Bernardo Gonçalves

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Brazilian citizen. Born on June 21, 1982.

Short biography

I am a computer scientist, philosopher and historian specializing in the conceptual foundations of AI & machine learning. My approach is analytical and historiographical. I have 10+ years of experience with AI theory, systems, and applications, and I observe closely the potential and implications of computing, AI & machine learning in society. My work has appeared in *AI & Society*, *Artificial Intelligence*, *IJAR*, *Computing in Science & Engineering*, *Proceedings of the VLDB*.

My current project is entitled 'The Future of AI: the Logical Structure of Alan Turing's Argument' (supported by The São Paulo State Research Foundation under grant #19/21489-4). I have been studying Alan Turing's life and works, with an emphasis on his contributions to the mind-machine controversy in England (1946-1952) and his views about the future capabilities of digital computers. These are articulated in the vivid image of the Turing Test, as detailed in my forthcoming book The Turing Test Argument (Routledge, under contract).

Previously, I have worked in the design, development, and deployment of AI systems as a permanent research scientist at IBM Research (2016-2020), and have contributed to large joint-development projects with oil & gas companies such as Galp Energy, Schlumberger, and Gazprom Neft.[1]

I earned my second Ph.D., in Philosophy (University of São Paulo, 2021), as a result of a recent career shift from computer science, the field in which I earned my first Ph.D., in Computational Modeling (National Laboratory for Scientific Computing, 2015), and my M.Sc. and B.Sc. degrees. In the year 2015, I have been a visiting scholar in the Department of Computer Science at the University of Michigan. Also, I am a member of the Association for the History and Philosophy of Science of the Southern Cone (AFHIC), and a former member of the Science, Technology & Society group Scientiae Studia at the University of São Paulo (2017-2020).

In the Faculty of Philosophy, Languages, and Humanities at the University of São Paulo, I have taken graduate courses on the philosophy of history (e.g., the idea of progress in Cicero, Machiavelli, Voltaire and Rousseau, and Walter Benjamin's theses), history of economics (e.g., the formation of the modern state in England), ancient and modern skepticism (Pyrrho, Montaigne, Descartes), early modern science (Galileo and the Renaissance, Descartes and mechanicism), in addition to having read classics in the history and the philosophy of science such as Duhem, Popper, Kuhn, Hacking. At the National Laboratory for Scientific Computing, I have taken graduate courses in theoretical computer science, mathematical modeling, real analysis, numerical analysis, vector calculus, and the calculus of variations.

1) Employment

Feb. 2016–Oct. 2020 | IBM Research | Research staff member

R&D on the design and deployment of artificial intelligence systems customized for large global industries - majorly the oil & gas industry and digital agriculture

Reference #1 - Research Lab Director: Dr. Ulisses Mello (ulissesm@us.ibm.com)

Reference #2 - Senior Research Manager: Dr. Rogerio de Paula (ropaula@br.ibm.com)

[1] For an early 2017 snapshot of my professional page from the Internet Archive, please cf. <http://web.archive.org/web/20170115141702/http://researcher.watson.ibm.com/researcher/view.php?person=br-bng>.

2) Education and Research Training

CURRENT **Postdoctoral fellowship**, University of São Paulo, Polytechnic School
Research topic: The future of artificial intelligence: the structure of Alan Turing's argument
Supervisor: Prof. Fabio G. COZMAN (fgcozman@usp.br)

MAR. 2021 **Ph.D. degree in Philosophy**, University of São Paulo
Dissertation: "Machines will think: structure and interpretation of Alan Turing's imitation game". Supervisor: Prof. Edelcio DE SOUZA (edelcio.souza@usp.br)

FEB. 2016 **Postdoctoral fellowship**, University of Michigan, Computer Science Department
Research topic: Probabilistic models for disambiguation of natural language queries
Supervisor: Prof. H. V. JAGADISH (jag@umich.edu)

JAN. 2015 **Ph.D. degree in Computational Modeling**, National Laboratory for Scientific Computing
Dissertation: "Managing large-scale scientific hypotheses as uncertain and probabilistic data
Supervisor: Prof. Fabio PORTO (fporto@lncc.br)

MAY 2009 **Master's degree in Computer Science**, Federal University of Espírito Santo
Thesis: "An ontological theory of the electrocardiogram with applications"
Supervisor: Prof. Giancarlo GUIZZARDI (giancarlo.guizzardi@unibz.it)

FEB. 2007 **Bachelor's degree in Computer Science**, Federal University of Espírito Santo
Scientific initiation: "Ontologies and knowledge-based systems"
Supervisor: Prof. Giancarlo GUIZZARDI (giancarlo.guizzardi@unibz.it)

