

# Curriculum vitae

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## Personal

Born November 14, 1958 in Lisbon, Portugal. Portuguese citizen.  
Married 1994. A child, born in 1995.

## Academic interests

Mathematical Logic (main interest). Foundations and Philosophy of Mathematics.

## Degrees

- 2005: *Agregação* in Mathematics, Universidade de Lisboa. Title of the lesson: “Novas interpretações em teoria da demonstração.”
- 1988: Ph.D. in Mathematics, Pennsylvania State University, USA. Dissertation: *Polynomial Time Computable Arithmetic and Conservative Extensions*.  
Advisor: Stephen G. Simpson.
- 1981: Licenciatura em Matemática (Muito Bom com Distinção), Universidade de Lisboa.

## Academic position

Associate Professor of Mathematics at Universidade de Lisboa.

## Academic visits

- Tinker Visiting Professor, Stanford University (USA), Autumn quarter, 2009/2010.
- Fulbright Scholar, Harvard University (USA), Spring semester, 2003/2004.
- Visiting Scholar, University of Aarhus (Denmark), October-December 2003.
- Visiting Scholar, Stanford University (USA), April-May 1992.

## Distinctions

- Corresponding member of Academia das Ciências de Lisboa (since 2006).
- Silver medal (finalist) of the Kurt Gödel Centenary Research Prize Fellowship (Kurt Gödel Society and Templeton Foundation). Senior category, 2008.

## Main invited talks

- “An overview of predicativity”, a three part mini-course in *Set Theory and Higher-Order Logic: Foundational Issues and Mathematical Developments*, Birkbeck College, University of London, United Kingdom (August de 2011). Also a talk entitled “A note on Spector’s consistency proof of analysis.”
- “The Structure of Natural Deductions,” invited (three-part) tutorial in *World Congress and School on Universal Logic III*, Monte Estoril, Portugal (18-20 April, 2010).
- “Mathematical Logic as a Foundational Enterprise,” in *Philosophy Colloquium*, Stanford University (November 2009). A previous version with title “A lógica matemática como empreendimento fundamentador,” was given to the *Academia das Ciências de Lisboa* (January 2009).
- “Bar-recursive interpretations of classical analysis,” in *Leeds Symposium on Proof Theory and Constructivism*, Leeds, UK (July 2009). Also in *ASL Invited Address* (Joint Mathematics Meetings), San Francisco, California, USA (January 15, 2010) and in *UCLA Logic Colloquium*, Los Angeles, USA (January 9, 2010).
- “An introduction to the *dialectica* and majorizability interpretations” and “Injecting uniformities into classical mathematics,” two lectures at *Mathematisches Forschungsinstitut Oberwolfach*, Germany (April 2008).
- “On a new functional interpretation,” plenary talk in *Logic Colloquium 2007*, Wrocław, Poland (July 2007).
- “Ideas and results in weak analysis,” in *26th Weak Arithmetic Days*, Seville, Spain (June 2007).
- “A Shoenfield-like bounded functional interpretation,” in *Methods of Proof Theory in Mathematics*, Max-Planck Institut für Mathematik, Bonn, Germany (June 2007).
- “Em torno do mundo de L. E. J. Brouwer,” plenary talk in *Encontro Nacional da Sociedade Portuguesa de Matemática* (June 2006).
- “Majorizability interpretations in finite type arithmetic,” *Mathematisches Forschungsinstitut Oberwolfach*, Germany (March 2005).
- “Amending Frege’s *Grundgesetze der Arithmetik*,” in *Fregefest* University of California at Irvine, USA (May 2004).
- “Groundwork for weak analysis,” in *Mathematisches Forschungsinstitut Oberwolfach*, Germany (April 2002).

## Books

- *Matemática Finita* (with Carlos André). Edited by Universidade Aberta. Lisboa, 2000, 309 pages.

