary Causation and Developmental Mechanisms', *Work in Progress Seminar*, Department of Philosophy, University of Bristol, Bristol, March 2013

21. Ioannidis, S. 'Between Pluralism and Realism: Philip Kitcher's Philosophy of Biology', *Philip Kitcher Symposium*, Department of History and Philosophy of Science, University of Athens, Athens, June 2013.

22. Ioannidis, S. 'Population vs. typological thinking in evolutionary biology: a problematic distinction', *3rd Panhellenic Conference in Philosophy of Science*, Department of History and Philosophy of Science, University of Athens, Athens, November 2014.

23. Ioannidis, S. 'Contrastive Explanation and Reduction in Evolutionary Biology: the Debate on the Evolution of Phyla', *Departmental Research Seminar*, Department of History and Philosophy of Science, University of Athens, Athens, October 2014.

24. Ioannidis, S. '(Early) Modern Synthesis and mutationist theories of evolution: a debate that never happened?', *3rd Panhellenic Conference in History of Science and Technology*, Department of History and Philosophy of Science, University of Athens, Athens, March 2015.

25. Ioannidis, S. 'Modularity and the Limits of Mechanistic Explanation in Biology', *ISHPSSB Biennial Conference,* Université du Québec à Montréal, Montréal, July 2015.

26. Ioannidis, S. 'Modularity and the Limits of Mechanistic Explanation in Biology', *Rotman Institute of Philosophy,* Western University, London, ON, July 2015.

27. Ioannidis, S. 'Modularity and the Limits of Mechanistic Explanation in Biology', Department of History and Philosophy of Science, University of Athens, Athens, July 2015.
28. Kanellou, A. On an interlocking view of motor representation and intention, European Society for Philosophy and Psychology, Sicily September 2014
29. Kanellou, A. An interlocking view of motor representation and intention and the particularity of action content, in Southern Society for Philosophy and Psychology, April 2015 New Orleans
30. Psillos, S: "Scientific realism with a Humean face", The Metaphysics of Scientific Realism, University of Αθήναϛ, March 2013
31. Psillos, S: "Metaphysics of Science: Fact or Framework?" Invited talk in the conference 'Metaphysics within and Without Physics', June 7-8 2014, Rotman Institute of Philosophy, International Philosophy of Physics Conference, 2-4 June 2014
32. Psillos, S: 'Laws, Regularities and Natural Patterns', Department of Philosophy, Communication and Media Studies, University of Rome III, 29 January 2015
33. Psillos, S: 'Induction: the Historical and Logical context of a problem', Department of Philosophy, Communication and Media Studies, University of Rome III, 28 January 2015
34. Psillos, S: 'Induction and Necessary Connections', Dept of Media, Cognition and Communication, University of Copenhagen, 27 February 2015
35. Psillos, S: 'Induction: The Historical and Philosophical Context of a Problem', University of Crete, 20/01/2015
36. Psillos, S: 'Metaphysics of Science: Fact or Framework?', The Bar-Hillel Colloquium, University of Tel Aviv, 11 May 2015
37. Psillos, S: 'Scientific realism & the neo-Aristotelian conception of nature' in Scientific Realism: Objectivity and Truth in Science, Conference of the International Academy of Philosophy of Sciences, University of La Coruna, Spain, 22-25 September 2015

Workshop

The Metaphysics of Scientific Realism, 1-2 March 2013, Athens UOA, Organiser: S. Psillos

Deliverables in Progress

1. Panagiotatou, M. "Quantum Mechanics & Scientific Realism: restoring a misconceived relation", submitted to The British Journal for the Philosophy of Science.
2. Livanios, V. 'Beyond Platonism and Nominalism?', Review of An Aristotelian Realist Philosophy of Mathematics: Mathematics as the Science of Quantity and Structure, by James Franklin, Axiomathes, forthcoming, DOI 10.1007/s10516-015-9277-8, pp.1-7.
3. Livanios, V. 'Smart and Thébault on Hamilton's Principle and Dispositional Essentialism', submitted to Analysis.
4. Livanios, V. Science in Metaphysics: Exploring the Metaphysics of Properties and Laws, submitted to Palgrave Macmillan.
5. Psillos, S. Induction and Natural Necessities
6. Nounou, A. "Scientific Understanding with and without Scientific Explanation". In collaboration with F.A. Muller. Under review in *Journal for the General Philosophy of Science*.
7. Nounou, A. "On Scientific Understanding without Explanation". In collaboration with F.A. Muller.
8. Nounou, A. "Properties: Quantum variations of classical themes". In collaboration with Harris Anastopoulos.

WP3 "Realism and Modern Physics" [Team UOA]

Planned Deliverables: 3 papers, 1 workshop,
Deliverables concluded: 6 papers

Papers

1. Karakostas, V. & Papadopoulos, K, «Quantum theory of measurement in the light of Process Philosophy», forthcoming, Nefsis, 2015 (in Greek)
2. Karakostas, V. "Correspondence Truth and Quantum Mechanics", Axiomathes 24, 343-358, 2014.

3. Karakostas, V. "Truth as Contextual Correspondence in Quantum Mechanics", forthcoming in Proceedings of Logic, Methodology and Philosophy of Science (14th LMPS), edited by Pierre Edouard Bour, Gerhard Heinzmann, Wilfrid Hodges and Peter Schroeder-Heister. Philosophia Scientiæ, 19(1), 199-212, 2015.

4. Karakostas, V. & Zafiris, E. "A Categorial Semantic Representation of Quantum Event Structures,", Foundations of Physics. 43:1090–1123, 2013

5. Karakostas, V. & Zafiris, E. "Contextual Semantics in Quantum Mechanics from a Categorical Point of View", forthcoming in Synthese, 2015.

6. Karakostas, V. & Zafiris, E. "On the Notion of Truth in Quantum Mechanics: A Category-Theoretic Standpoint", forthcoming in D. Aerts, H. Freytes and R. Giuntini (eds.), Probing the Meaning and Structure of Quantum Mechanics: Dynamics and Identity, World Scientific, 2015.

Talks

1. Karakostas, V. (2013a), "On the Notion of Truth in Quantum Mechanics: A Categorical Standpoint", *Twenty-third World Congress of Philosophy* (4-10 August 2013, University of Athens).

2. Karakostas, V. & Zafiris, E. (2013b), "A Category-Theoretic Perspective on Truth Valuation in Quantum Mechanics", *Fourth European Philosophy of Science Association Conference* (*EPSA*) (28-31 August 2013, University of Helsinki, Finland).

3. Karakostas, V. (2013c), "Why the Traditional Conception of Correspondence Truth Should be Modified Within Contemporary Physics", *Workshop on Metaphysics of Scientific Realism*, *Research Programme "Thalis"* (1-2 March 2013, University of Athens).

4. Karakostas, V. (2014a), "On the Problem of Truth Valuation in Quantum Mechanics in Light of Category Theory", *Workshop on Quantum Mechanics and Quantum Information: Physical, Philosophical and Logical Approaches* (23-25 July 2014, University of Cagliari, Italy) — invited speaker.

5. Karakostas, V. (2014b), «The Novel Dimension of Category Theory in Modern Philosophy of Science" 3rd Panhellenic Congress of Philosophy of Science, November 2014, University of Athens

6. Karakostas, V. & Zafiris, E. (2015a), "From a Categorical Point of View: Contextual Semantics in Quantum Mechanics", *Fifteenth Congress of Logic, Methodology and Philosophy of Science* (*LMPS*) (3-8 August 2015, Helsinki

7. Hantzidaki, P. 'Scientific realism in view of quantum non-separability'**,** the Fourth Conference of the European Philosophy of Science Association (EPSA), University of Helsinki, 28- 31.8.2013, Book of Abstracts, p. 58.

8. Hantzidaki, P. 'Bohr's complementarity: an epistemological framework transcending the domain of physical sciences'**,** 23rd World Congress of Philosophy (WCP 2013), Athens, 4–10 August 2013, School of Philosophy, National & Kapodistrian University of Athens.

9. Hantzidaki, P. 'The 'one-world' interpretation of Kantian transcendentalism in view of quantum non-separability'**,** 15th Congress of Logic, Methodology and Philosophy of Science (CLMPS), University of Helsinki, 3–8 August 2015, Book of Abstracts, pp. 377-8.

WP4 "The roots of modern debate in Aristotle's thought" [Team AUTH]

Planned Deliverables: 3 papers, 1 book, 1 doctoral dissertation, 1 workshop
Deliverables concluded: 7 papers, 1 doctoral dissertation, 1 book review, 1 master's thesis

Papers

1. Pechlivanidis, C.: "Aristotle's Calculative / Deliberative Imagination and Ernan McMullin's Second Imagination: Exploring Interactions among Versions of Realism". In Efe Duyan & Ayşe Güngör (Ed.s), Interactions in the History of Philosophy, pp. 193-202. Istanbul: Mimar Sinan Fine Arts University, 2013.

2. Pechlivanidis, C.: "The History of Reception of Charles S. Peirce in Greece". European Journal of Pragmatism and American Philosophy, vol. 6, n. 1: 70-74, 2014

3. Papachristou, C. "Three kinds or grades of phantasia in aristotle's de anima". Journal of Ancient Philosophy, 7(1), 2013.

4. Papachristou, C. "Aristotle's Theory of 'Sleep and Dreams' in the light of Modern and Contemporary Experimental Research". E-LOGOS (Electronic Journal for Philosophy), 1-47, 2014.

5. Gogousis, A. “How is engineering design of operation possible? - The role of causal unilateralization and the conception of praxiological methodologies”, In the Proceedings of the XXIII World Congress of Philosophy "Philosophy as Inquiry and Way of Life", Athens, 4-10 August, 2013.
6. Sfendoni-Mentzou, D., ‘Charles S. Peirce’, pp. 239-249. Στο F. Bellucci et al. eds., PEIRCE. 5 QUESTIONS (Automatic Press, 2014)
7. Sfendoni-Mentzou, D., ‘Is Time Real for Aristotle?’, Proceeding of the 5th INTERNATIONAL SYMPOSIUM, “THE ISSUE OF TIME IN ARISTOTLE.” Aristotle University of Thessaloniki & Naoussa-Mieza. May 12-15, 2012, Editions OYSIA Distribution: Librarie Philosophique, J. Vrin

Book Reviews

Pechlivanidis, C.: Review of: D. Sfendoni-Mentzou, *Pragmatism – Rationalism – Empiricism. Theories of Knowledge* (2nd upgraded and enlarged edition, Thessaloniki, Ziti editions, 2012), *Philosophia* 43, 487-88

Doctoral Dissertation

Balla, M., «Form, species and matter in Aristotelian Biology» (Supervisor: Sfendoni-Mentzou, D)

Master Thesis

The Aether in Aristotle’s ‘De Caelo’, 7/1/2015 (Supervisor: D. Sfendoni-Mentzou)

Talks

1. Pechlivanidis, C. “Selecting Theories: An Old Problem Revisited”. II International History of Philosophy Conference: *PHILHIST 15 –Interactions in the History of Philosophy* Turkey-Istanbul, May 14-16, 2015
2. Pechlivanidis, C. “What is behind the Logic of Scientific Discovery: Aristotle & Charles S. Peirce on Imagination”. The Charles S. Peirce International Centennial Congress “Invigorating Philosophy for the 21st Century” University of Massachusetts, Lowell, USA Lowell Mass., 16-19 July, 2014

3. Pechlivanidis, C. “On Fitting the Phenomena’: Aristotle’s Critique of Pythagoreans in *De Caelo* 2.13 and *Metaphysica* A5”. 4th Biennial Conference of International Association for Presocratic Studies (IAPS) ''Interdisciplinary Center for Aristotle Studies'', AUTH Thessaloniki, June 30-July 4, 2014

4. Pechlivanidis, C. Lecture in Greek Philosophical Society: “Imagination in the Logic of scientific Discovery: Aristotle and Charles S. Peirce” Athens, April 4, 2013, Athens’ Cultural Centre

5. Pechlivanidis, C. International Summer School. Aristotle University of Thessaloniki 19-31 August 2013 Course/3 hours: Aristotle’s Ethics: Virtue and Reason August 23, 2013

6. Pechlivanidis, C. “Aristotle’s Calculative / Deliberative Imagination and Ernan McMullin’s Second Imagination: Exploring Interactions among Versions of Realism”. Paper presented in the International Conference *Interactions in the History of Philosophy*, Istanbul - Mimar Sinan Fine Arts University, November 7-9, 2013

7. Pechlivanidis, C. “Epagōgē, nous and phantasia in Aristotle’s logical system: From Posterior Analytics to De anima”. Paper presented in the XXIII World Congress of Philosophy *Philosophy as Inquiry and Way of Life*, Organized by the Greek Philosophical Society & FISP Athens, August 4-10, 2013

8. Papachristou, C. “Aristotle on Sleep (Ὕπνος), *Phantasmata* (Φαντάσματα) and Dreams (Ἐνύπνια)”. “31st International Conference on Ancient and Medieval Philosophy”, organized by *Society for Ancient Greek Philosophy (SAGP)* και τη/ and the *Society for the Study of Islamic Philosophy (SSIPS)*. 11-13 October 2013. Fordham University.

9. Papachristou, C. “Sleep and Dreams in Democritus and Aristotle”. *International Association for Presocratic Studies*. *Fourth Biennial Conference*: 30 June – 4 July 2014.

10. Goggousis, A. Presentation of the aforementioned article at the 23rd World Congress of Philosophy, Athens, August 2013.