Awards and grants

2020. The São Paulo Research Foundation (FAPESP) post-doctoral fellowship (http://fapesp.br/en/postdoc)

2016. Nomination by LNCC for the national award for Ph.D. dissertations

2015. The Brazilian Research Council (CNPq) post-doctoral fellowship abroad

2013. IBM Ph.D. Fellowship Award 2013-2014 (http://www.research.ibm.com/university/awards/fellowships.html)

2013. FAPERJ 'Strict A' Ph.D. Fellowship (granted by the Rio de Janeiro State Research Funding Agency).

2009. CNPq RHAE (Human resources in strategic areas), a.k.a. 'researcher in the enterprise'

2007. Coordination for the Improvement of Higher Education Personnel (Masters degree scholarship)

3) Research, inventions and media record

Books

B. Gonçalves. *The Turing Test Argument*. London, NY: Routledge, 2023 (forthcoming)

Ph.D. theses

1. B. Gonçalves. *Machines will think*: structure and interpretation of Alan Turing's imitation game. Ph.D. Thesis. School of Philosophy, Languages and Human Sciences, University of Sao Paulo, Sao Paulo. Defended and approved on 9 March 2021. doi:10.11606/T.8.2021.tde-10062021-173217

2. B. Gonçalves. *Managing large-scale scientific hypotheses as uncertain and probabilistic data*. Ph.D. thesis. National Laboratory for Scientific Computing (LNCC), Brazil. Defended and approved on 28 January 2015. Preprint available at: <http://arxiv.org/abs/1501.05290>.

Working papers in the conceptual foundations and history of AI

1. B. Gonçalves. 'Dystopian or Utopian? Two Images of Alan Turing'. Preprint available at: <http://philsci-archive.pitt.edu/20533/>.

2. B. Gonçalves. 'Turing's Philosophy of Science for Intelligence'.

3. B. Gonçalves. 'The Turing Test is a Thought Experiment'.

4. B. Gonçalves. 'Can machines think? The Controversy that Led to the Turing Test'. *AI & Society*. ISSN: 0951-5666. JCR Impact Factor: 1.605. doi: 10.1007/s00146-021-01318-6

Selected publications in computer science journals

1. B. Gonçalves, F. Porto. A note on the complexity of the causal ordering problem. *Artificial Intelligence* 238: 154-65, 2016. ISSN: 0004-3702. **JCR Impact Factor: 9.088**. doi:10.1016/j.artint.2016.06.004

2. B. Gonçalves, H. V. Jagadish. Bsmooth: learning from user feedback to disambiguate query terms in interactive data retrieval. *International Journal of Approximate Reasoning*, 101: 10-30, 2018. ISSN: 0888-613X. **JCR Impact Factor: 3.816**. doi:10.1016/j.ijar.2018.06.003

3. B. Gonçalves, F. Porto. Managing scientific hypotheses as uncertain and probabilistic data with support for predictive analytics. *IEEE Computing in Science & Engineering* 17(5): 35-43, 2015. ISSN: 1521-9615. **JCR Impact Factor: 2.080**. doi:10.1109/MCSE.2015.102

4. B. Gonçalves, F. Porto. Y-DB: Managing scientific hypotheses as uncertain data, *Proceedings of the Very Large Data Bases Endowment* 7(11): 959-62, 2014. ISSN: 2150-8097. **JCR Impact Factor: 2.862**. doi:10.14778/2732967.2732971

5. B. Gonçalves, G. Guizzardi and J.G. Pereira Filho. Using an ECG reference ontology for semantic interoperability of ECG data. *Journal of Biomedical Informatics* 44(1): 126-36, 2011. ISSN: 1532-0464. **JCR Impact Factor: 6.317**. doi:10.1016/j.jbi.2010.08.007

6. Bruno S. P. M. Correa, B. Gonçalves, Iuri M. Teixeira, Antônio T. A. Gomes, and Artur Ziviani. AToMS: a ubiquitous teleconsultation system for supporting AMI patients with prehospital thrombolysis. *International Journal of Telemedicine and Applications*, 2011. doi:10.1155/2011/560209

Selected publications in computer science conferences

7. B. Gonçalves, F. Cozman. The Future of AI: Neat or Scruffy? In: Britto A., Valdivia Delgado K. (eds) The Brazilian Conference on Intelligent Systems. (BRACIS 2021). Lecture Notes in Computer Science, vol 13074. Springer, doi:10.1007/978-3-030-91699-2_13

8. M. Vasconcelos, C. Cardonha, B. Gonçalves. Modeling epistemological principles for bias mitigation in AI systems: an illustration in hiring decisions. *Proceedings of the 2018 AAAI/ACM Conference on AI, Ethics, and Society*, p. 323-329. doi:10.1145/3278721.3278751

9. B. Gonçalves. Show me the material evidence: initial experiments on evaluating hypotheses from user-generated multimedia data. *IEEE Proceedings of the International Symposium on Multimedia)*, San Jose, December 2016. doi:10.1109/ISM.2016.0145

10. Breno W. S. R. Carvalho, Aline Paes, B. Gonçalves. Augmenting linguistic semi-structured data for machine learning: a case study using Framenet. *Proceedings of the International Conference on Machine Learning Techniques and NLP (MLNLP 2020)*, October 2020, Sydney, Australia. doi:10.5121/csit.2020.101201

11. B. Gonçalves, F. Porto. A lattice-theoretic approach for representing and managing hypothesis-driven research. *Proceedings of AMW (International Workshop on Foundations of Data Management)*, Puebla, Mexico, 2013. Available at: <http://ceur-ws.org/Vol-1087/paper3.pdf>.