## Survey paper

- “Proof interpretations and majorizability.” In: *Logic Colloquium 2007* (Françoise Delon *et al.*, eds.), Cambridge University Press 2010, pp. 32-81. A previous version of this survey was published under the name “Proof Interpretations” in *Days in Logic '06 (Two Tutorials)* (R. Kahle & I. Oitavem, eds.), *Textos de Matemática (Série B)* do Departamento de Matemática da Universidade de Coimbra, vol. 38, pp. 1-42 (2006).

## Articles in refereed journals

- “The bounded functional interpretation of the double negation shift” (with Patrícia Engrácia), **The Journal of Symbolic Logic** 75, pp. 759-773 (2010).
- “Commuting conversions vs. the standard conversions of the ‘good’ connectives” (with Gilda Ferreira), **Studia Logica** 92, pp. 63-84 (2009).
- “Injecting uniformities into Peano arithmetic,” **Annals of Pure and Applied Logic** 157, pp. 122-129 (2009). Special issue: *Kurt Gödel Centenary Research Prize Fellowships*, edited by S. Artemov, M. Baaz and H. Friedman.
- “The co-ordination principles: a problem for bilateralism,” **Mind** 117, pp. 1051-1057 (2008).
- “Harrington’s conservation result redone” (with Gilda Ferreira), **Archive for Mathematical Logic** 47, pp. 91-100 (2008).
- “A most artistic package of a jumble of ideas,” invited article in commemoration of the 50th anniversary of Gödel’s *dialectica* paper (T. Strahm, guest editor). **dialectica** 62, 205-222 (2008) .
- “The Riemann integral in weak systems of arithmetic” (with Gilda Ferreira), **Journal of Universal Computer Science** 14, pp. 908-937 (2008).
- “Bounded functional interpretation and feasible analysis” (with Paulo Oliva), **Annals of Pure and Applied Logic** 145, pp. 115-129 (2007).
- “Counting as integration in feasible analysis” (with Gilda Ferreira), **Mathematical Logic Quarterly** 52, pp. 315-320 (2006).
- “Comments on predicative logic,” **Journal of Philosophical Logic** 35, pp. 1-8 (2006).
- “Bounded modified realizability” (with Ana Nunes), **The Journal of Symbolic Logic** 71, pp. 329-346 (2006).
- “Bounded functional interpretation” (with Paulo Oliva), **Annals of Pure and Applied Logic** 135, pp. 73-112 (2005).
- “A simple proof of Parsons’ theorem,” **Notre Dame Journal of Formal Logic** 46, pp. 83-91 (2005).
- “Amending Frege’s *Grundgesetze der Arithmetik*,” **Synthese** 147, pp. 3-19 (2005). An extended abstract of this paper is published in portuguese under the title “Emendando o *Grundgesetze der Arithmetik* de Frege” in *Encontro Nacional de Filosofia Analítica*, organized by Henrique Jales Ribeiro, Universidade de Coimbra, Coimbra 2003, pp. 137-142.
- “On the consistency of the  $\Delta_1^1$ -CA fragment of Frege’s *Grundgesetze*” (with Kai Wehmeier), **Journal of Philosophical Logic**, 31, pp. 301-311 (2002).

- “Groundwork for weak analysis” (with António Fernandes), **The Journal of Symbolic Logic**, 67, pp. 557-578 (2002).
- “Two general results on intuitionistic bounded theories,” **Mathematical Logic Quarterly** 45, pp. 399-407 (1999).
- “A note on finiteness in the predicative foundations of arithmetic,” **Journal of Philosophical Logic** 28, pp. 165-174 (1999).
- “On the Parmenidean misconception,” **Philosophiegeschichte und logische Analyse** 2, pp. 37-49 (1999). A first version of this paper appeared in Portuguese under the title “Exercícios eleáticos” in **Disputatio** 2, pp. 3-21 (1997).
- “Extracting algorithms from intuitionistic proofs” (with António Fernandes), **Mathematical Logic Quarterly** 44, pp. 143-160 (1998).
- “On end extensions of models of  $\neg exp$ ,” **Mathematical Logic Quarterly** 42, pp. 1-18 (1996).
- “What are the  $\forall\Sigma_1^b$ -consequences of  $T_2^1$  and  $T_2^2$ ?” **Annals of Pure and Applied Logic** 75, pp. 79-88 (1995).
- “A note on a result of Buss concerning bounded theories and the collection scheme,” **Portugaliae Mathematica** 52, pp. 331-336 (1995).
- “A feasible theory for analysis,” **The Journal of Symbolic Logic** 59, pp. 1000-1011 (1994).
- “Binary models generated by their tally part,” **Archive for Mathematical Logic** 33, pp. 283-289 (1994).

