Nicola Angius

Curriculum Vitae

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Istruzione e Formazione

2017 **Abilitazione Scientifica Nazionale, professore universitario di II fascia, settore scientifico-disciplinare M-Fil/02 Logica e Filosofia della Scienza**.

2010 **Dottorato di Ricerca in Discipline Filosofiche**, *Università degli Studi di Cagliari*, Giudizio: OTTIMO.

2005 **Diploma di Laurea Vecchio Ordinamento in Filosofia**, *Università Cattolica del Sacro Cuore di Milano*, Voto: 110/110.

1999 **Diploma di Maturità Scientifica presso Liceo Scientifico "G. Spano"**, *Sassari*, Voto: 100/100.

Tesi di Dottorato

Titolo *MODEL VERIFICATION IN COMPUTER SCIENCE: SCIENTIFIC METHODOLOGY, ABSTRACTION, AND IDEALIZATION*

Supervisor prof. Guglielmo Tamburrini (Università di Napoli Federico II)

Abstract This work provides an epistemological and methodological analysis of model checking to advance the thesis that the conjectural knowledge of computer programs and hardware systems which formal methods in Computer Science enable one to attain involves the deployment of methodologies which, in their essential traits, are on a par with traditional methodologies one utilizes in physics and other natural sciences for predictive and explanatory purposes. This examination will drawn upon reflective work carried out in the philosophy of science and it chiefly concerns the philosophy of models on one hand and distortive idealizations in scientific practice on the other. This work is divided into two parts, the first one dealing with the notion of theoretical models in empirical sciences and model checking, the second part examining the practice of idealization within empirical models and drawing some relative reflections on the issue of abstraction in model checking.

Interessi di Ricerca

Filosofia della Computazione; Filosofia delle Scienze Cognitive; Filosofia dell'IA; Filosofia delle Simulazioni al Computer; Logica Computazionale.

Esperienza Lavorativa

2022 - **Ricercatore senior (RTDb)**, *Dipartimento di Scienze Cognitive, Psicologiche, Pedagogiche e degli Studi Culturali, Università degli Studi di Messina*.

A.A. 2020–2021 **Professore a contratto del corso 'Epistemologia dell'Informatica'**, *Dipartimento di Storia, Scienze dell'Uomo e della Formazione, Università degli Studi di Sassari*.

A.A. 2019–2020 **Professore a contratto del corso 'Epistemologia dell'Informatica'**, *Dipartimento di Storia, Scienze dell'Uomo e della Formazione, Università degli Studi di Sassari*.

A.A. 2018–2019 **Professore a contratto del corso 'Progettazione di Applicazioni Interattive'**, *Dipartimento di Storia, Scienze dell'Uomo e della Formazione, Università degli Studi di Sassari*.

A.A. 2017–2018 **Professore a contratto del corso 'Filosofia della Psicologia'**, *Dipartimento di Scienze Biomediche, Università degli Studi di Sassari*.

Maggio 2016 - Ottobre 2017 **Assegnista di ricerca**, *Dipartimento di Storia, Scienze dell'Uomo e della Formazione, Università degli Studi di Sassari*.

2011–2015 **Titolare a contratto delle 'Esercitazioni di Logica'**, *Dipartimento di Storia, Scienze dell'Uomo e della Formazione, Università degli Studi di Sassari*.

Gennaio - Giugno 2011 **Visting Scholar**, *School of Computer Science and Electronic Engineering*, Univeristy of Essex, UK.

2010–2012 **Borsista di Ricerca RAS**, *Dipartimento di Teorie e Ricerche dei Sistemi Culturali*, Università degli Studi di Sassari.

Insegnamento

Philosophy of Computing; Epistemologia della Psicologia; Filosofia della Scienza, *Dipartimento di Scienze Cognitive, Psicologiche, Pedagogiche e degli Studi Culturali*, Università degli Studi di Messina.

Membro del collegio docenti del Dottorato in Scienze Cognitive, *Dipartimento di Scienze Cognitive, Psicologiche, Pedagogiche e degli Studi Culturali*, Università degli Studi di Messina.

Attività Accademiche

Revisore di Riviste peer review: Analysis; Synthese; Minds & Machines; Journal of Logic and Computation; Philosophy & Technology; AI & Society; Philosophical Studies; Foundations of Science; International Studies in the Philosophy of Science; Oxford Bibliographies; Techné: Research in Philosophy and Technology; Axiomathes; Humana.Mente; APhEx.

Curatore - Associate Editor of Axiomathes: Global Philosophy (Springer).

-Lead Guest Editor dello Special Issue 'Book Symposium on Foundation of Computation', Axiomathes (Springer).