12. B. Gonçalves, F. Porto. Research Lattices: Towards a scientific hypothesis data model. *ACM Proceedings of SSDBM (International Conference on Scientific & Statistical Database Management)*, Baltimore, USA, 2013. doi:10.1145/2484838.2484861

13. B. Gonçalves, et al. On the semantic engineering of scientific hypotheses as linked data. *Proceedings of Linked Science, co-located with ISWC (Intl. Conference on the Semantic Web)*, Boston, USA, 2012. Available at: <http://ceur-ws.org/Vol-951/paper2.pdf>.

14. F. Porto, A.M. de C. Moura, B. Gonçalves, R. Costa, S. Spaccapietra. "A scientific hypothesis conceptual model". In: Castano S., Vassiliadis P., Lakshmanan L.V., Lee M.L. (eds) *Advances in Conceptual Modeling*. ER 2012. Lecture Notes in Computer Science, vol 7518. Springer, Berlin, Heidelberg. doi:10.1007/978-3-642-33999-8_13

15. B. Gonçalves, et al. An ontology-based application in heart electrophysiology: Representation, reasoning and visualization on the web. *Proceedings of ACM Symposium on Applied Computing*, Hawaii, March 2009. doi:10.1145/1529282.1529456

16. B. Gonçalves, et al. ECG data provisioning for telehomecare monitoring. *Proceedings of ACM Symposium on Applied Computing*, March 2008. doi:10.1145/1363686.1364004

17. B. Gonçalves, et al. A service architecture for sensor data provisioning for context-aware mobile applications. *Proceedings of ACM Symposium on Applied Computing*, March 2008. doi: 10.1145/1363686.1364155

Patents granted and/or filed in the United States Patent and Trademark Office

13. V. F. de Santana, B. Gonçalves, A. P. D. Binotto, A. P. Appel, R. L. de F. Cunha. Maintaining a knowledge database based on user interactions with a user interface. 2021/8/12 US20210248482A1, publication date: 12 August 2021. <http://patents.google.com/patent/US20210248482A1>.

14. C. H. Cardonha, J. L. G. Diaz, B. Gonçalves, M. A. Vasconcelos. System, method and computer program product for dispatching of medical emergencies and wait time control. US20180089377A1, publication date: 29 March 2018. <http://patents.google.com/patent/US20180089377A1>.

15. C. H. Cardonha, B. Gonçalves, J. L. G. Diaz, M. A. Vasconcelos. Data-driven Urban Interventions Based on Crowdsourcing. US Patent App. US20180225613A1, publication date: 9 August 2018. <http://patents.google.com/patent/US20180225613A1>.

Press and social media

B. Gonçalves. 'The first 60 years of feats of artificial intelligence: revisiting the predictions of Herbert Simon' (in Portuguese). *O Estado de S. Paulo*, April 12, 2018. Available at: <https://estadodaarte.estadao.com.br/os-primeiros-60-anos-de-feitos-da-inteligencia-artificial-revisitando-as-previsoes-de-herbert-simon/>. (This is a large newspaper in Brazil.)

Member of roundtable podcast 'Artificial intelligence' (in Portuguese). Jointly with Prof. Fabio Cozman (USP) and Prof. Renata Wasserman (USP), on March 23 of 2018. Available at: <http://oestadodaarte.com.br/inteligencia-artificial/>.

4) Selected courses taught, oral communications and organization of events

Graduate courses

B. Gonçalves. PCS5786 'The future of artificial intelligence: from the Turing test to superintelligent machines'. Polytechnic School, University of São Paulo. March to July 2021.

Undergraduate courses

B. Gonçalves. INF022774 'Introduction to computer science'. Computer Science Department, Federal University of Espírito Santo, March to July 2008.

Organization of academic events

B. Gonçalves, P. Mariconda. Symposium 'Artificial intelligence: philosophical, historical and social aspects', in *XI Meeting of the Association for Philosophy and History of Science of the Southern Cone*. Buenos Aires (Argentina), June of 2018. Available at: <http://www.afhic.com/es/encuentros-anteriores/encuentro/simposios/#asp>.

D. C. Martins-Jr., C. S. Santos, B. Gonçalves. *eScience International Workshop*, Federal University of ABC, São Paulo. June of 2017. Available at: <http://poscomp.ufabc.edu.br/eventos/workshop-de-escience/>.

Consulting and member of advisory committees

São Paulo Research Foundation (FAPESP): 2017-2022.

5) Research profile

ORCID: <http://orcid.org/0000-0003-2794-8478>

Google Scholar: <http://scholar.google.com/citations?user=udofaJwAAAAJ>

CNPq Lattes (for Brazilians): <http://lattes.cnpq.br/3537386106760841>

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