11. Goggousis, A. Invited Lecture - Keynote Speech – at ACSTAC (Anatolia College Science & Technology International Annual Conference), Thessaloniki, March 14-16, 2014. Title of speech *The elixir of Humanity: Philosophy, Science and Technology*

12. Goggousis, A. Presentation at the 2nd Symposium of New Technologies in the service of Archaeognostic research, Academy of Institutions and Cultures, Thessaloniki, June 16, 2015. Title of topic presented: *Robotics and Philosophy*.

13. Sfendoni, D. "Is Time Real for Aristotle?" 5th INTERNATIONAL SYMPOSIUM: "THE ISSUE OF TIME IN ARISTOTLE" , Aristotle University of Thessaloniki & Naoussa-Mieza - May 12-15, 2012

14. Sfendoni, D. XXIII WORLD CONGRESS OF PHILOSOPHY ATHENS - AUGUST 4-10, 2013

    (a) Invited Session, "ARISTOTLE AND CONTEMPORARY SCIENTIFIC THOUGHT" Presentation of paper entitled "Aristotle and Contemporary Physics. What is 'Prime Matter' for Aristotle?"

    (b) ROUND-TABLE, "THE POLYVALENCE OF EVANGHELOS MOUTSOPOULOS' PHILOSOPHY" paper entitled: "An Overall Appreciation of the Philosophy of Evanghelos Moutsopoulos"

    (c) ROUND-TABLE: "ARISTOTLE AND THE ARISTOTELIAN TRADITION" paper: "The Role of "εἶδος" in Aristotle's Theory of Perception, Knowledge and the Structure of the World"

15. Sfendoni, D. "Peirce and Aristotle: A Neo-Aristotelian Version of Scientific Realism" CHARLES S. PEIRCE CENTENNIAL CONGRESS JULY 16-19, 2014 UNIVERSITY OF MASSACHUSSETTS, LOWELL, USA

16. Sfendoni, D. "Aristotle and Contemporary Scientific Realism: A New Image of Physis through the Looking Glass of Aristotle's Physics", XI INTERNATIONAL ONTOLOGY CONGRESS, "OLD QUESTIONS ON PHYSIS, CONTEMPORARY APPROACHES" October 1 – 7, 2014 San Sebastian – Barcelona, Spain

17. Sfendoni, D."Aristotle and contemporary Physics", INTERNATIONAL CONFERENCE "ARISTOTLE AND CONTEMPORARY SCIENCE: CELEBRATING THE 60TH ANNIVERSARY OF CERN" October 30-31, 2014 Organized by the "Interdisciplinary Centre for Aristotle Studies" and the "European Organization for Nuclear Research" (CERN) Aristotle University of Thessaloniki

18. Sfendoni, D. "Charles S. Peirce's Tychism and its Relevance to Contemporary Physics", PRESIDENTIAL ADDRESS TO THE GENERAL ASSEMBLY OF THE "*CHARLES S. PEIRCE SOCIETY*", in The American Philosophical Association's Annual Meeting. February 18-21, 2015 St. Louis, Missouri, USA

19. Sfendoni, D. “Potentiality as the Core of Aristotle’s Dynamic Model of Nature in the Light of Contemporary Science” VI INTERNATIONAL SEMINAR ON ARISTOTLE: “ENERGEIA AND DYNAMIS IN ARISTOTLE” October 14-16, 2015 University of Lisbon, Lisbon-Portugal
20. Sfendoni, D. “Aristotle the Universal Philosopher” October 17, 2012 Hellenic Studies Program, Philosophy Department & Department of HumanitiesYork University, Toronto-Canada
21. Sfendoni, D. “Aristotle the Universal Philosopher” October 25, 2012 The Classics Program & The Paideia Chapter of New Hampshire Hamilton Smith – 214, New Hampshire, USA
22. Sfendoni, D. “Aristotle the Universal Philosopher” October 26, 2012, UCONN Classics and Mediterranean Studies Department & UCONN Hellenic Student Association Paideia, Paideia of Connecticut & Paideia Center UCONN
23. Sfendoni, D. “Aristotle’s Direct Realism. Towards a Neo-Aristotelian Scientific Realism” May 16, 2013 Department of Philosophy, University of Edinburgh, UK
24. Sfendoni, D. “Scientific Realism: C. S. Peirce, Aristotle and Contemporary Science” June 11, 2014 Department of Philosophy, University of Kassel, Germany

Deliverables in progress

1 book
Demetra Sfendoni-Mentzou: Aristotle and Contemporary Physics, forthcoming.
Maria Kechagia: paper titled “The Notion of Aether in Aristotle’s ‘De Caelo’ and its timelessness” (submitted)

WP5 “New approaches to the problem of method and theories of confirmation” [Team NTUA]

Planned Deliverables: 2 papers, 1 doctoral dissertation, 1 workshop
Deliverables concluded: 3 papers, 1 doctoral dissertation, 1 workshop, 2 master theses

Papers

1. Arageorgis, A., & Stergiou C. “On Particle Phenomenology Without Particle Ontology: How Much Local Is Almost Local?”, Foundations of Physics , 43 (8): 969–977, 2013.

2. Arageorgis, A., "Aristotle and the atomists vis-à-vis the mathematicians", Philosophical Inquiry: Philosophical Quarterly, 39 (1): 164-18, 2015.
3. Stergiou, C. "Explaining Correlations by Partitions", Foundations of Physics, 1-14, DOI 10.1007/s10701-015-9945-y, 2015.

Doctoral Dissertation

Stelios, S., «Communication and Belief Revision: Investigation and Development of a descriptive model of measurement» (Supervisor A. Koutoungkos)

Master Theses

1. Apostolidis, A. , «Scientific realism and modality in abduction: Limits of abductive inferences» (Supervisor: C. Dimitracopoulos)
2. Flouris, Z., «Epistemological and metaphysical aspects of mathematical structuralism» (Supervisor: A Arageorgis).

Talks

1. Arageorgis, A. (2014). "Relativism, translation, and the metaphysics of realism". Talk at the Center for Philosophy of Science, University of Pittsburgh, USA, January 24, 2014.
2. Stergiou, C. "Coins, Machines and Partitions: Explaining Statistical Correlations." 3rd Panhellenic Conference on Philosophy of Science (Athens, 27-29/11/2014).
3. Stergiou, C. "Reichenbachian Common Cause Systems Compared."15th Congress of Logic, Methodology and Philosophy of Science, (Helsinki, 3-8/8/2015).
4. Stelios, S. "Belief Revision: Extensions of Micro Communication Structures – Macro Applications" in the Workshop: Induction, Abduction, Belief Revision, and Realism, December 15-16, 2015, Athens, Greece.
5. Stelios, S. "Communication and Belief Revision: Investigation and Treatment of a Descriptive Measurement Model" in the 3rd PanHellenic Conference of Philosophy of Science, November 27-29, Philosophy and History of Science Department, National and Kapodistrian University of Athens, Greece.
6. Stelios, S. "Communication and Belief Revision: Ethos and Credibility as a Parameter of Change, within a Descriptive Measurement Model" in the international Conference ETHOS/PATHOS/LOGOS – The Sense and Place of

Persuasiveness in Linguistic, Literary and Philosophical Discourse, October 18-20, 2012, UPG University, Ploiesti, Romania in collaboration with Cardiff University and University of Bern.

7. Apostolidis, A. Selecting the most parsimonious explanation in a modal frame, In: workshop Induction, Abduction, Belief Revision and Realism, NTUA, Athens 16/12/2014.

Workshop

Induction, Abduction and Belief Revision and Realism, 15-16 December 2014, Athens NTUA (Organiser: A Arageorgis)

Deliverables in Progress

Arageorgis, A. (2015). "Relativism, translation, and the metaphysics of realism", 36 pp. Under review British Journal for the Philosophy of Science.

WP6 "The structure of scientific models and the problem of representation" [Team UOA]

Planned Deliverables: 3 papers, 1 doctoral dissertation, 1 workshop
Deliverables concluded: 2 papers

Papers

1. Psillos, S. 'Conventions and Relations in Poincaré's Philosophy of Science'. *Methode-Analytic Perspectives* 3: 98-140 (2014)

2. Koilakos, D., 'Scientific representations as tools for cognition', *Proceedings of International Conference Social Philosophy of Science*, Russia Prospects, v.3 Section 2. Social Ontology, pp. 25 24 (Moscow Institute of Philosophy Russian Academy of Sciences), 2015.

Talks

1. Koilakos, D. "Scientific Representations: An analogy with Vygotskian concepts, mediation and ZPD", *XVI L.S. Vygotsky International Readings*, Moscow: Russian State University for the Humanities - L.S. Vygotsky Institute of Psychology 16-20 Nov 2015

2. Xenikou, A. 'Organizational values and identification: The relationship of perceived organizational values with cognitive and affective identification', Ομιλία στο συνέδριο της EAWOP Congress, University of Munster, May 2013
3. Psillos, S: 'Representing is perspectival, the represented is not', University of Cyprus, Workshop on Scientific Modeling: Describing the Abstract and Representing the Real, May 28-30 2015
4. Psillos, S: 'Conventions and Relations in Poincaré's Philosophy of Science', International Workshop on Henri Poincaré's Philosophy: Conventions and Structural Realism, Center for Philosophy of Science of the University of Lisbon, 19 June 2015
5. Psillos, S: 'Hypotheses in the two Principia' Workshop: Descartes and Newton on Method, Center for Philosophy of Science of the University of Lisbon, 17 June 2015

Deliverables in progress

1 doctoral dissertation: 'Models and Active Representation in Science: A Marxist Approach' (submitted, examination on the 4th of December 2015). Supervisor: S. Psillos
Psillos, S. The Representing is Perspectival, the Represented is not.

WP7 "Conceptual change and the role of experiment in science" [Team UOA]

Planned Deliverables: 3 papers, 1 workshop
Deliverables concluded: 3 papers, 1 workshop, 1 edited issue of journal.

Papers

1. Arabatzis, T., "The Structure of Scientific Revolutions and History and Philosophy of Science in historical perspective." To appear in A. Blum, K. Gavroglu, C. Joas, and J. Renn (eds.), Shifting Paradigms: Thomas S. Kuhn and the History of Science. Berlin: Edition Open Access, 13 pp, 2015.
2. T. Arabatzis & D. Howard, "Introduction: Integrated history and philosophy of science in practice," Studies in History and Philosophy of Science 50 (2015): 1-3.

3. T. Arabatzis & D. Ioannidou, "The role of models and analogies in the Bohr atom." In F. Aaserud and H. Kragh (eds.), One hundred years of the Bohr atom (Royal Danish Academy of Sciences and Letters, 2015), pp. 360-376.

Special issue of Journal

T. Arabatzis & D. Howard (eds.), Integrated History and Philosophy of Science in Practice. Special Issue of *Studies in History and Philosophy of Science* 50 (2015): 1-90.

Talks

1. Arabatzis, T. "A philosophical history of the discovery of argon," Knowledge, Technologies, and Mediation: A Workshop in Honor of Norton Wise, Department of History, UCLA, 17 October 2015.
2. Arabatzis, T. "Experiment in historical and philosophical Perspective," CITA: Centre for IT and Architecture, Royal Danish Academy of Fine Arts, School of Architecture, Copenhagen, 18 September 2015.
3. Arabatzis, T. "Concepts out of theoretical contexts," Relocating the History of Science: Conference in Honor of Kostas Gavroglu, co-organized by the Department of Philosophy & History of Science, University of Athens and the Max Planck Institute for the History of Science, Athens, 15 May 2015 (with Nancy Nersessian).
4. Arabatzis, T. "A historian's perspective on integrated HPS," IUC Philosophy of Science Conference, Philosophy of the History of Science, Dubrovnik, 17 April 2015.
5. Arabatzis, T. "The history and prospects of integrated HPS," The Faculty of Humanities, The Hebrew University of Jerusalem, 21 January 2015.
6. Arabatzis, T. "Experimentation and the meaning of scientific concepts: The philosophy of experiment meets the causal theory of reference," The Cohn Institute for the History and Philosophy of Science and Ideas, Tel Aviv University, 19 January 2015.
7. Arabatzis, T. "Revisiting the discovery of argon," Annual Meeting of the History of Science Society, Chicago, Illinois, 6-9 November 2014 (with Kostas Gavroglu).
8. Arabatzis, T. Five Lectures at the Department of History and Philosophy of Science, University of Lisbon, September 29 – October 3, 2014:

Lecture 1: An overview of the history of HPS

Lecture 2: The structure of scientific discovery

Lecture 3: Scientific representation: theories and models

Lecture 4: The history and philosophy of experimentation

Lecture 5: The current state of play: the prospects of philosophical history of science

9. Arabatzis, T. "Integrated HPS in historical perspective," International Summer School in Social and Historical Epistemology, University of Pécs (Hungary), 1 July 2014.
10. Arabatzis, T. "The philosophy of experiment meets the causal theory of reference," Thalis Workshop: Experimentation, Conceptual Change, and Scientific Realism, University of Athens, 2-3 May 2014.
11. Arabatzis, T. "Telling (and evaluating) philosophical tales about the scientific past," Workshop: The Philosophy of Historical Case Studies, University of Bern, 21-22 November 2013.
12. Arabatzis, T. "The prospects of integrated HPS: Historical philosophy of science and philosophical history of science," Conference: Science and Reality, Rotman Institute of Philosophy, Western University, London, Ontario, Canada, 5-6 October 2013.
13. Arabatzis, T. "What is wrong with the received view of the discovery of the electron?" Center for Science Studies, Institute of Physics and Astronomy, University of Aarhus, 26 June 2013.
14. Arabatzis, T. "The role of models and analogies in the Bohr atom," Conference: One hundred years of the Bohr atom, 1913–2013, Niels Bohr Archive, Copenhagen, 12-14 June 2013 (with Despina Ioannidou).
15. Arabatzis, T. "Philosophical history of science," Hungarian Academy of Science, Budapest, 14 May 2013.
16. Arabatzis, T. "*The Structure of Scientific Revolutions* and the prospects of philosophical history of science," *Towards a history of the history of science: 50 years since "Structure"*, Max Planck Institute for the History of Science, Berlin, 17-20 October 2012.