Progetti finanziati -PRIN 2022 (Progetti di Rilevante Interesse Nazionale) SMART (Simulation of Probabilistic Systems for the Age of Digital Twin)

Gruppi di ricerca

- Resposnabile di unità del progetto PRIN 2022 *SMARTEST*: Simulation of Probabilistic Systems for the Age of Digital Twin.

- *PROGRAMme*, ANR project: What is a (computer) program? Historical and philosophical perspectives.

- Logic and Formal Methods Research Group ($\lambda - For M$). Department of Mathematics, School of Applied Mathematical and Physical Sciences, National Technical University of Athens.

- Progetto Fondazione Sardegna "Verità e discorso valutativo" (2021-2023).

- Principal Investigator del progetto "Formal Methods in Computer Science and Computational Model Development in Robotics and Natural Computing: Methodological, Epistemological and Applied Ethics Issues" finanziato dalla *Regione Autonoma della Sardegna* (2010-2012).

Invited talks

- *From coding to Curing*, seminari del HLRS, Università di Stuttgart, 3 Novembre 2023, Stuttgart, Germania.

- *PROGRAMme workshop*, Università di Lilla, 14-15 giugno 2022, Lilla, Francia. Titolo intervento: Computational theories – Representing the world through programs.

- *Summer School On Computer Simulation Methods*, presso HLRS, University of Stuttgart, 25-29 settembre, 2017, Stoccarda, Germania. Titolo intervento: Qualitative Models in Computational Systems Biology. Representation, confirmation, experimentation.

- *3th Séminaire Histoire et philosophie de l'informatique*, 23 febbraio 2017, presso IHPST, Parigi. Titolo intervento: From Simulative Programs as Theories to Theories of Simulative Programs.

- Workshop su *Algebraic Modelling of Topological and Computational Structures*, National Technical University of Athens; 3 luglio 2015, Atene, Grecia. Titolo Intervento: Syntactic and Semantic Presentations of Scientific Theories in Abstract Model Theory.

- *HaPoC 2015 : 3rd International CONFERENCE on the HISTORY and PHILOSOPHY of COMPUTING*, 8-11 ottobre 2015, Pisa.

- Workshop on *Induction, abduction, belief revision, and realism*. National Technical University of Athens; School of Applied Mathematics and Physics; Department of Humanities, Social Sciences and Law. Research Funding Program: THALIS - UoA, 15-16 dicembre 2014, Atene, Grecia.

Organizzazione di workshops e convegni

-Co-organizzatore del simposio *Epistemological Perspectives on Neural Language Models*, *SFILS 2023*, Conferenza Internazionale triennale della Società Italiana di Logica e Filosofia delle Scienze, Urbino, 4-7 settembre 2023.

- Membro del Steering Committee di Truth in Evaluation - Mid-Term Conference of the Italian Society for Analytic Philosophy – 30 Years of SIFA (1992-2022) - 26-28 September 2022, Alghero (University of Sassari).

- Membro del Program Committee di HaPoC 2021, 6th International Conference on the History and Philosophy of Computing, 27-29 Oct 2021 Zürich (Switzerland).

- Co-organizzatore del simposio 'Identity in Computational Formal and Applied Systems', presso *CLMPST2019, 16th International Congress on Logic, Methodology and Philosophy of Science and Technology*, 5-10 Agosto 2019, Praga.

- Membro del Program Committee di HaPoC 2019, 5th International Conference on the History and Philosophy of Computing, 28-30 ottobre 2019, Università di Bergamo.

- Membro del Program Committee di HaPoP 2018, Fourth Symposium on the History and Philosophy of Programming, 23 March 2018, Mathematical Institute, University of Oxford, United Kingdom.

- Co-organizzatore del simposio 'Methodological issues in the Philosophy of Computer Science' presso *IACAP 2016: International Association for Computing and Philosophy*, Annual Meeting, 14-17 giugno 2016, Ferrara.

- Co-organizzatore del workshop 'Philosophy of Computer Science' al 5^{th} congresso *UNILOG*, 20-30 giugno, Istanbul, Turchia.

- Membro del Program Committee del congresso *PHILOWEB GR*, 31 maggio 2014, Thessalonica, Grecia.

Submitted talks

- "Co-Simulations of Brain Language Processing using Neural Language Models", at COGSCI (Cognitive Science Society) 2024, 24-27 luglio 2024, Rotterdam, the Netherlands (con Perconti P., Plebe A., Acciai A.).

- " Undesigned Cognitive Architecture", at ACS (Advances in Cognitive Science) 2024, 17-19 giugno 2024, Consiglio Nazionale delle Ricerche (CNR), Palermo (con Acciai A., Perocnti P, Plebe A.)"