### Other peer-reviewed articles

- “Basic applications of weak König’s lemma in feasible analysis” (with António Fernandes). In: *Reverse Mathematics 2001* (S. Simpson, ed.), Lecture Notes in Logic (Association for Symbolic Logic), vol. 21, A K Peters 2005, pp. 175-188.
- “Some notes on subword quantification and induction thereof.” In: *Logic and Algebra* (A. Ursini & P. Aglianò, eds.), Lecture Notes in Pure and Applied Mathematics 180, Marcel Dekker 1996, pp. 477-489.
- “Stockmeyer induction.” In: *Feasible Mathematics* (S. Buss and P. Scott, eds.), Progress in Computer Science and Applied Logic 9, Birkhäuser 1990, pp. 161-180.
- “Polynomial time computable arithmetic.” In: *Logic and Computation* (W. Sieg, ed.), Contemporary Mathematics 106, American Mathematical Society 1990, pp. 137-156.

### Other research articles

- “To catch one’s own shadow,” invited article. In *Actas do Segundo Encontro Nacional de Filosofia Analítica* (ed. Sofia Miguens, João Alberto Pinto and Carlos Mauro), Faculdade de Letras da Universidade do Porto, Porto 2006, pp. 14-16.
- “A two-worlds, two-semantics, interpretation of Plato’s *Sophist*.” In: *Greek Philosophy and Epistemology*, volume II (ed. Constantine Boudouris), Ionia Publications 2001, Athens, pp. 61-68.

- “A substitutional framework for arithmetical validity,” **Grazer Philosophische Studien** 56, pp. 91-107 (1999).
- “Análise, exequibilidade e lógica.” In: *Actas do III Encontro dos Algebristas Portugueses* (Marques de Sá et al., eds.), Department of Mathematics, University of Coimbra (1994), pp. 49-70.

### General and expository articles (in portuguese)

- “*Grundlagenstreit* e o intuicionismo Brouweriano,” **Boletim da Sociedade Portuguesa de Matemática** 58, pp. 1-23 (2008).
- “A matemática de Kurt Gödel,” **Boletim da Sociedade Portuguesa de Matemática** 55, pp. 39-62 (2006).
- “O problema P versus NP.” In: *2000 Matemática  $\sqrt{\text{Radical}}$*  (Miguel Ramos and Jorge Nuno Silva, eds.), Textos de Matemática, Departamento de Matemática da Universidade de Lisboa, Lisboa 2002, pp. 1-15.
- “Teoria dos conjuntos: uma vista,” **Boletim da Sociedade Portuguesa de Matemática** 38, pp. 29-47 (1998). This paper is an expansion of the entry “Teoria dos Conjuntos” in *Enciclopédia de Termos Lógico-Filosóficos*, organized by João Branquinho and Desidério Murcho (Coleção Filosofia Aberta, no. 11, Gradiva Publicações, Lisboa, 2001).
- “Lógica, filosofia e matemática.” Essay followed by an interview in: *A Cultura da Subtileza (Aspectos da Filosofia Analítica)* (Manuel Lourenço, ed.), Coleção Trajectos Portugueses, Gradiva Publicações, Lisboa 1995, pp. 110-126.
- “No paraíso, sem convicção... (uma explicação do programa de Hilbert).” In: *Matemática e Cultura II* (Furtado Coelho, ed.), Centro Nacional de Cultura and SPB Editores, Lisbon 1995, pp. 87-121.
- “Como ser sério com palavras cruzadas.” In: *Matemática e Cultura I* (Furtado Coelho, ed.), Centro Nacional de Cultura and Edições Cosmos, Lisboa and Porto 1992, pp. 37-53.