17. Arabatzis, T. “Scientific realism and the history of experimentation,” *Scientific Realism in Light of the History of Science*, University of Durham, 7-8 September 2012.

18. Arabatzis, T. “Modeling the atom in the early 20th century,” *Values and Norms in Modeling (VaNiM 2012)*, Eindhoven, 25-27 June 2012 (with Despina Ioannidou).

Workshop

Experimentation, Conceptual Change, and Scientific Realism, 2-3 May 2014, Athens UOA (Organiser: T. Arabatzis)

Deliverables in progress

1. T. Arabatzis, “Forming a concept versus discovering an entity.” To appear in R. Burian and J. Lennox (eds), Concepts, Induction, and the Growth of Scientific Knowledge.
2. T. Arabatzis, “The electron's hesitant passage to modernity, 1913-1925.” To appear in M. Epple & F. Müller (eds.), Science as Cultural Practice (Akademie-Verlag), 25 pp.
3. T. Arabatzis, “The Structure of Scientific Revolutions and History and Philosophy of Science in historical perspective.” To appear in A. Blum, K. Gavroglu, C. Joas, and J. Renn (eds.), Shifting Paradigms: Thomas S. Kuhn and the History of Science. Berlin: Edition Open Access, 2015, 13 pp.
4. T. Arabatzis & K. Gavroglu, “From discrepancy to discovery: How argon became an element.” To appear T. Sauer & R. Scholl (eds), The Philosophy of Historical Case-Studies (Springer), 22 pp.

WP8 “Theories of truth and scientific realism” [Team UOA]

Planned Deliverables: 3 papers
Deliverables concluded: 1 paper

Papers

1. Stephanou, Y.: “A Propositional Theory of Truth”, forthcoming in the *Notre Dame Journal of Formal Logic,* 43 pages, 2016.

Talks

1. Manolakaki, E. "A Measurement Theoretic account of Propositional Attitude Ascriptions", European Congress for Analytic Philosophy, ECAP8, Bucharest 27/8-2/9 2014

2. Psillos, S: 'Causal Descriptivism Revisited', in Conference 'The Analysis of Theoretical Terms' Munich Centre for mathematical Philosophy, University of Munich, April 2013

Deliverables in progress

Stephanou Y.: 'Classical Logic and the Liar', submitted, 17 pages.

WP9 "The role of mathematics in scientific theories" [Team UOA]

Planned Deliverables: 3 papers, 1 book, 1 workshop
Deliverables concluded: 4 papers

Papers

1. Christopoulou, D. On the synthetic content of implicit definitions. Logic and Logical Philosophy 22: 47–60, 2013.
2. Christopoulou, D. "Weyl on Fregean implicit definitions: between phenomenology and symbolic construction", Journal for the General Philosophy of Science, Volume 45, Issue 1, pp 35-47, 2014.
3. Dimitracopoulos C. and Paschalis V., «Grades of discernibility», Panhellenic Logic Symposium (Karlovassi, June 11-15, 2015), pp.13--16.
4. Psillos, S. and Christopoulou, D. "Mathematical Nominalism/Fictionalism: problems and perspectives» (forthcoming) (in Greek)

Talks

1. Christopoulou, D. "Implicitly defining mathematical terms" Conference 2013 - LMU Munich The analysis of theoretical terms
2. Christopoulou, D. "Hermann Weyl's implicit definitions" 2nd Panhellenic Conference of Philosophy of Science 2012

3. Discernibility in Philosophy and Arithmetic, 32nd Weak Arithmetics Days (Athens, June 24-26, 2013).
4. Dimitracopoulos, C. Grades of specifiability, 3rd Panhellenic Conference of Philosophy of Science (University of Athens, November 27-29, 2014).
5. Dimitracopoulos, C. Logicism and interpretability in arithmetic, Workshop "Induction, abduction, belief revision, and realism" (NTUA Campus, Athens, December 15, 2014).
6. Dimitracopoulos, C. Grades of discernibility, 10th Panhellenic Logic Symposium (Karlovassi, Samos, June 11-15, 2015).
7. Dimitracopoulos, C. Grades of specifiability, 15th Congress of Logic, Methodology and Philosophy of Science (Helsinki, Finland, August 3-8, 2015).
8. Psillos, S. 'Nominalism and Science., University of Patras, May 2013

Workshop

Model Theory, Weak Arithmetic and the Role of Mathematics in Scientific Theories, 24 – 26 June 2013, Athens UOA (Organiser: C. Dimitracopoulos)

Deliverables in progress

1 book on the Philosophy of Mathematics (by Psillos & Christopoulou)

WP10 "Co-ordination and Evaluation of the project" [Team UOA]

Planned Deliverables: Co-ordinations, evaluations, progress reports.
Deliverables concluded: Co-ordination, biennial progress reports.
Deliverables in progress: Final evaluation; External evaluation.

3. Assessment per Team

3.1 Team UOA

Team UOA had the bulk of the project with 8 work packages. Of them, Psillos was primarily responsible for work Packages 1, 2, 6, with participation in packages 8 and 9. Arabatzis was responsible for Work Package 7; Karakostas was responsible for Work Package 3; Stephanou was primarily involved in Work Package 8 and Dimitracopoulos was responsible for Work Package 9. In these work packages the output was 30 papers, 6 book reviews and 2 doctoral dissertations.

Key issues

The following are key issues that were explored by the team, based on the focus of each work-package:

In WP1, part of the target was the development of the strongest possible realist position, in the face of important sceptical arguments such as the pessimistic induction and the underdetermination of theories by evidence. Particular emphasis was given to historical case studies.

In WP2, the main target was the thorough investigation of the resurgence of a neo-Aristotelian metaphysics of science. A neo-Humean view of laws of nature was developed. The focus was on how much metaphysics scientific realism should buy into.

In WP3, the question of realism was examined in the light of contemporary Quantum Mechanics, focusing on the conceptual tools of category theory.

In WP6, the focus was on the roles of idealization and abstraction in model-building.

In WP7, two were the major focal points. The first was the relative autonomy of concepts from theories and hence the possibility that they can retain their identity even when theories change. The second concerned the role of experiment in fixing the reference of concepts.

In WP8, the concept of truth, especially in the light of well-known paradoxes, was investigated.

In WP9, one strand concerned the issue of individuation in science and mathematics. The other strand aimed to discuss the notion of nominalistic adequacy of scientific theories and to unravel difficulties for nominalistic accounts of the use of mathematics in science.

3.2 Assessment of each work package per member contribution

WP1: The epistemic phase of the debate around scientific realism: problems and prospects

The focus of attention in this WP was on current forms of realist positions which deny the full-blown commitment to realism, eg, structural and semi-realism.

Stathis Psillos

I concentrated my attention on the development of a thorough defence of realism by looking in detail into Jean Perrin's argument for the reality of molecules and the atomism debate in the end of the nineteenth century. I also defended realism against Chakravartty's semi-realism and offered a thorough criticism of French's Ontic Structuralism.

Ioannis Votsis

Throughout the duration of the Thales project, I continued to work on main research area, structural realism, and, more broadly, the scientific realism debate. The direct result was the publication of three articles, Votsis (2012), Votsis and Schurz (2012) and Schurz and Votsis (2014). The two co-authored articles are case studies demonstrating that to the extent that a predecessor theory, e.g. the caloric theory of heat, enjoyed genuine success, the structural parts responsible for that success have been incorporated into its successor theory, in the case at hand the kinetic theory of heat. The research that led to these publications was conducted with the help of a related project funded by the German Research Foundation (DFG) and whose aim was to investigate the dynamics of scientific theory change via Lawrence Barsalou's recursive frame theory.

Beyond work that deals directly with issues arising in the scientific realism debate, I have also produced several other publications on related issues, namely unification, ad hocness, theory-ladenness and confirmation theory. On the subject of unification, I have proposed a novel conception and associated measure that gauges the unity of a theory through the confirmational connections of its content parts – see Votsis (2015b). This proposal is closely tied to my suggestion of how to discriminate between ad hoc and non-ad hoc hypotheses – see Votsis (forthcoming b). Both of these notions, i.e. unification and non-ad hocness, play a crucial role in the scientific realism debate as they can be put to work when we need to choose between empirically equivalent theories. Providing a robust conception of these notions is thus of paramount importance to the debate and that was precisely what I attempted to do with the aforementioned publications. On the subject of theory-ladenness, I published a defence of the veridicality of observation reports and perceptual beliefs against accusations of widespread theoretical bias – see Votsis (2015a). Once more, answering questions in this topic is vital to making progress

in the scientific realism debate as the veridicality of observation reports and perceptual beliefs is a necessary ingredient for both realists and moderate anti-realists, e.g. constructive empiricists. Finally, on the subject of confirmation theory, in Votsis (2014) I attempted to lay some cornerstones in the foundations of an objective theory of confirmation by considering lessons from the failures of predictivism. The latter is a hot topic closely related to the realism debate. That is, it is sometimes claimed that the no miracles argument should be qualified with a predictivist clause, namely realism is the only view that can explain the novel predictive success of science. My research argues against this reading of the no miracles argument.

Other publications include four edited volumes/special issues. Three of these explore topics that have already been mentioned, viz. novel predictions (Votsis, Fahrbach and Schurz 2014), theory-ladenness (Votsis, Tacca and Schurz) and unification (Votsis and Schurz). The fourth is a more general publication, namely the proceedings of the European Philosophy of Science Association meeting in Helsinki (Mäki, Votsis, Ruphy and Schurz).

Philippos Georgiadis

His work was focused on Poincare's version of structural realism and the role of the history of science in the realism debate.

Work Package 2: Realism and the metaphysics of science

The theme of this WP was "Realism and the Metaphysical Commitments of Science". This was a heavily researched package with a number of contributors. There were various research lines all focusing on the relation between science and the metaphysics of science and especially on the current versions of neo-Aristotelianist metaphysics. Sub-projects concerned the issues of laws of nature, causation, dispositions, powers, realism in quantum mechanics, biological kinds and mechanisms and mental causation.

Stathis Psillos

In my own work I tried to develop a neo-Humean conception of laws of nature which best suits the scientific image of the world. I focused on the view that laws of nature are regularities and developed this view by analyzing the concept of 'natural pattern'. I also worked on clarifying issues about modality and counterfactuals.

Antigone Nounou

In terms of research, the themes that span my work are scientific realism in the context of contemporary high-energy physics, and scientific understanding with and without scientific explanation. During the programme, I worked on five papers, of which one was published ("For or against OSR? A verdict from High Energy Physics"), one was rejected ("One real gauge potential is one too many", submitted to and rejected by *SHPMP*), while the remaining three are still works in progress and collaborations: two of them with another philosopher of science, F.A. Muller, University of Rotterdam, and one with a physicist, Harris Anastopoulos, University of Patras. These papers have been presented in conferences in Greece and abroad (USA, Germany and Finland).

Vassilis Livanios

My research work done in the context of APRePoSMa is a part of a broader project of defending a sui generis categorical monism for the fundamental properties and relations of the actual world. The main tenets of this metaphysical account, as well as their consequences for the ontological features and the modal status of laws of nature, are described in my book *Science in Metaphysics: Exploring the Metaphysics of Properties and Laws*. The best part of this book (a draft of which has been already submitted to be considered for publication to Palgrave Macmillan) has been written during the research programme.

Two of the issues with which I have been preoccupied during the research programme are the critique of the dispositional essentialist account of laws of nature and the defence of a way of de re modal representation of the fundamental properties and structures which is independent of their nomic/causal roles. Related to the first issue is my published article «The 'Constant' Threat to the Dispositional Essentialist Conception of Laws», in which I argue for the incompatibility of the dispositional essentialist account of laws with the presence of fundamental constants in them. This article is a part of my critique of the dispositional essentialist account of laws, started with my earlier article «Symmetries, Dispositions and Essences» in which I discuss the problems raised when one attempts to offer a dispositional essentialist account of the conservations laws and symmetries. Also related to the first issue is my latest article «Smart and Thebault on Hamilton's Principle and Dispositional Essentialism» (submitted to *Analysis*) in which I discuss the compatibility of the basic tenets of Dispositional Essentialism with the theoretical explanatory role of the Principle of Least Action.

The second of my APRePoSMa-related published articles is «Categorical Structures and the Multiple Realisability Argument». In this article I defend a way of de re modal representation which is completely independent of causal/nomic roles against the major objection to it (the so called Multiple Realisability Argument) and show how one may

defend the possibility of fundamental categorical structures which are de re modally represented via the aforementioned way.