- "Co-Simulations of Brain Language Processing using Neural Language Models", at IACAP (International Association for Computing and Philosophy) 2024, 8-10 luglio 024, Eugene (Oregon), University of Oregon (con Perconti P., Plebe A., Acciai A.)

- "How Can Neural Language Model Work?" (con Pietro Perconti, Alessio Plebe, e Alessandro Acciai), *SFILS 2023*, Conferenza Internazionale triennale della Società Italiana di Logica e Filosofia delle Scienze, Urbino, 4-7 settembre 2023.

- "From Thinking to How to Think" (con Alessio Plebe e Alessandro Acciai) *IACAP 2023* - Congress of the International Association of Computing and Philosophy 3-5 luglio 2023, Praga, Repubblica Ceca.

- "Deep Learning in Simulative Sciences' (con Alessio Plebe) *IACAP 2023* - Congress of the International Association of Computing and Philosophy 3-5 luglio 2023, Praga, Repubblica Ceca.

-"From Coding to Curing" (con Alessio Plebe e Arianna Pavone) *IACAP 2022* - Biennial Congress of the International Association of Computing and Philosophy July 22-24 2022, Santa Clara University, Santa Clara, CA, USA.

- "Second Order Properties of Copied Computational Artefacts" (con Giuseppe Primiero). CLMPST2019, 16th International Congress on Logic, Methodology and Philosophy of Science and Technology, 5-10 Agosto 2019, Praga.

- "From Simulative Programs as Theories to Theories of Simulative Programs" (con Guglielmo Tamburrini). IACAP 2016: International Association for Computing and Philosophy, Annual Meeting, 14-17 giugno 2016, Ferrara.

- "Defending the Semantic View of Theories. A Computer Science Perspective" (con Petros Stefaneas). 15th Congress on Logic, Methodology and Philosophy of Science (CLMPS), Helsinki, 3-8 agosto 2015.

- "The Logical Structure of Modular Semantic Theories of Software Systems" (con Petros Stefaneas). IACAP 2014, The Annual Meeting of the International Association for Computing and Philosophy, 2-4 luglio 2014, Salonicco, Grecia.

- "Faslifiability and Probability of Hypotheses about Computational Systems, and Scientific Experiments in Software Testing". The Answers of Philosophy: SIFA 20th Anniversary Conference. 12-15 September 2012, Alghero (Università degli Studi di Sassari).

- "Model Based Abductive Reasoning in Software Verification". MBR012 Model-Based Reasoning in Science and Technology. Theoretical and Cognitive Issues, 21-23 giugno 2012, Sestri Levante, Italy.

- "Falsification and confirmation of hypotheses about computational systems in software testing", 14th congress of logic, methodology and philosophy of science (CLMPS11), 19-26 luglio 2011, University of Nancy.

- "Model Checking and scientific methodology: models, regularities, and idealizations." International Conference of the Italian Society for Logic and Philosophy of Science (SILFS 2010), 15 - 17 dicembre 2010, Università degli Studi di Bergamo.

-"Model Checking and Models in Science. Models, Regularities, Prediction" (con Guglielmo Tamburrini). 7th European Conference on Philosophy and Computing (ECAP09) - 2-4 luglio 2009, Universitat Autonoma de Barcelona.

Pubblicazioni

Angius, N. (2025). Meaning and Reference in Programming Languages. *Philosophies*, 10(2), 40.

Angius, N., Perconti, P., Plebe, A.,& Acciai, A. (2025) Making sense of transformer success. *Frontiers in Artificial Intelligence*, 8, 1509338.

Angius, N. & Primiero G. & Turner, R. (2025) The Philosophy of Computer Science. *Stanford Encyclopedia of Philosophy* (Spring 2025 Edition), Edward N. Zalta (ed.)

Angius, N., Perconti, P., Plebe, A.,& Acciai, A. (2024). The Simulative Role of Neural Language Models in Brain Language Processing. *Philosophies*, , 9(5), 137.

Angius, N., & Stefaneas, P. (2024). The Logical Structure of Modular Semantic Theories of Software Systems. *Metaphilosophy*, 55(3), 440-456. https://doi.org/10.1111/meta.12701.

Angius, N. (2024). The Epistemology of DT simulations. *The Reasoner*, 18(4)

Angius, N., (2024). What is (the Philosophy of) Computer Science? *Metascience*, 33 (1), 123-126. https://doi.org/10.1007/s11016-023-00928-8

Angius, N., Perconti, P., Plebe, A.,& Acciai, A. (2024). Co-Simulations of Brain Language Processing using Neural Language Models. In *Proceedings of the Annual Meeting of the Cognitive Science Society* (Vol. 46).