### Editions

- *Programs, Proofs, Processes*, Fernando Ferreira *et al.*, eds. Proceedings of the 6th Conference of Computability in Europe, Ponta Delgada, Azores (Portugal). **Lecture Notes in Computer Science** 6158, Springer-Verlag (2010).
- *Programs, Proofs, Processes*, Fernando Ferreira *et al.*, eds. Abstract and Handout Booklet, 6th Conference of Computability in Europe, Ponta Delgada, Azores (Portugal). Centro de Matemática Aplicada e Tecnologias de Informação, Universidade dos Açores (2010).
- Editor of a volume commemorating the centenary of Kurt Gödel: **Boletim da Sociedade Portuguesa de Matemática**, vol. 55 (2006).

### Reviews

- Of *A Course in Mathematical Logic for Mathematicians* (2nd edition), Yuri Manin, Graduate Texts in Mathematics, Springer Verlag, 2009. **Newsletter of the European Mathematical Society** 78, pp. 61-63 (2010).

- Of *Gödel's theorem. An incomplete guide to its use and abuse*, Torkel Franzén, A K Peters, Wellesley, Massachusetts, 2005. **Boletim da Sociedade Portuguesa de Matemática** 55, pp. 39-62, 2006 (in portuguese).
- Of *Fixing Frege*, John Burgess, Princeton University Press, 2005. In **Australasian Journal of Philosophy**, vol. 84, no. 3, pp. 464-466 (2006).
- Of “Polynomial time operations in explicit mathematics,” Thomas Strahm, *The Journal of Symbolic Logic*, vol. 62 (1997), pp. 575-594 and of “Feasible operations and applicative theories based on  $\lambda\eta$ ,” Andrea Cantini, *Mathematical Logic Quarterly*, vol. 46 (2000), pp. 291-312. In **The Bulletin of Symbolic Logic**, volume 8, pp. 534-535 (2002).
- Of “The function  $[a/m]$  in sharply bounded arithmetic,” Mitsuro Tada and Makoto Tatsuta, *Archive for Mathematical Logic*, vol. 37, pp.51-57 (1997). In **The Bulletin of Symbolic Logic**, volume 7, p. 391 (2001).
- Of *Arithmetic, Proof Theory and Computational Complexity* (P. Clote and J. Krajíček, eds.), Oxford Logic Guides 23, Oxford University Press, 1993. In **The Journal of Symbolic Logic** 60, pp. 1014-1017 (1995).

## Abstracts

- “Bar-recursive interpretations of classical analysis,” **The Bulletin of Symbolic Logic** 16, pp. 430-431 (2010).
- “A most artistic package of a jumble of ideas,” in *Lógica e Filosofia da Ciência*, pp. 19 and 20 (O. Pombo and A. Nepomuceno, eds.). Centro de Filosofia das Ciências da Universidade de Lisboa, Portugal (2009).
- “Ideas and results in weak analysis”, in *26èmes Journées sur les Arithmétiques Faibles* (A. Cordon-Franco *et al.*, eds.). Proceedings of a conference at the University of Seville (Spain), p. 47. Fénix Editora, Seville (2008).
- “On a new functional interpretation,” **The Bulletin of Symbolic Logic** 14, p. 128-129 (2008).
- “Amending Frege’s *Grundgesetze der Arithmetik*,” **The Bulletin of Symbolic Logic** 9, p. 247 (2003).
- “Basic analysis in a feasible theory, with an application to interpretability in  $\mathbb{Q}$ ,” **The Bulletin of Symbolic Logic** 6, pp. 380-381 (2000).
- “Subword quantification and the complement function,” **The Journal of Symbolic Logic** 57, p. 295 (1992).
- “A conservation result over polynomial time arithmetic,” **The Journal of Symbolic Logic** 54, pp. 651-652 (1989).