Elina Pechlivanidi

My research within the project Thalis-APRePoSMa concerns the metaphysical commitments in science. Particularly, I examine the nature of causality from the aspect of a metaphysics based on a new ontological category, powers (or dispositions). The general aim of my study is to explore the metaphysical assumptions and their consequences of an ontology based on powers. So far my research has been developed by focusing on three aims: firstly, to explore, whether overall the reality of dispositions is a viable metaphysical approach, one that is not only in accordance with the scientific image of the world, but primarily, one that is consistent; secondly, provided a powers understanding of causality, to investigate the type of modality that such a view implies, and thirdly, given the desideratum of a scientifically informed metaphysics, to examine the recent attempts to view powers, in parallel to the newtonian forces, as entities that can be represented as being vector-like. More specifically, while examining the kind of modality that realism about causal powers implies, I expressed my scepticism regarding the view that the adoption of a dispositional account of causation introduces a distinctive kind of modality, i.e. dispositionality. In my presentation 'Three options for the modality of causal relations', at the Rotman Institute of Philosophy, I compare the aforementioned view with the more traditional one, according to which there is a necessary relation between dispositions and their manifestations. The critique of dispositional necessitation takes, in the metaphysical literature, the form of a series of counterexamples in which the existence of dispositions is not sufficient for the appearance of their manifestations. This possibility of counterexamples has been examined from two aspects in my talks and papers: 'Dispositions and intrinsic interference' (presented in the third Panhellenic Conference of Philosophy of Science) and 'Antecedent-strengthening test and causal necessitation' (based, initially, on preliminary work presented in a workshop at the University of Cologne, and then presented at the University of Bristol and in the research seminar of the Thalis-APRePoSMa project). There, at first I criticize the possibility of intrinsic interference, a view that is based on a functional analysis of the disposition of a system, and I argue that it does not provide a good reason for abandoning the traditional view of the necessitation of the effect by their dispositional causes. The second paper discusses the Antecedent-strengthening test as it has been used as an argument against causal necessitation. My argument there is that this test as it is usually understood, is misleading. Furthermore, I elaborate a conceptual analysis of the notion of necessitation , and investigate whether the combination of dispositions that form the dispositional

cause should be viewed as insufficient but necessary parts of an unnecessary but sufficient condition for the effect (INUS condition-thesis). This is directly linked to the discussion regarding both the reality of dispositions as well as the modality they impose. Finally, in the talks and paper 'Representing dispositional causes: a critique of the vector model' and 'Powers are not vectors' I criticize the proposed model for representing dispositional causes which introduces a vectorial representation of causal powers. There I show that this model has been developed on the assumption that powers are vector-like and interact in a way represented by operations among vectors. I argue that this relation of powers to vectors is highly problematic and overall the model misrepresents dispositional causation.

Nikos Bisketzis

Nikos Bisketzis participated in the organizing team of the research seminar APRePoSMa program along with Maria Panagiotatou and Vassilis Sakellariou. The group organized, from May 2012 until November 2015, thirty-nine (39) lectures with topics from all actions to implement the program.

He made a presentation in the 3rd National Conference of Science Philosophy titled "The properties of causation in the frame of probabilistic causality." In the context of the presentations of the program, he made a speech entitled: "Absences, promotions and causality".

In collaboration with Stathis Psillos, he wrote the article entitled "Absences, promotions and causality", which was accepted for publication in Deucalion, a journal for philosophical research and critique. Finally, an article on the implications of the Simpson paradox in probabilistic causality is in the process of final treatment.

Maria Panagiotatou (WP2, 3)

Maria Panagiotatou worked on the relation between realism and quantum mechanics, which stemmed from her doctoral dissertation, which won the first prize for the best Greek philosophical dissertation for the years 2011 & 2012 from the philosophical journal *Κριτικά* (Kritika).

In the context of the programme she published an essay review with title "Making sense of probabilities in physics" in the journal *Metascience* and has submitted a paper with title "Quantum mechanics and scientific realism: restoring a misconceived relation" in *The British Journal for the Philosophy of Science*.

In August 2015 she presented her work in the paper "Quantum mechanics and scientific realism: restoring a misconceived relation" at the LMPS international congress in Helsinki of Finland.

Stavros Ioannidis

My research as a member of the APRePoS-Ma research project concerned the nature of causation and explanation in biology, and especially in evolutionary theory. A main part of this research focused on the relevance of developmental biology for evolutionary explanations, and especially on the relationship between selectionist and other kinds of explanations.

A main aim of the research was to explore whether and to what extent development can be regarded as an evolutionary cause. In particular, I have argued, focusing on recent research within evolutionary developmental biology, that developmental mechanisms can influence the direction of evolutionary change. Part of this research was presented in the 2nd Panhellenic Conference in Philosophy of Science and in the Work in Progress Seminar of the Department of Philosophy at the University of Bristol, and forms part of an article in preparation ('Evolutionary causation: independent domains, directing causes, and the 'lucky mutant' view of evolution'). Debates over evolutionary causation and over the correct explanation of the direction of evolutionary change where prevalent in the decades before the formation of the Modern Synthesis. I have examined some important aspects of these discussions in a presentation prepared for the 3rd Panhellenic Conference in History of Science and Technology ('(Early) Modern Synthesis and mutationist theories of evolution: a debate that never happened?').

I have also examined the relationship between selectionist and developmental explanations in the case of macroevolution. I have presented this part of my research in the Departmental Research Seminar of the Department of History and Philosophy of Science at the University of Athens ('Contrastive Explanation and Reduction in Evolutionary Biology: the Debate on the Evolution of Phyla').

The distinction between population and typological thinking plays a central role in current discussions within philosophy of biology. In a paper entitled 'Population vs. typological thinking in evolutionary biology: a problematic distinction', presented in the 3rd Panhellenic Conference in Philosophy of Science, I criticised the adequacy of this distinction for understanding contemporary debates within evolutionary theory.

My research has also focused on the nature of mechanistic explanation in biology. In particular, I examined the extent to which biological systems encountered in molecular and cell biology can be regarded as modular in nature, and the relationship between modularity taken as a requirement for mechanistic explanation and concepts of 'modularity' commonly encountered in biology. Part of this research was presented in the ISHPSSB Biennial Conference at the Université du Québec à Montréal in Montréal and at the Rotman Institute of Philosophy in London, ON ('Modularity and the Limits of Mechanistic Explanation in Biology').

Moreover, in a presentation prepared for the APRePoS-Ma Research Seminar, I explored the relationship between two different ways to explain major transitions in evolution, i.e. via inclusive fitness theory vs. via multilevel selection theory ('Evolutionary Transitions and Group Adaptation'). Lastly, I participated in the Philip Kitcher Symposium, organised by the Department of History and Philosophy of Science at the University of Athens, with a presentation on the realist and pluralist aspects of Kitcher's philosophy of biology ('Between Pluralism and Realism: Philip Kitcher's Philosophy of Biology').

Irini Goudarouli

Apart from being a member of the administration and support team of the programme, I attended the research seminar of the programme and I participated in two international conferences. I also participated to the workshop «Experiment, Conceptual Change, and Scientific Realism» which took place 2-3 May 2014. During the duration of the programme I completed my dissertation entitled "The Formation of the Concept of Force in Natural Philosophy in Mid-17th Century England. An Interdisciplinary Approach Based on the Convergence of History of Science and History of Concepts".

In my Dissertation I explore the formation of the concept of force in the mid-17th century English philosophical discourse. In short, the study aims to draw the attention to the importance of investigating not only the historical and the intellectual but also the conceptual conditions of the period – a period where the discussion about what would be the proper philosophical language for describing nature became important within the English natural philosophical discourse. By bringing the need for the establishment of a proper philosophical language into the center of the research, I direct attention to the mid-17th century and the ongoing antithesis related to the proper language discourse developed by Thomas Hobbes and a few of the early Royal Society members, among them John Wilkins. The study derives its methodological and theoretical tools from the field of conceptual history (also known as history of concepts) and comparatively explores the concept of force within the different semantic fields developed within the linguistic contexts of Hobbes and five of the early members of the RS, such as, Wilkins, Robert Hooke, Robert Boyle, Thomas Sprat, Joseph Glanvill. Within this framework, the concept of force is not studied as a mere accumulation of mathematical technicalities but as a concept that emerged within the conceptual interrelations developed within specific linguistic contexts.

Aspasia Kanellou

Two are my main areas of interest: The first concerns the nature of sensation, which was part of my research for my PhD thesis in Greece entitled Illusions and perceptual

content, written in Greek. The second is mental causation, which was my research when I was a student at the University of Oxford (1999-2001) and at the University of London (2002-2003). The types of things I have been writing and working on cover mostly these areas.

With respect to the nature of sensation I have presented diverse things, which I now am trying to synthesize in a single paper which I will probably name 'naïveté about sensation'. I also raise some problems for Fregean Representationalism, that the modes of presentations it posits do not seem less mysterious than sense-data. Then I presented a paper at ESPP2013 in Granada entitled "Where is sensation to be found?". In that paper I argued that sensation is absent from discussions of perceptual content and this is rather puzzling given the existence of a variety of illusions, especially cross-modal illusions. I then named many substitutes for sensation like epiphenomenal qualia and non-conceptual content, and then turned to a more promising characterisation of sensation through focus on the uni-sensory multi-sensory distinction and Casey O'Callaghan's discussion. Another paper related to this was my presentation at the third Greek philosophy of science conference titled "The sense of perceptual presence for the sensorimotor contingency approach". While the sensorimotor contingency approach argues that it can individuate sensory modalities better than other alternatives it ends up endorsing doxastic views of consciousness, hostile to sensation.

For my research on mental causation, I presented a paper entitled "On Marc Jeannerod's action representations" at the ESPP in London 2012, a predecessor of two related presentations that got funded by Thales. The first was presented at ESPP (European Society for Philosophy and Psychology) 2014 Noto, Sicily and was called "On an interlocking view of motor representation and intention". There I outlined an alternative model of mental causation (alternative for example to John Searle's more philosophical one) proposed by Butterfill and Sinigaglia (2012,2015) which is also something like a dual-process theory and relies heavily on motor schemas and mirror-neurons. The same work with a specific argument against Butterfill and Sinigaglia was presented at the SSPP2015 (Southern Society for Philosophy and psychology) in New Orleans with commentator Mason Cash. It was entitled "An interlocking view of motor representation and intention and the particularity of action content".

Work Package 3: Realism and modern physics

The key issue in this package was realism and modern physics (especially Quantum Mechanics).

Vassilios Karakostas

Our contribution to the aforementioned research programme of Thalis concerns mainly the application and interpretative role of category theory in the modern conceptual foundations of quantum mechanics and its philosophical implications. It integrates in a consistent novel framework the deep conceptual insights obtained by the conception of truth as contextual correspondence in quantum theory, together with the new concepts and methods provided by category theory and categorical logic in order to shed light on the interpretation of quantum mechanics from a revised realist standpoint. To the best of our knowledge, the implementation of this research programme is the first to have explored thoroughly the implications of a category-theoretical scheme in the conceptual foundations of quantum theory concerning, in particular, the nature and interpretation of microphysical reality, the problem of truth in contemporary physics, and the multifarious ramifications of the interdependent issues involved.

The functioning of the proposed category-theoretical approach to conceptual foundations of quantum mechanics is based on the establishment of a bi-directional dependence (technically called adjoint functorial or categorical adjunction) between the Boolean and quantum structural levels in local or partial congruence. It is the impact of this bi-directional functorial relation, formulated strictly within the proposed category-theoretical framework, which allow us to provide an integrated framework for a novel realist interpretation of quantum theory by synthesizing all the relevant philosophical, logical and mathematical aspects. This is a crucial methodological difference that characterizes the novelty and fruitfulness of our research programme in comparison to a multiplicity of various other approaches on the conceptual foundations of quantum physics.

The implementation of this research programme has led to the following results:

(i) provides a viable realist interpretation of quantum theory by applying the proposed category-theoretical scheme to quantum event structures; on this basis, the quantum level of reality can be conceived comprehensively only through a contextual categorical perspective.

(ii) elucidates the role of contextuality in quantum mechanics by re-interpreting the consequences of Kochen-Specker's theorem in the light of local-global relations between Boolean contexts and quantum event structures.

(iii) signifies the structural rules of the revised realist position creating a separating boundary against instrumentalist claims.

(iv) confronts the fundamental problem of truth valuation in quantum mechanics by applying the powerful logical classification methodology of category theory to the quantum universe of discourse; it resolves, in particular, the semantic ambiguity with respect to truth valuation that is inherent in conventional Hilbert-space quantum mechanics.

(v) shows that the proposed category-theoretic representation of quantum propositional structures in terms of sheaves of local Boolean contexts incorporates an object of truth values, or classifying object, which constitutes the appropriate tool for the definition of quantum truth-value assignments to propositions describing the behavior of quantum systems.
(vi) formulates a suitable version of a theory of truth as contextual correspondence that squares with the propositional structure of quantum theory; importantly, the traditional conception of correspondence truth, involving a direct context independent relation between singular terms of propositions and definite autonomous facts of an external reality, may be viewed as a species or as a limit case of the more generic, proposed alethic scheme of contextual correspondence, when the latter is applied in straightforward unproblematic circumstances where the non-explicit specification of a context of discourse poses no further consequences.
(vii) heals intrinsic weaknesses of the conventional scheme of correspondence truth by providing, in particular, a concrete explanation of the nature of the correspondence relation, and, thus, enlightens the very notion of truth.
(ix) signifies the transition from the transcendence condition of the conventional correspondence theory of truth to the transcendental reasoning of the proposed account of truth, thus, illuminating the debate with respect to epistemic/non-epistemic status of a notion of truth.

Pandora Hantzidaki

Following the general guidelines of the Assoc. Prof. V. Karakostas, my work attempts to face the philosophical challenges raised by modern quantum theory from the viewpoint of three distinct, despite their frequent overlapping, groups of philosophical issues.
The first group includes issues concerning, among others: the methodological strategies implemented in the field of physical sciences for the approach of new knowledge; the empirical, structural, conceptual or ontological correlations between two successive physical theories; the development (cumulative or not) of scientific knowledge. The very nature of these issues requires a diachronic perspective on scientific knowledge, a perspective which, in my opinion, imposes in turn a dialectical association of history with philosophy of science. Following this line of research, my paper 'Bohr's model of the atom and its inherent inconsistency: Disentangling standard scientific realism from scientific rationality', critically compares the reconstruction of Niels Bohr’s atomic model, as proposed by John Norton (in his work the 'How we know about electrons', 2000), with the original form of this model. My paper leads up to the claim that, contrary to Norton’s central position, Bohr’s model and, mainly, the enclosed in this model methodology evidently attest for the continuous and non-cumulative development of

scientific knowledge, a development entirely compatible with a realistic view which explicitly delimits the philosophical premises of scientific realism.