Angius, N., & Symons, J. (2023). Central Themes and Open Questions in the Philosophy of Computer Science. *Axiomathes: Global Philosophy*, 33(6), 51. https://doi.org/10.1007/s10516-023-09704-z

Angius, N., & Plebe, A. (2023). From Coding To Curing. Functions, Implementations, and Correctness in Deep Learning. *Philosophy & Technology*, 36(3), 47.

Angius, N. (2023) Can Computer Programs be Formally Verified? *APhEx*, 28, 322-338.

Angius, N. (2022) On the Experimental Foundation of Computing. *Axiomathes*, 32(3), 1221–1236 https://doi.org/10.1007/s10516-022-09645-z

Angius, N. & Primiero G. (2022) Copying Safety and Liveness Properties of Computational Artefacts. *Journal of Logic and Computation*, 33 (5), 1089-1117. https://doi.org/10.1093/logcom/exac053

Angius, N. & Primiero G. & Turner, R. (2021) The Philosophy of Computer Science. *Stanford Encyclopedia of Philosophy* (Spring 2021 Edition), Edward N. Zalta (ed.)

Angius, N. & Primiero, G. (2020) Infringing Software Property Rights. Ontological, Methodological, and Ethical Questions. *Philosophy & Technology*, 33(2), 283-308

Angius, N. (2020). On the Mutual Dependence between Formal Methods and Empirical Testing in Program Verification. *Philosophy & Technology*, 33(2), 349-355

Angius, N. (2019). Qualitative Models in Computational Simulative Sciences. Representation, Confirmation, Experimentation. *Minds& Machines.*, 29(3), 397-416

Angius, N. & Primiero, G. (2018) The logic of identity and copy for computational artefacts. *Journal of Logic and Computation*, 28(6), 1293-322

Angius, N., Dimarogkona M., & Stefaneas, P. (2017) Building and Integrating Semantic Theories over Institutions. In S. Lambropoulou, D. Theodorou, P. Stefaneas & L. H. Kauffman (Eds), *Algebraic Modeling of Topological and Computational Structures and Applications*, Springer, PROMS series

Turner, R., & Angius, N. (2017) The Philosophy of Computer Science.*Stanford Encyclopedia of Philosophy*(Spring 2017 Edition), Edward N. Zalta (ed.)

Angius, N. & Tamburrini, G. (2017) Explaining Engineered Computing Systems' Behaviour: the Role of Abstraction and Idealization. *Philosophy & Technology*, 30(2), 239-258.

Angius, N. & Tamburrini, G. (2016) Dai Programmi Simulativi come Teorie alle Teorie dei Programmi Simulativi. *Sistemi Intelligenti.*, XXVIII(1), 153-168

Angius, N., & Stefaneas, P. (2016) Discovering Empirical Theories of Modular Software Systems. An Algebraic Approach. In Muller, V. (ed.), *Computing and Philosophy: Selected Papers from IACAP 2014. (Synthese Library)* Berlin: Springer.

Angius, N. (2015) Computer Simulations Without Simulative Programs in Executable Cell Biology. Hypothesis Discovery and Justification. *Paradigmi*, XXXIII(3), 67-82

Angius, N. (2014) Computational Idealizations in Software Intensive Science: a Comment on Symons' and Horner's paper. *Philosophy and Technology*, 27(3), 479-484.

Angius, N. (2014) The Problem of Justification of Empirical Hypotheses in Software Testing. *Philosophy and Technology*, 27(3), 423-439

Angius, N. (2013) Model-based Abductive Reasoning in Automated Software Testing. *Logic Journal of the IGPL*, 21(6), 931-942.

Angius, N. (2013) Abstraction and Idealization in the Formal Verification of Software Systems. *Minds and Machines*, 23(2), 211-226.

Angius, N. (2011) Software Verification and Scientific Methodology: Models, Regularities, Idealizations. *L&PS - Logic & Philosophy of Science*, 9, 569-577.

Angius, N., & Tamburrini, G. (2011) Scientific Theories of Computational Systems in Model Checking. *Minds and Machines*, 21(2), pp. 323-336.

Angius, N., & Tamburrini, G. (2010) Epistemologia dell'Artificiale e Informatica Teorica. In P. Greco, S. Termini (a cura di), *Memoria e Progetto. Un Modello per il Mezzogiorno che Serva a Tutto il Paese*, Edizioni GEM.

Competenze Linguistiche

Italiano **Madrelingua**

Inglese **Parlato e scritto fluente**