## Doctoral students

- Patrícia da Conceição Engrácia. Dissertation title: “Proof-theoretical studies on the bounded functional interpretation.” A thesis in Mathematics, September 2009.

- Eduardo Jorge de Sousa Castro. Dissertation title: “A indispensabilidade da matemática na ciência natural.” A thesis in Philosophy co-supervised with Professor João Branquinho. January 2008.
- Gilda Maria Saraiva Dias Ferreira. Dissertation title: “Sistemas de análise fraca para a integração.” A thesis in Mathematics, October 2006.
- António Marques Fernandes. Dissertation title: “Investigações em sistemas de análise exequível.” A thesis in Mathematics, July 2001.
- Isabel Maria Oitavem Fonseca da Rocha. Dissertation title: “Classes of computational complexity: implicit characterizations - a study in mathematical logic.” A thesis in Mathematics, July 2001.

## Master students

- Renata Maria Machado Teixeira. Dissertation title: “Normalização de termos no cálculo dos combinadores.” A thesis in Mathematics, July 2008.
- Jaime da Gama Gaspar. Dissertation title: “Em torno das interpretações funcionais da aritmética.” A thesis in Mathematics, December 2007.
- Nuno Gonçalo Baptista dos Santos. Dissertation title: “O desafio filosófico da lógica intuicionista.” A thesis in Philosophy, September 2007.
- Gilda Maria Saraiva Dias Ferreira. Dissertation title: “Aritmética computável em tempo polinomial.” A thesis in Mathematics, January 2002.
- Sancho Telo Abreu Ataíde Neves da Silva. Dissertation title: “Em torno da filosofia da matemática de Frege.” A thesis in Philosophy, January 2002.
- Isabel Maria Oitavem Fonseca da Rocha. Dissertation title: “Três assuntos de lógica e complexidade.” A thesis in Mathematics, February 1995.
- António Marques Fernandes. Dissertation title: “O teorema de Morley no contexto da teoria da classificação.” A thesis in Mathematics, June 1993.

## Other professional activities

- Programme Committee member of *Computability in Europe 2006* (Swansea, Wales, United Kingdom), *Computability in Europe 2007* (Siena, Italy), *Computability in Europe 2011* (Sofia, Bulgaria), *Classical Logic & Computation* (Reykjavik, Iceland, 2008), *Logic Colloquium'09* (Sofia, Bulgaria, 2009), *Encontro Nacional da Sociedade Portuguesa de Matemática* (Leiria, Portugal, 2010).
- Co-chair of *Computability in Europe 2010* (Ponta Delgada, Azores, Portugal). Co-organizer of *BACC (Bounded Arithmetic and Computational Complexity)* (Lisbon, Portugal, 2002) of *Days in Logic 2004* (Braga, Portugal) and of *Special Workshop on Realism and Anti-realism in the Philosophy of Mathematics* within ECAP 5 (Lisbon, Portugal, 2005).
- Referee of papers submitted to *Annals of Pure and Applied Logic*, *Annual Proceedings of LICS*, *Archive for Mathematical Logic*, *Boletim da Sociedade Portuguesa de Matemática*, *Disputatio*, *Erkenntnis*, *Journal of Philosophical Logic*, *Mathematical Logic Quarterly*, *Portugaliae Mathematica*, *The Journal of Symbolic Logic* and *Theoretical Computer Science*.

- Member of *Centro de Matemática e Aplicações Fundamentais* (CMAF).
- Co-founder in 1989 of the joint *Seminário de Lógica Matemática* of the departments of mathematics of the University of Lisbon and Technical University of Lisbon.
- Member of the editorial board of *DISPUTATIO - Revista Internacional de Filosofia Analítica*.
- Member of the *Association for Symbolic Logic*, *American Mathematical Society*, *Sociedade Portuguesa de Matemática* and *Sociedade Portuguesa de Filosofia*. Current president of *Sociedade Portuguesa de Filosofia Analítica*.