The second group comprises issues requiring a synchronic perspective on scientific knowledge; they concern, among others, the structural and conceptual study of modern physical theories, the investigation of their epistemological implications, and, from a realistic viewpoint, an attempt to understand what these theories tell us about the natural world. In this direction, my work 'Scientific realism in view of quantum non-separability', explores whether an interpretative approach to quantum theory which sets as key-stone of its constitution the concept of ‘quantum-non-separability’ is adaptable in principle to the philosophical context of scientific realism, contrary to what is usually affirmed. Through the analysis of the concepts involved in the proposed approach, I proceed to a compatible with the concept of quantum non-separability reformulation of the fundamental theses of scientific realism (the 'metaphysical', the 'semantic' and the 'epistemic' thesis) and I come to the following conclusion: the fact that quantum theory seems to imply a non-separable natural world, a world not entirely knowable and not susceptible of reductionistic approaches does in no way undermine neither the trustworthiness of quantum theory, as physical theory, nor the legitimacy of scientific realism, as philosophical view. The epistemological consequences of quantum theory, as they emerge from quantum non-separability and as they are consistently reflected in Bohr’s concept of 'complementarity', are further highlighted in my paper 'Bohr's complementarity: an epistemological framework transcending the domain of physical sciences'.

The third group includes issues stemming from the exploration of the possibility of connecting the philosophical implications of modern scientific knowledge with broader philosophical thinking. In this direction, my paper 'The one-world interpretation of Kantian transcendentalism in view of quantum non-separability' examines the 'one world' interpretations of the Kantian distinction between 'things themselves' and 'phenomena' [the interpretations proposed by Langton (1998), Allais (2004) and Mueller (2010)] in the light of quantum non-separability. This paper opens, in my opinion, a fertile dialogue between Kantian philosophy and modern physics from a realistic perspective.

Kostas Papadopoulos

He worked in a specific part of WP3 looking into process theories, as advanced by A N Whitehead and their relation to quantum mechanical processes.

Work Package 6: The structure of scientific models and the problem of representation.

The key theme of this package was "The Nature and Structure of Theories and the Problem of Scientific Representation". The doctoral dissertation criticized recent pragmatist approaches to representation and developed a novel account of representation in science based on a broadly Marxist perspective. Part of the project was the development of a coherent view of representation in science consistent with Poincare's philosophy of science.

Stathis Psillos

I supervised the dissertation by Koilakos and published a long stude of Poincare's philosophy of science which discusses the relation between conventionalism and structuralism.

Demetris Koilakos

In my PhD thesis, which is is about the nature and function of scientific models and scientific representations in general, I attempt to deploy an approach on the issue from a Marxist perspective.

The originality of the thesis is that a systematic effort to study the issue of scientific models from a Marxist perspective, which is significantly missing from the current discussion. Under this prism I have scrutinized, commented and criticized the development of the relevant discussion in the history of philosophy of science; on the basis of this criticism, I attempted to make an interesting contribution to the discussion.

The chapters of dissertation may be developed into independent papers.

The concerns I raise in my thesis develops may also be of interest to the philosophical community from another point of view a problem, namely that it could be seen as an attempt to introduce a Vygotskian perspective to philosophy of science.

Athena Xenikou

Dr Xenikou worked in a specific part of WP6 aiming to explore representation in the social sciences, and in particular in organizational structures.

Work Package 7: Conceptual change and the role of experiment in science

The key subject of this package was the study of conceptual change, experimentation and scientific discovery in light of the realism debate.

Theodore Arabatzis

During the past four years I've been working on several issues directly related to the seventh-work package of the Thalis research project: conceptual change, experimentation, scientific discovery, and the relationship between history and philosophy of science (HPS). I have published on all of these topics, producing five papers, one book review, and a special issue of a journal. I also organized, together with Irene Goudarouli and Antigone Nounou, a workshop on experiment and conceptual change. I thus fulfilled all of my obligations to the project (three papers and a workshop). Since I've described the workshop separately, let me focus on the main publications that have come out of my research.

The first publication concerned "Experimentation and the meaning of scientific concepts" (2012). The thesis I defend in the paper is that concepts are relatively independent from theories and, thus, may retain their identity even when theories change. The formation and development of concepts involves experimentation, which is to a significant extent independent from theory. Thus, the meaning of concepts has an experimentally obtained component that is remarkably immune to changes in theoretical perspective.

Of course, theoretical considerations often drive conceptual change. This is the subject of the second publication, "The role of models and analogies in the Bohr atom" (coauthored with Despina Ioannidou). This paper investigates the transition from the classical to the quantum representation of the atom. In examining that transition, we stress the importance of the negative analogies between atomic and planetary systems. We argue that the emergence and development of Niels Bohr's model of the atom went hand in hand with the elaboration of those negative analogies.

The next two publications focus on the integration of history and philosophy of science, which is crucial for an adequate treatment of the realism problem as it pertains to conceptual change and the so-called pessimistic induction.

The third publication is a special issue of *Studies in History and Philosophy of Science*, co-edited by myself and Don Howard. In our introductory essay we suggest various possibilities for integrating HPS and discuss how they are exemplified in the papers in the special issue. Some of the papers focus directly on salient aspects of scientific realism, namely the underdetermination of theory by evidence and the debate between realists and constructivists.

The fourth publication, "*The Structure of Scientific Revolutions* and History and Philosophy of Science in historical perspective", examines how history and philosophy of science are intertwined in Kuhn's classic book. After a brief sketch of the history of integrated HPS, I point out some possibilities for integrating the two disciplines that were opened up by *Structure* but haven't been sufficiently explored. Finally, I reflect on one of those possibilities, what I call philosophical history of science.

In the final paper, "From discrepancy to discovery: How argon became an element" (coauthored with Kostas Gavroglu), we revisit a classic episode in the history of chemistry, the discovery of argon. We argue that to understand historically how argon was discovered we need to take into account the philosophical insight that scientific discoveries are extended processes, which involve the conceptual accommodation of discrepant results and, in some cases, the legitimation of new experimental techniques.

All of the above papers were delivered in international conferences and Universities. The funding I received from the THALIS project has considerably facilitated my research and enabled its presentation to international audiences

Work Package 8: Theories of truth and scientific realism

The theme of this package was the concept of truth.

Yiannis Stephanou

In the context of Thalis, I carried out research that referred to the concept of truth and the paradoxes that involve it. The most well-known among them is the liar paradox, which, in a typical version, concerns a sentence, (L), that says of itself that it is not true:

(L) (L) is not true.

It seems that if that sentence is true, then it is not true, and if it is not true, then it is. Other paradoxes about truth do not concern odd, self-referring sentences, such as (L), but sentences that could be used in ordinary speech.

In the 20th century, one usually tackled the antinomies about truth by partly rejecting the so-called naive conception of truth. The naive conception comprises the propositions about truth that are at first sight obvious and mainly all claims of the form

S is true if and only if p,

where the letter 'p' has been replaced with any declarative sentence, whereas 'S' has been replaced with a name of that sentence. If, for example, we replace 'p' and 'S' with the sentence (L) and its name, we get the biconditional ' (L) is true if and only if (L) is not true'. Classical logic allows us to infer from that biconditional to the contradiction '(L) is and is not true'.

The correspondence theory of truth, which is often considered to be required by realism either in philosophy of science or in other branches of philosophy, generally endorses the claims of the form 'S is true if and only if p'. So do the deflationary views that oppose the correspondence theory. Thus, if those claims must be partly rejected, this has consequences for the kind of correspondence or deflationary theory we may accept.

The approach I elaborated consists in tackling the liar and kindred antinomies not by partly rejecting the principles about truth that are at first sight obvious, but by diverging

from classical logic. The non-classical logic we need should not allow us to infer from a premiss of the form 'p if and only if not-p' to the contradiction 'p and not-p'. More generally, the logic should be capable of combining with the naive conception of truth without giving rise to contradictions. At the same time, it is good if the logic we need does not diverge too much from classical logic. I formulated non-classical logics that meet those conditions, as well as formal theories of truth embedded in such a non-classical logical framework. The same approach to the semantic paradoxes has been adopted in the last fifteen years by H. Field and others, but they follow different methods and end up with different non-classical logics.

If one diverges from classical logic, one may also say that it is objectively indeterminate whether (L) is or is not true. In other words, there is no fact of the matter whether (L), as well as various other sentences involved in paradoxes, is true. It is doubtful if such a view is compatible with realism about truth. I argued that the approach I elaborated does not require such a view and does not call realism into question.

Work Package 9: The role of mathematics in scientific theories

The aim of this work package was the study of the role of mathematics in science.

Costas Dimitracopoulos

The discernibility of objects has been a topic of great interest, at least since the time of Leibniz. In the last decade or so, research in this area has been intense, especially by using tools and methods of first-order logic. Out of the four grades of discernibility that have been studied (see, e.g., J. Ladyman, O. Linnebo and R. Pettigrew, Identity and Discernibility in Philosophy and Logic, Review of Symbolic Logic 5 (2012), 162-186) three were essentially introduced by W. V. Quine (Grades of discriminability, Journal of Philosophy 73 (1976), 113-116), i.e. the ones he called *strong discriminability*, *moderate discriminability* and *weak discriminability*. A thorough study of the grades of discernibility is considered worthwhile, given that they have been used (see, e.g. A. Caulton and J. Butterfield, On kinds of indiscernibility in Logic and Metaphysics, British Journal for the Philosophy of Science 63 (2012), 27-84) for stating corresponding metaphysical theses (about the identity relation), which are thought to be closely related to structural realism. Closely connected with the notion of discernibility is the notion of *specifiability* of objects, which was also introduced by Quine (in the paper mentioned above) and corresponds to what is known, in Mathematical Logic, as *definability* of objects (with or without parameters). We have defined grades of specifiability of objects and studied these notions, within a specific model-theoretic framework, in particular, inside models of first-order Peano arithmetic (PA). While the usual transition from

intrinsic to extrinsic properties is based solely on the existence or not of quantifiers occurring in the (first-order) formulas which define the properties considered, our approach lays emphasis on the number of quantifier alternations in these formulas, so that we are led to an (infinite) scale of grades of specifiability. To be more specific, our grades of specifiability are defined by means of the quantifier complexity of the first-order formula used to specify an object in a model; so, for any n**N**, one has the notion of $_n$–specifiability and the notion of $_n$–specifiability of objects in a model. By exploiting a variety of old and new results, concerning the arithmetic hierarchy (studied extensively in Recursion Theory), as well as the distribution of $_n$– and $_n$–definable elements in models of PA, we have examined the relationships existing at various levels of this hierarchy and settled most of the problems concerning possible implications and non-implications. We are continuing our work, in the same spirit, towards (a) defining and studying enriched hierarchies involving the notions of strong, moderate and weak discriminability and (b) exploiting tools and results concerning the new, more refined, notions of specifiability/discernibility of objects to solve the question of Quine (in the paper mentioned above), i.e. whether or not there exist grades of discernibility which differ from the ones studied by him, i.e. strong, moderate and weak discernibility.

Demetra Christopoulou

During 2012-14, I continued and expanded my older research on implicit definitions (which had started as a postdoc in 2008). Particularly, I highlighted an aspect of implicit definitions according to which, they possess a synthetic (but not empirical) content. This thesis was developed by means of the *Ramseyfication method* whose application showed that systems of axioms and abstraction principles have a broadly factual content grasped by their Ramsey-sentences. Besides, I introduced one version of the notion "arrogance", a general form of which has been used by the Neofregeans B. Hale and C. Wright. I argued that *arrogance* is a logical characteristic of axioms and abstraction principles whereas Carnap-conditionals enjoy epistemic innocence, by being non-arrogant. Further, a part of my research focused its attention on a systematic comparison between the (neo)Fregean account of abstraction principles and Weyl's constructivist approach to them that is influenced by phenomenology. Weyl elaborates abstraction on the basis of Fregean examples as well as others he introduces. He highlights the role of the equivalence relations among certain elements of an initial domain as *invariances* upon which mathematical knowledge is based. This aspect of abstraction takes in account intentionality and the way it cooperates with intuition in order to make mathematical objects known. The comparison between the Neofregean abstraction and Weyl's abstraction showed off certain differences that stem from the different philosophical traditions which those accounts follow. The results of the above research have been

published in two papers in English (presented in the list of publications). Aspects of the above positions and argumentation have been presented in the conferences and talks mentioned in the relative list.

B) A second part of my research has been a collaboration with S. Psillos on the debate between mathematical nominalism and realism. The product of this research is a paper written in Greek which is going to be published in a collective volume. The paper takes under consideration and evaluates H. Field's project against indispensability arguments as well as the ways M. Balaguer and M. Leng have upgraded the nominalistic views in philosophy of mathematics. The argumentation of the paper supports the view that causal inactiveness of mathematical and other abstract objects does not make them dispensable in scientific explanations and theories. So nominalistic claims against indispensability of mathematics do not hit their target.

Stathis Psillos

My work in this package was focused on an attempt to show that current science implies an anti-nominalist account of mathematics, as it is used in science. A book on the philosophy of mathematics (co-authored with Christopoulou) is in progress

3.3 Other activities of Team UoA

e-Journal αnalytica

This is an open access e-jounral that has been published under the auspices of the project.

αnalytica is an open-access, English-language electronic journal dedicated to philosophy of science. It is edited by a younger generation of Greek philosophers of science, with the aid and support of an international advisory board. αnalytica invites submissions in all areas of philosophy of science and of individual sciences. It is open to all traditions, schools and approaches. αnalytica publishes research papers and, by invitation, survey articles and state-of-the-art papers. It does not publish book reviews and discussion papers. All unsolicited submissions will be refereed anonymously. All papers should be submitted electronically.

Editors:
Stavros Ioannidis (EiC)
Elina Pechlivanidi (EiC)
Demetra Christopoulou
Haris Hatziioannou
Vassilios Livanios

Antigone Nounou
Vassilis Sakellariou
Chrysovalantis Stergiou
URL http://www.analytica.phs.uoa.gr/

Research Seminar in UoA

This was a seminar that started in May 2012. It has run for four periods. There have been 39 talks from the members of the UOA and NTUA teams as well as from visiting scholars.

1st period, May 2012 – June 2013

1. 08/05/2012 **Vassilis Livanios**: *"Are fundamental physical properties intrinsic? The argument from gauge theories"*.
2. 22/05/2012, **Antigone Nounou**: "*For or against structural realism? A verdict from quantum field theories*".
3. 12/06/2012 **Vassilis Sakellariou**: "*The many faces of Janus: theories, hypotheses, insightful fallacies and the case of the electromagnetic theory*".
4. 16/10/2012 **Stathis Psillos**: *"Scientific Realism as an Historical Thesis ".*
5. 13/11/2012 **Maria Panagiotatou**: "*The paradox of deterministic probabilities and other mysteries*".
6. 27/11/2012 **Aspasia Kanellou**: "*The myth of phenomenal concepts*".
7. 11/12/2012 **Aristidis Arageorgis**: "*Relativism, translation and the metaphysics of realism*".
8. 15/01/2013 **Stavros Ioannidis**: "*Evolutionary transitions and group adaptation*".
9. 05/02/2013 **Costas Dimitracopoulos**: *"On ontology and realism in Mathematics"*.
10. 12/03/2013 **Harris Hatziioannou**: "*Conception and knowledge of metaphysical possibilities*".
11. 26/03/2013 **Philippos Georgiadis**: *«Henri Poincaré: structure, convention and history».*
12. 02/04/2013 **Theodore Arabatzis**: "*Experiment and conceptual change*".
13. 19/04/2013 **Dimitris Kilakos**: "*Aspects of the criticism of pragmatist approaches to scientific representations*".
14. 04/06/2013 **Konstantinos Stergiopoulos** : "*Physics and Mathematics: the riddle of an harmonious relationship*".
15. 17/06/2013 **Stathis Psillos**: *«APRePoSMa* Seminar, 1st year: *annual report»*

2nd period, December 2013 – June 2014

16. 09/12/2013 **Elina Pechlivanidi:** "*Representing dispositional causes: a critique of the vector model*".
17. 16/12/2013 **Yiannis Stephanou:** "*Classical logic and the liar*".
18. 27/01/2014 **Pandora Hadzidaki:** *"Scientific Realism in the light of Quantum Non-Separability".*
19. 10/02/2014 **Spyridon Stelios:** *"Revising beliefs: theoretical approaches and applications".*
20. 10/03/2014 **Ioannis Votsis:** *"The Metaphysical Status of Logical Principles".*
21. 31/03/2014 **John Wright:** *"Inference to the unobservables without inference to the best explanation".*
22. 28/04/2014 **Demetra Christopoulou:** *"Are mathematical implicit definitions arrogant?"*
23. 19/05/2014 **Doukas Kapantais:** "*"True in" and "True about": a Way to Interpret the Controversy over 'Contingent Identities".*
24. 16/06/2014 **Stathis Psillos (via skype):** "*Induction: the History of a good idea"*

3rd period, July 2014 – June 2015

25. 21/10/2014 **Chrysovalantis Stergiou:** "*Statistical correlations and common cause systems*".
26. 4/11/2014 **Michel Ghins:** "*Bas van Fraassen's modelling and representing: a critique".*
27. 9/12/2014 **Elina Pechlivanidi:** "*The criterion of strengthening of the antecedent in research involving dispositional modality*"
28. 10/2/2015 **Nikos Bisketzis:** "*Causation, absences and promotions".*
29. 10/3/2015 Vassilis Karakostas: "On the problem of truth via category theory".
30. 31/3/2015 **Orly Shenker:** "*Physicalism in physics: the case of classical statistical mechanics*".
31. 5/5/2015 **Alexandros Apostolidis:** "*Formalisation of explanatory virtues in abduction*"
32. 26/5/2015 **Petros Stefaneas:** "*Issues in philosophy of computer science*".
33. 2/6/2015, **Howard Sankey:** *"Scientific Realism and Basic Common Sense"*.
34. 4/6/2015, **Sankey vs Psillos on Scientific realism.**
35. 10/6/2015 **William Harper:** *"Isaac Newton's Scientific Method*" (Part 1).
36. 11/6/2015 **William Harper:** *"Isaac Newton's Scientific Method*" (Part 2).
37. 23/6/2015 **Robert DiSalle:** "*Newton's path from* De Gravitatione *to a theory of relativity*".

4th period, September 2015 – November 2015

38. 10/9/2015 **Orly Shenker:** "*The emergence of special sciences in a physical world***"**.
39. 10/11/2015, **Vassilis Livanios:** "*Dispositional Essentialism and the principle of Least Action*".

3.4 Team AUTH (PW4)

The relations of the modern worldview with the aristotelian conception of nature

The aim of the project was to shed light on the relation between Aristotle's philosophy of nature with contemporary science, so as to develop arguments for a Neo-Aristotelian version of scientific realism. To this purpose Aristotle's ideas have been studied and analyzed in the context not only of his treatises, but also in close relation to contemporary relevant scientific theories. The goal therefore was to arrive at a re-evaluation of Aristotle's work through an interdisciplinary approach. Thus, the method that has been followed for the study of Aristotle is disctinctly different from the traditional one, which is confined within the framework of Aristotle's writings and Aristotelian scholarship. The innovative aspect of the project is the extension of the basic lines of research to various fields of contemporary science so as to arrive at a re-evaluation of Aristotle's work and to defeat the traditional opinion that Aristotle's philosophy of nature was a "failure". This was an opinion developed through the centuries by the majority of Aristotle scholars, as well as by the scientists since the Renaissance. The reason for this attitude was due to the fact that the principles of Aristotle's philosophy of nature were, indeed, in total disagreement with the basic principles established by the founders of "scientific revolution" and subsequently by Newtonian Mechanics. In Newton's universe there was no place for the Aristotelian physical world of qualitative change, of the passage from potentiality to actuality, of the becoming of nature. The frame of thinking deriving from Newtonian mechanics offered the basis for the development of the positivist and the logical-positivist trends which domintated the scientific and philosophical thought, at least, up to the mid-twentieth century. The discoveries, however, since the second part of the last century in numerous fields of science have shown the limitations of the positivist-mechanist view and the need for fundamental changes in our conceptual categories for thinking about the physical world. It is important to note here that Aristotle's philosophy of nature includes not only his *Pysics, but also* the following equally important treatises: On the heaven (*Περὶ Ούρανοῦ), On generation and corruption (Περὶ γενέσεως καὶ φθορᾶς), Meteorologica (Μετεωρολογικὰ),* On the Soul (*Περὶ ψυχῆς), On the sense and sensibilia (Περὶ αίσθήσεως καὶ αίσθητῶν), On memory and reminiscence (Περὶ μνήμης καὶ άναμνήσεως), On Sleep and (Περὶ ὕπνου και Περὶ μαντικῆς τῆς έν τοῖς ὕπνοις*), as well as Aristotle's biological treatises, such as On the parts of animals

(*Περὶ ζῴων μορίων)*, *On the generation of animals*, (*Περὶ ζῴων γενέσεως)*, and On the history of animals (*Περὶ τὰ ζῷα ἱστορίαι*). In the above treatises Aristotle examines a number of concepts that are central in science and in philosophy of science today, such as matter, time, movement, causality, laws of nature, natural kinds, mind, memory, imagination, as well as issues connected with the methods of science: induction-abduction-reduction.

Therefore, the themes developed in the context of the project are the following (per member of the team)

Demetra Sfendoni-Mentzou Aristole and Contemporary Physics (Book)

My aim in this book is to shed light on the conceptual relationship between Aristotle's philosophy of nature and contemporary Physics, as well as to develop arguments, through the study of Aristotle's work, in defense of contemporary scientific realism. The central idea on which the whole development of the book is built is that the concepts, which the Natural scientists are invited to use today in order to be able to understand the structure and character of physical reality, have a strong Aristotelian air. The new discoveries in the field of Quantum Physics and Physics of Elementary Particles point the way to the formation of a dynamic model of nature, which has substantial analogies with that of Aristotle. The position that I put forward is part of a new trend in the study of Aristotle's Natural Philosophy, which leads to the formation of a Neo-Aristotelian version of scientific realism.

Thus, due to the nature of the issue, this book presents the following distinctive characteristics: It attempts the conceptual marriage of two areas, each one of which consists a particular field of study and research. The first is the area of ancient Greek philosophy, especially of Aristotelian thought, while the second one, of modern and contemporary Physics. The presentation and analysis of the issues on ancient Greek philosophy is grounded on particular references to ancient texts, taking at the same time into account the basic classical scholarship. However, the treatment of the topic does not enter into an exhaustive investigation, either from a philological or from a highly specialized philosophical point of view, because this is not the aim of the book. My attempt is to present the basic stages of development of physical theories associated with the issue and subsequently to proceed to a philosophical discussion developed and based on data that have emerged in the two contemporary fields of Physics, i.e. Quantum Physics and Physics of Elementary Particles. The whole presentation and analysis does not include technical details that would require from the reader the knowledge of a specialist. Finally, I must say, that the tissue on which I try to knit the material of the two areas above is that of the Philosophy of Science, which offers the means for linking the Aristotelian model of the nature with contemporary Physics, and to shed light on that particular material which can contribute to the development of a strong version of scientific realism founded on the principles of Aristotle's Physics.

Aristides Gogoussis

The goal of the conducted research was the connection of the Aristotelian philosophy with modern scientific contemplation oriented toward Technology. To accomplish that, a synthetic approach was followed having as its primary direction the investigation of the physiognomy, the objectives and the methodology of Engineering design with a particular emphasis on the notions of purpose and that of the δυνάμει. Deeply influenced by the study of Aristotelian texts, the founder of pragmatism Charles S. Peirce conceived a theory founded on the triadic archetype as the fundamental component of each structurally interesting functional system with a rich spectrum of manifestation possibilities. The combination of causal and teleological conjunction aiming at a methodically guided synthesis of particular subsystems in order to obtain complicated structures which serve ambitious engineering goals may be considered as the origin for the materialization of the modern technological fulfillment. Within this context the problem of Engineering Design of Systems specified to operate in accordance with logically and physically consistent constraints acquires a considerable importance. Thus, *engineering design of operation* as a problem that seeks a satisfactory solution calls for a thorough consideration of issues such as our partial ignorance of nature's lawfulness, the interdependence of nature's components as well as our inability to model mathematically all the dynamical aspects of nature's interacting subsets. Its resolution lies in the identification of a key element i.e. the possibility of *causal unilateralization*. This element does not emerge explicitly in physical phenomena but its manifestation for further exploitation is accomplished via ingenious engineering contrivances. In conjunction with a guiding principle promoting the ultimate achievement of *accuracy* of the ends through-and-despite the unavoidable *inaccuracy* of the means, and along with conforming praxiological methods which rely on the embedded potentialities of the various processes which characterize the hypostasis of the real, the resulting design procedure as a whole is empowered enormously toward its goal of achieving any well-defined operation.

Christina S. Papachristou

I studied the Aristotelian theory on the role of "φαντάσματα" (phantasmata) in the thinking process and it's connection with the current discussion in the field of contemporary scientific research about the role of ''mental images''.

First it was examined the Aristotelian theory of 'phantasia' in Book III, Chapter 3 of De Anima, and its connection with phantasmata [(mental) images or representations]. On the basis of Aristotle's discussion concerning the role and function of phantasia in certain chapters and passages of the treatise De Anima, the author concluded that the Stageirite philosopher discriminates not two —as it is commonly argued by the Aristotelian scholars

— but three kinds or grades of phantasia: (a) Indefinite/indeterminate phantasia (ἀόριστος φαντασία) which is to be found in the imperfectly developed creatures — they have no sense except that of touch—, as for example zoophytes and molluscs, which have the power of formatting diffuse and indefinite phantasmata. (b) Sensitive phantasia (αίσθητικὴ φαντασία) which is to be found in animals that possess more than one sense (normal animals) and have the power of forming more vivid phantasmata. (c) Calculative, or deliberative, phantasia (λογιστικὴ or βουλευτικὴ φαντασία) which is the highest development of the faculty of phantasia. It appears only in human beings, because they have the power of thinking and the ability to combine several mental images (phantasmata) into one.

Furthermore, research has been focused on Aristotle's theory of sleep (ὕπνος) and dreams (ἐνύπνια), which is a subject that has received little attention through the centuries. More specifically, his philosophical and psychophysical interpretations of the cause and function of dreaming have been related with modern and contemporary views on sleep and dreams. Some of the subjects that have been discussed extensively and elaborated on are the following: (i) sleep in mammals and birds, (ii) dreams and problem solving, (iii) lucid dreaming, (iv) dreams as manifestations of internal sensations (dream imagery), (v) hypnagogic and hypnopompic phenomena, (vi) dream telepathy.

Parts of this research have been presented at international conferences with referees in Greece and the United States. Finally, two research papers have been published in blind peer-review scientific journals: (a) a peer-reviewed e-journal published by the Department of Philosophy of the Universidade de São Paulo (USP, Brazil) and (b) a peer-reviewed scientific journal published by the Research and Development Council of the Government of the Czech Republic.

Christos A. Pechlivanidis

My research focuses on highlighting ideas and meanings from Aristotle's treatises, which, according to my analysis, constitute a basic conceptual framework on which has been built a large part of theories of contemporary philosophers of science, such as Charles S. Peirce and Ernan McMullin.

Specifically, I investigate the conceptual tools offered by Aristotle such as, *epagoge*, *apagoge*, *nous* and *phantasia* as fundamental elements of contemporary realist analyses on scientific research, method and shaping of a fertile and ampliative realist worldview.

This project also includes my research on Aristotle's critique of the Pythagorean cosmological method and my study on the enhancement of the cognitive role of *achinoia* by Aristotle himself and the philosophers of Late Antiquity. Finally, the historical reconstruction of the discussion between Thomas Kuhn and Ernan McMullin on the criteria for theory choice is another important aspect of the same project. In this paper, I attempt to

show the realist terms and conditions under which a fruitful view for the character of scientific theories and their relationship with the natural world is possible.

My lectures in International Conferences in Universities in Greece and abroad, in scientific associations and summer schools focus precisely on the issue of structuring and adopting a realist worldview that has its roots in Aristotelian logical philosophy and methodology.

Demetra Balla

The aim of my thesis is to investigate the various aspects of form (*εἶδος* and *μορφή*), the most significant side of nature, as they are revealed through the Aristotelian analysis in the biological treatises *De Partibus Animalium* and *De Generatione Animalium*, as well as in the treatise *De Anima*. The living being is approached in two ways: synchronically, as a functional whole that is built from systems of bodily parts and functions, and diachronically, as a growing entity oriented to the fulfillment of the parental form. What is regarded as noteworthy in the Aristotelian perspective on living beings and is intended to be highlighted is the interactive relationship that form / soul and matter / body develop within each living being, the composition of which is founded on a mutual delimitation of the two aforementioned ontological principles.

The thesis closes with the introduction of the contemporary *species problem*, which is associated with Aristotle's approach of eidos as infima species, and his inconsistent taxonomic activity. It is argued that one can identify in the Aristotelian biology, as in contemporary philosophy of biology and biology, a problematic that concerns both the reality and the epistemic value of the species category, as well as the difficulties of drawing clear and definitive lines of demarcation between the genera/species of living beings, which with small steps "climb" in the hierarchical scale of life (widely known as *Scala Naturae*).

Maria Kechagia

The topic of this project is the fifth element of nature, *aether*. Aristotle included this element in his cosmologic theory, considering responsible for everything that is happening in heaven, the world he calls "above the moon". After a short report of all philosophers and non-philosophers who mentioned the word *aether*, as well as a short analysis of Empedocles' and Plato's cosmologic theories, there is an analytical study of aether, both in *On the Heavens* and *Meteorologica*. Moreover, there is a report of all those who contradicted the theory of the *aether*, starting with Theophrastus and concluding to Ioannis Philoponus.

The Stageirian philosopher's cosmologic theory, however, was considered right for many centuries. Ptolemaeus and Kepler are among those who embraced Aristotle's cosmologic theory, unlike Galileo. Descartes used *aether* in a similar meaning with Aristotle,

while Newton embraced with passion. On the other hand, physicists such as Young, Fresnel, Faraday and Fizeau, did not succeed in integrating in their models.

On the contrary, Maxwell applied in his model *aether*, as an inextricable part, but of course, he did not manage to reach a tangible result proving its existence, while Lorentz wanted to prove that there should not be a matter of its existence. Moreover, maybe one of the most significant experiments in the history of *aether* the Michelson and Morley's experiment, is the existence of an immobile *aether*. Unfortunately, all experiments, had a negative result, while Poincare and Einstein' s "Theory of Relativity" reached the same result, too. Finally, this project closes with what applies nowadays concerning *aether* and whether it really is the fifth element of nature.

Overall Significance of the results in Action 4

In the framework of this program an innovative approach of Aristotle's work has been attempted on the following pillars: (1) a new reading of Aristotle was attempted through the inter-scientific approach of his work (2) Aristotle's texts were thoroughly examined and simultaneously were illuminated the meeting points between Aristotle and contemporary science in the light of the discoveries of contemporary sciences (3) an overturn of the traditional understanding of the "grand failure" of Aristotle in the field of natural philosophy was attempted. Finally, it is estimated that the profit of the program has other results of broader significance: It opens the field and offers the grounds for an interdisciplinary approach to knowledge and for a fruitful dialogue between philosophy and science.

3.5 Team NTUA (WP5)

Action 5, hosted by the National Technical University of Athens (NTUA), focused on investigating the viability of realist theses via the normative evaluation and the quantitative description of processes of belief formation and revision. Four research directions have been explored: (1) defending scientific realism on the face of inductive skepticism and of the phenomenon of radical scientific change (change in linguistic, conceptual, logical, etc. framework) by utilizing methods of formal epistemology, (2) exploring the limits of formal approaches to the statement and justification of abductive rules ("inference to the best explanation"), (3) developing and investigating quantitative models of belief revision, and (4) investigating the notion of truth as *resistance* to the beliefs of agents.

In the research direction (1), the main results are included in the paper Arageorgis, A. (2015), "Relativism, translation, and the metaphysics of realism" that has been submitted to the *British Journal for the Philosophy of Science*.

In the research direction (2), the following MA thesis has been completed:
Apostolidis, A. (2015), *Scientific realism and modality in abduction: Limits of abductive inferences*. Graduate program in Logic, Algorithms, and Computation.

In the research direction (3), the following Ph.D. thesis has been completed under the supervision of NTUA Professor A. Koutoungos: Stelios, S. (2014), *Communication and belief revision: Investigation and treatment of a descriptive measurement model*. University of Athens and National Technical University of Athens.

In the research direction (4), a paper entitled "Negative realism and science: Discharging philosophical dilemmas", co-authored by NTUA Professor A. Baltas and NTUA Ph.D. candidate S. Heliadi, is in progress.

In addition, the research team hosted by NTUA organized an international Workshop on "Induction, abduction, belief revision, and realism" (NTUA, Athens, December 15-16, 2014). In this Workshop several members or external collaborators of the group participated with talks:

- Apostolidis, A.: "Selecting the most parsimonious explanation in a modal frame"
- Baltas, A. & Iliadi, S.: "Negative realism and science: Discharging philosophical dilemmas"
- Kelly, K. (with K. Genin & H. Lin, Carnegie Mellon University): "Realism, rhetoric, and reliability"
- Stefaneas, P. (National Technical University of Athens): "Some open problems in the philosophy of computer science"
- Stelios, S. & Koutoungos, A.: "Extensions of micro-communication structures: Macro-applications".

Lastly, members of the research team contributed, often in collaboration with members of other research teams of the research program, toward the completion of other works. Products of such activities are the following:

- Arageorgis, A. & Stergiou, Ch. (2013). "On particle phenomenology without particle ontology: How much local is almost local?" *Foundations of Physics, 43,* 969-977.
- Arageorgis, A. (2015). "Aristotle and the atomists vis-à-vis the mathematicians", *Philosophical Inquiry*, *39 (1)*, 164-180.
- Flouris, Z. (2015). *Epistemological and metaphysical aspects of mathematical structuralism*. MA thesis. Graduate program in History and Philosophy of Science and Technology. Athens: University of Athens & National Technical University of Athens. Supervisor: A. Arageorgis.

Reports from individual members of Team NTUA

Arageorgis

In the context of the research program, I worked in three areas: (1) defense of scientific realism on the face of the phenomenon of radical scientific change (change of linguistic, conceptual, logical, etc. framework) by utilizing the concept of reliability of inductive methods, (2) exploration of issues related to realism in the philosophy of quantum theories, and (3) exploration of Aristotle's realism about mathematical entities.

Paper [3] is the product of the research in area (1). It focuses on the antirealist relativist line of reasoning, according to which competing theories do not describe just one definite and mind-independent world-structure *because* they fail to be relatively translatable even though equally correct. I argue that this line of reasoning is shaky by deriving a theorem about relativistic inquiry in Kevin Kelly's framework for the "logic of reliable inquiry". According to the theorem, two scientists, who share some background knowledge but follow different appropriately reliable methods, will converge to relatively formally translatable competing theories, even if meaning, truth, logic, and evidence are allowed to vary in time depending on each scientist's conjectures, actions, or conceptual choices. The implications of this result for the metaphysical thesis of realism and for the incommensurability thesis are assessed. The main ideas were presented at the talk [7].

Paper [1] (with Dr. Chrysovalantis Stergiou) and talks [5] and [6] are the products of the research in area (2) so far. Some ideas of talk [5] are currently under development in work-in-progress [4]. In paper [1], we state and prove a theorem in algebraic relativistic quantum field theory, which suggests that the phenomenology of detecting particles – and not only the ontology of localizable particles, as it is commonly accepted – comes into conflict with plausible assumptions about locality and causality. The antirealist stance of the contemporary approach to the interpretation of quantum mechanics that has been dubbed "Quantum Bayesianism" is the target of talk [5] (and of work-in-progress [4]). According to this approach, quantum probabilities are just subjective (personalist) degrees of belief of rational agents and quantum measurement is just Bayesian updating of such degrees of belief. I marshal arguments against this approach related to the viability of its application to the measurement of quantum observables with *continuous* spectra and to the explication of the underlying concept of rationality. Lastly, in talk [6], I presented a new argument against the basic tenet of early algebraic quantum field theory that dictates that, courtesy of Fell's mathematical theorem, the entire physical content of a quantum field theory is encapsulated in a net of local C*-algebras, while the choice of concrete Hilbert-space representations is a matter of *convention*. I showed that under certain assumptions, which hold true in some C*-algebras of physical interest, an agent can converge "in the limit" to ascertaining the actual state of the system and thus to excluding some representations.

Paper [2] is the product of the research in area (3). The paper focuses on Aristotle's thesis that the natural philosophy of the atomists, of Leucippus and Democritus, comes into conflict with geometry. I claimed that this Aristotelian criticism was instigated by a particular brand of realism about mathematical entities, according to which geometrical entities exist, if only potentially, in natural objects. This brings atomism into conflict with the geometrical notion of the continuum, but also (as I argued) Aristotle's own views about infinity with the geometrical notion of infinite extendibility.

In addition to the above, I participated in the organization of an international workshop ([8]) and I supervised an MA diploma thesis ([9]).

[1] Arageorgis, A. & Stergiou, Ch. (2013). "On particle phenomenology without particle ontology: How much local is almost local?" *Foundations of Physics, 43,* 969-977.

[2] Arageorgis, A. (2015). "Aristotle and the atomists vis-à-vis the mathematicians", *Philosophical Inquiry*, *39 (1)*, 164-180.

[3] Arageorgis, A. (2015). "Relativism, translation, and the metaphysics of realism", 36 pp. Under review *British Journal for the Philosophy of Science*.

[4] Arageorgis, A. "Qualms about QBian 'measurement'"

[5] Arageorgis, A. (2012). "Quantum measurement as revision of rational degrees of belief: What rationality?" (in Greek). *2nd Panhellenic Philosophy of Science Conference*. NKUoA (Athens, Greece, November 29 – December 1, 2012).

[6] Arageorgis, A. (2014). "Confounding inductive with metaphysical skepticism: The concept of 'physical equivalence' in early algebraic quantum field theory" (in Greek). *3rd Panhellenic Philosophy of Science Conference*. NKUoA (Athens, Greece, November 2014).

Stergiou

My research in the context of APRePoSMa focused on the ontology of contemporary physical theories and the metaphysical dimension of scientific realism. In particular, I proved (along with Dr. A. Arageorgis) that a phenomenology of localized particles – and not only an ontology of the kind, as commonly accepted – is incompatible with reasonable locality and causality conditions in relativistic algebraic quantum field theory. Additionally, in a different project, I compared the compatibility, equivalence and explanatory adequacy of two different accounts of Reichenbachian Common Cause Systems. This notion generalizes the statistical common cause which is very important for the foundations of probabilistic causality, the local explanation of quantum statistical correlations of events at spacelike distance on the basis of the principle of the common cause and the prospect of having local realistic interpretations of quantum theories. The conclusion I reached is that for reasons of explanatory adequacy one of the two accounts should be preferred.

The fruits of the aforementioned philosophical research were presented in a conference in Greece, in an international conference in Finland as well as in the research seminar of APRePoSMa, and it resulted in two publications in peer-reviewed journals.

In a different part of my research, I focused on the possibility of an ontology based on causal processes, in a world described by particle and field-theoretic accounts of classical and quantum physics. This part is as yet unpublished.

Apostolidis

I participated in program Thales: Aspects and Prospects in the Philosophy of Science and Mathematics. My contribution consists in my thesis for the graduate program in Logic, Algorithms and Computation which is hosted by University of Athens. The project title is *Scientific Realism and Modality in Abduction - Limits of Abductive Inferences*. The project is complete and remains the final presentation under the committee of Prof. Dimitracopoulos, Psillos and Stephanou, all members of the program.

In this thesis we study the formalization of abduction in modal frames. Over the last decade researchers focus on modal frames. The typical modal operators can formalize the diversity between knowledge and beliefs. Also, we can construct some many-world models of ascending cardinality. Our main issues are the criteria of selecting the best explanation and their possible correlation.

In introduction we sketch some abductive inferences and show some applications in science and philosophy. The second chapter contains a vast presentation of selective abductions due to Schurz and a brief presentation of some explanatory virtues. The third chapter contains the many-world approach of Soler-Toscano, Fernandez-Duque and Nepomuceno-Fernandez. In the fourth chapter we present the dynamic proofs approach, as defined by Gauderis. Chapter 5 and 6 consist in a brief discussion of these models. We examine if they formalize every possible selective abduction and if they satisfy any of the explanatory virtues. Chapter 7 contains an alternative approach for formalizing consilience. The final chapter contains the conclusion and some open problems.

Iliadi & Baltas

Our aim in the research program Thales "Aspects and Prospects of Realism in the Philosophy of Science and Mathematics" has been the study and evaluation of negative realism in the philosophy of science.

In our paper "*Negative Realism and Science: Discharging Philosophical Dilemmas*" we tried to show that negative realism, having warded off objections which were raised

against it in the past, can be used as a tool for "discharging" traditional philosophical dilemmas. More specifically, we decided to focus our attention on the debate between realists and constructivists regarding the status of scientific objects. Are the objects of scientific inquiry real (as realists claim) or are they the product of scientific theorizing (as constructivists claim)? By taking into account the metaphysical as well as the epistemological aspects of this debate, we argued that from the perspective of negative realism this dilemma is in fact a false one: the objects of scientific inquiry are in some sense *both* real and constructed.

Furthermore, in the course of our research we had the opportunity to examine in depth several related issues such as the different meanings which are ascribed to the notion of mind-independence in the recent philosophical literature and the points of convergence and divergence between negative realism and scientific perspectivism (Ronald Giere) on the one hand and negative realism and critical realism (Ilkka Niiniluoto) on the other hand.

The first presentation of our paper took place in December 2014 at the two-day workshop "*Induction, abduction, belief revision and realism"* that we, as a research team, organized at the National Technical University of Athens. The questions that were raised and the comments that were made after the presentation (and more importantly the question of whether there is a positive content in negative realism), were taken into consideration and addressed in the final version of our paper which will be submitted for publication soon.

Finally, from the beginning of the program we participated regularly in the series of seminars that were organized in Athens. The stimulating presentations of our colleagues and the rich discussion following each presentation were a constant source of philosophical inspiration for us, thereby contributing significantly to the completion of our research project.

Stelios

The main project was the research that led to the writing of the dissertation. First, relevant literature was considered which concerned formal epistemology and more specifically the degrees of belief of a rational agent and Bayesian inference. According to the epistemological interpretation, the degrees of belief about the truth of a proposition represent probabilities. Bayesian theory combines both a formal position towards a rational agent's degrees of belief at a given time as well as a diachronic position on how these degrees evolve through the presented evidence. Typically, these degrees of belief are probabilities. Over time, these points are updated according to rules of conditionalization. Then the literature on the relatively new discipline of belief revision

was considered. Belief revision refers to the procedure of changing a belief that takes into account the presence of new information. Normative approaches, adopted by computer scientists and philosophers, study the question of how intelligent beings should change beliefs. Descriptive approaches, which are mainly adopted by cognitive psychologists, social scientists, and scholars of communication, seek to demonstrate how people really function when changing beliefs. Of course, both approaches often overlap, and their boundaries are not always distinct.

Then, a descriptive belief revision (or adjustment) model of a recipient (“hearer") in her communication with a "speaker was investigated for its empirical adequacy. The model was proposed by the theoretical-philosophical research of Aris Koutoungkos about the possibility of *partial* agreement. At a second level of analysis, comparability with the application framework of *Bayesian inference* was investigated. Through the structural asymmetry of the two models, concerning the absence of a value in the hearer’s posterior possibility to the fact that the speaker assigns a probability to *E* evidence, the concept of *'subsequent probability*' emerged (according to Van Fraassen’s *Reflection Principle*, *RP*). This concept allows for the model to be regarded as strictly 'bipolar', ie, the probability at which the hearer confronts the speaker/estimator about the exact same sentence, is already a *'subsequent probability*', in the sense that it already incorporates every possible assessment of the hearer for this belief.

Finally, the possibility of extending the finding of the empirical study was investigated. It was ascertained that the model has a momentum which could be applied for interpreting social phenomena (i.e. groups of people instead of individuals). The main difference between these two communication contexts (micro-macro) is that in the social sphere the continuation of the revision process is essential, while on the interpersonal level the process was instantaneous. So, in the macro scale, the convergence between groups has a procedural meaning and it is open to continuation.

Flouris

My work in the research program was on Mathematical Structuralism and cultivated in the writing of a graduate thesis with title: "Epistemological and Metaphysical Issues on Mathematical Structuralism". In this thesis are examined some problems concerning mathematical structuralism. The first chapter is an introduction to the main ideas and positions of mathematical structuralism. In the second chapter we study the epistemological challenges that all mathematical realists enface and the special way that they are answered by those structuralists which are also realists. Finally, the third chapter is devoted various metaphysical issues which emerge when an ante rem mathematical structuralist proposes identity criteria for position in a structure.

Appendix

Workshops Programmes

Workshop on the Metaphysics of Scientific Realism

Friday, 1 March
4:30pm – 8:00pm
Cultural Centre of the University of Athens *Kostis Palamas*

4:30 – 6:00 Chair: Theodore Arabatzis, University of Athens
Stathis Psillos, University of Athens
"Regularities all the way down"
Demetris Portides, University of Cyprus
"Living without the Abstract: Realism and Models"

6:00 – 6:30 Coffee Break

6:30 – 8:00 Chair: Aristidis Arageorgis, National Technical University of Athens
Michel Ghins, Catholic University of Louvain
"A mixed view account of laws of nature"
Michael Andreas Esfeld, University of Lausanne
"Realism about dispositions in the philosophy of physics"

Saturday, 2 March
10:00am – 7:15pm
Philosophy and History of Science Department, University Campus

10:00 – 11:30 Chair: Eleni Manolakaki, University of Athens
Demetra Sfendoni-Mentzou, University of Thessaloniki
"A Discussion of Aristotle's "Direct Realism" as a Way Out of the Problem of Representationalism"
Vassilios Karakostas, University of Athens
"Why the Traditional Conception of Correspondence Truth Should be Modified Within Contemporary Physics"

11:30 – 12:00 Coffee Break

12:00 – 1:30 Chair: Chrysovalantis Stergiou, University of Athens
Mauro Dorato, University of Rome III
"The Antiholistic Consequences of Rovelli's Relational Quantum Mechanics"
Steven French, Leeds University
"Enabling Eliminativism: Putting Metaphysics to the Service of Realism"

1:30pm – 3:30pm Lunch Break

3:30 – 5:00 Chair: Vassilis Sakellariou, University of Athens
Antigone Nounou & Harris Anastopoulos, University of Athens & University of Patras
"Properties Are …"
Ioannis Votsis, University of Düsseldorf
"The Houdini Argument for Intrinsic Properties"

5:00 – 5:30 Coffee Break

5:30 – 7:15 Chair: Costas Dimitracopoulos, University of Athens
Vassilis Livanios, University of Athens
"Categorical Structures and the Multiple Realizability Argument"
General Discussion

Workshop

Philosophy and Science in the 17th Century: the Problem of Method

Friday, 24th May
4:00pm – 8:45pm
Cultural Centre of the University of Athens *Kostis Palamas*

4:00pm – 6:15pm Chair: Theodore Arabatzis (University of Athens)
4:00-4:45 Vana Grigoropoulou (University of Athens)
Spinoza and Bacon on the fabrication of tools: Deduction and Induction
4.45-5.30 Dionysis Anapolitanos (University of Athens)
Leibniz's Labyrinth of the Continuum
5.30-6.15 Athanassios Raftopoulos, University of Cyprus
Bacon's New Atlantis and the Newtonian Scientific Method as Cartesian Analysis

6:15pm – 6:45 pm Coffee Break

6:45pm – 7:45pm Chair: Stathis Psillos (University of Athens)
6:45pm – 7:45pm Peter Anstey (University of Sydney)
Experimental Natural History
7:45-8:45pm Dan Garber (Princeton University)
Bacon's Program for Natural History: the Sylva Sylvarum, the Latin Natural Histories, and the New Atlantis

Workshop

Model Theory, Weak Arithmetic and the Role of Mathematics in Scientific Theories

Dept of Philosophy and History of Science, University Campus (Goudarouli room)

Monday, June 24
9.30 – 18.00

09.30-10.30 Angus Macintyre (Queen Mary College, London)

My current knowledge on primes in fragments of arithmetic

10.30-11.00 Coffee break

11.00-12.00 Tin Lok Wong (University of Ghent)

End-extensions of models of second-order arithmetic

12.00-15.00 Lunch break

15.00-16.00 Ali Enayat (University of Gothenburg)

Self-embeddings of models of arithmetic: from Vaught to Tanaka

16.00-16.30 Coffee break

Contributed papers

16.30-17.00 Michal Garlik (Charles University, Prague)

On Ajtai's completeness theorem for nonstandard _nite structures

17.00-17.30 Henri-Alex Esbelin (University Blaise Pascal, Clermont-Ferrand)

Reciprocity laws and Definability

17.30-18.00 Costas Dimitracopoulos (University of Athens) & Alla Sirokofskich (University of Crete)

Versions of the MRDP Theorem in $I\Delta_0+\Omega_1$

Tuesday, June 25
15.00 – 19.00

15.00-16.00 Tin Lok Wong (University of Ghent)

The generic choice of a cut

16.00-16.30 Coffee break

16.30-17.30 Ali Enayat (University of Gothenburg)

Self-embeddings of models of arithmetic: some recent results

Contributed papers

17.30-18.00 Jan Pich (Charles University, Prague)

Circuit lower bounds in Bounded Arithmetic

18.00-18.30 Thanases Pheidas & Alla Sirokofskich (University of Crete)

On extensions of the additive structure of polynomials over a finite field

18.30-19.00 Costas Dimitracopoulos (University of Athens)

Discernibilty in Philosophy and Arithmetic

Wednesday, June 26
09.30 – 12.00

09.30-10.30 A. Macintyre (Queen Mary College, London)

Henselizations of p-adic valutaions, for p a prime in $I\Delta_0+\Omega_1$

10.30-11.00 Coffee break

11.00-12.00 Y. Moschovakis (UCLA)

Intrinsic complexity in arithmetic (and algebra)

Workshop on Experiment, Conceptual Change, and Scientific Realism

Friday, 2 May

5:00 – 7:45pm

Argiriadis Hall, Central Building of the University of Athens,
30 Panepistimiou Str.

5:00 – 5:45 Hasok Chang, University of Cambridge
"Can we make sense of measurement outside of a realist framework?"

5:45 – 6:30 Hanne Andersen, University of Aarhus
"Investigating entities' lifelines"

6:30 – 7:00 Coffee Break

7:00 – 7:45 Robert Nola, University of Auckland
"Realism, reference, Ramsification and causal descriptivism: the case of the electron as an illustration"

8:00 – 10:00 Workshop dinner – Cultural Center of the University of Athens

Saturday, 3 May

10:00am – 1:30pm

Department of Philosophy and History of Science, University Campus

10:00 – 10:45 Theodore Arabatzis, University of Athens
"The philosophy of experiment meets the causal theory of reference"

10:45 – 11:30 Uljana Feest, University of Hannover
"Test validity and the problematic status of implicit social cognition"

11:30 – 12:00 Coffee Break

12:00 – 12:45 Irene Goudarouli, University of Athens
"Historicizing concepts in history of science: a methodological suggestion"

12:45 – 13:30 Friedrich Steinle, Technical University of Berlin
"Conceptual change and ontological agnosticism: the case of lines of force"

Workshop

Induction, abduction, belief revision, and realism

VENUE: Polytechneioupolis (Zografou Campus), 9 Iroon Polytechneiou Str.,

Lambadario Building (Rural and Surveying Engineering) - Small Amphitheater Λ014- Λ015

Monday, December 15, 16:00-20:00

Chair: Chrysovalantis Stergiou

16:00-17:15

Illka Niiniluoto (University of Helsinki): *Unification and abductive confirmation*

17:15-17:45

COFFEE BREAK

17:45-18:30

Eleni Manolakaki (University of Athens): *Degrees of belief: Illata or abstracta*

18:30-19:15

Nicola Angius (University of Sassari): *Semantic theories of software systems: Modularity, discovery, and justification* (with P. Stefaneas)

19:15-20:00

Aristides Baltas (National Technical University of Athens): *Negative realism and science: Discharging philosophical dilemmas* (with S. Iliadi)

Tuesday, December 16, 09:30-14:30

Chair: Aristidis Arageorgis

09:30-10:15

Petros Stefaneas (National Technical University of Athens): *Some open problems in the philosophy of computer science*

10:15-11:30

Kevin Kelly (Carnegie Mellon University): *Realism, rhetoric, and reliability* (with K. Genin and H. Lin)

11:30-12:00

COFFEE BREAK

12:00-12:30

Alexandros Apostolidis (National Technical University of Athens): *Selecting the most parsimonious explanation in a modal frame*

12:30-13:15

Spyridon Stelios (National Technical University of Athens): *Extensions of micro-communication structures: Macro-applications* (with A. Koutoungos)

13:15-14:00

Costas Dimitrakopoulos (University of Athens): *Logicism and interpretability in arithmetic*

14:00 - 14:30

Stathis Psillos (University of Athens): *Closing remarks - Induction: the history of a good idea*