

FILIPPO BONCHI

Chargé de recherche 2e classe CNRS, Section 6
Laboratoire de l'Informatique du Parallélisme (UMR5668 CNRS), ENS-Lyon
webpage: <http://perso.ens-lyon.fr/filippo.bonchi/>
e-mail: filippo.bonchi@ens-lyon.fr

PERSONAL DATA

- * Birthday: 01/03/1981
- * Birthplace: Montevarchi (AR, Italy)
- * Nationality: Italian
- * Civil Status: Single
- * Address: viale Gramsci 124, San Giovanni Valdarno (AR), Italy

RESEARCH INTERESTS

- * Abstract Semantics for Interactive Systems
- * Algebraic and Coalgebraic Specification
- * Categorical Models of Formal Languages
- * Term and Graph Rewriting
- * Logic and Concurrent Constraint Programming
- * Process Calculi and Petri Nets
- * Algorithms for equivalence checking

POSITIONS

- * (From 10/2010): Chargé de Recherche CNRS, in the team Plume (Ecole Normale Supérieure).
- * (10/2009 - 6/2010): ERCIM post-doc at INRIA, in the team Comète (Ecole Polytechnique).
- * (1/2009 - 9/2009): ERCIM post-doc at CWI, in the team SEN3.
- * (1/2008 - 12/2008): Post-doc at the Department of Computer Science of the University of Pisa.
- * (2005-2007): Ph.D. student at the Department of Computer Science of the University of Pisa.

AWARDS

- * Best paper award at CALCO 2013.
- * Winner of the *Prime d'Excellence Scientifique* given by CNRS in 2012.
- * Awarded by the Italian Chapter of EATCS (European Association for Theoretical Computer Science) for *the Best Italian Ph.D. Thesis on Theoretical Computer Science 2008*.
- * Selected by the national committee of CNRS (Section 7) in 2010 as "Chargé de recherche" (classified 10th on about 500 applicants).
- * Winner of an ERCIM "Alain Bensoussan" fellowship in 2008.

RESEARCH PROJECTS

- * Project leader of CoCa (ENS project).
- * Project leader of COGIP (PEPS-CNRS).
- * ANR project PACE (French-Chinese cooperation).
- * EU FP7-ICT IP ASCENS (Autonomic Service-Component ENSembles).
- * CHOCO (ANR-07-BLAN-0324).
- * PICOQ (ANR BLAN).
- * PRIN 2005015824 ART (Analysis of Reduction systems through Transition systems).
- * EU FP6-IST IP 16004 SENSORIA (Software Engineering for Service-Oriented Overlay Computers).
- * MIUR FIRB TOCA.IT (Knowledge Oriented Technologies for the Aggregation of Companies in Internet).
- * VIGONI: Bilateral exchange programme Italy-Germany.

CONFERENCE ORGANIZATION

- * Member of the Steering Committee of *ICE* (Interaction and Concurrency Experiences).
- * PC member of CMCS14: *12th International Workshop on Coalgebraic Methods in Computer Science (satellite event of ETAPS2014)*, April 2014, Grenoble, France.
- * PC member of APLAS13: *11th Asian Symposium on Programming Languages and Systems*, December 2013, Melbourne, Australia.
- * PC member of EXPRESS/SOS13: *Combined 20th International Workshop on Expressiveness in Concurrency and 10th Workshop on Structural Operational Semantics*, August 2013, Buenos Aires, Argentina.
- * PC member of CALCO13: *5th Conference on Algebra and Coalgebra*, August 2013, Warsaw, Poland.
- * PC member of ICE13: *6th Interaction and Concurrency Experience (satellite event of DisCoTec13)*, June 2013, Florence, Italy.
- * PC member of CMCS12: *11th International Workshop on Coalgebraic Methods in Computer Science (satellite event of ETAPS2012)*, March 2012, Tallinn, Estonia.
- * PC member of ICE12: *5th Interaction and Concurrency Experience (satellite event of DisCoTec12)*, June 2012, Stockholm, Sweden.
- * PC member of CALCO11: *4th Conference on Algebra and Coalgebra*, August 2011, Winchester, UK.
- * PC member of EXPRESS11: *18th International Workshop on Expressiveness in Concurrency (satellite event of CONCUR11)*, September 2011, Aachen, Germany.
- * PC member of SOS11: *Structural Operational Semantics (satellite event of CONCUR11)*, September 2011, Aachen, Germany.
- * PC member of ICE11: *4th Interaction and Concurrency Experience (satellite event of DisCoTec11)*, June 2011, Reykjavik, Iceland.
- * Co-chair of ICE09: *Second Interaction and Concurrency Experience (satellite event of CONCUR09)*, August 2009, Bologna, Italy.

- * Co-chair of ICE08: *First Interaction and Concurrency Experience (satellite event of ICALP08)*, July 2008, Reykjavic, Iceland.
- * Local Co-organizer of WADT08: *19th International Workshop on Algebraic Development Techniques*, June 2008, Pisa, Italy.

INVITATION TO CONFERENCES

- * Bellairs Workshop on Duality. McGill University, 14-21/03/2014.
- * 6th Interaction and Concurrency Experience (satellite event of DisCoTec13), June 2013, Florence, Italy.
- * Bellairs Workshop on Coalgebras. McGill University, 18-21/03/2013.
- * Coalgebraic Logics. Dagstuhl, 7-12/10/2012.
- * Logic and Program Semantics: festschrift for Dexter Kozen. Cornell University (Ithaca, NY) 26-27/04/2012.
- * 11th Italian Conference on Theoretical Computer Science (ICTCS09), Cremona (Italy) 22-29/03/09.
- * Coalgebra Day, Amsterdam (Netherlands) 2/03/09.
- * The colloquium on Emerging Trends in Concurrency Theory, Paris (France), 13-15/11/2006.

INTERNATIONAL COLLABORATORS

- * Austria: A. Sokolova.
- * Canada: P. Panangaden.
- * France: C. Palamidessi, D. Pous, F. Valencia.
- * Germany: J. Adámek, B. König, M. Hülsbusch, S. Milius.
- * Holland: M. Bonsangue, H. Hansen, J. Rutten, A. Silva.
- * Italy: U. Montanari, F. Gadducci, A. Corradini, P. Baldan, M. Boreale A. Brogi, V. Ciancia, S. Corfini, G. Monreale.
- * Iceland: G. Caltais.
- * UK: P. Sobocinski, D. Petrisan.

REVIEW SERVICE

- * Reviewer of top-class conferences and journals.
- * Project reviewer for the Foundation of Polish Science.

TEACHING AND SUPERVISING

- * (From 2012) Supervisor of F. Zanasi (Ph.D student at Ecole Normale Supérieure).
- * (2011) Teaching the M2 course “Concurrency and Categories” at ENS-Lyon.
- * (From 2010) Co-supervisor of A. Aristizábal and L. Pino (Ph.D students at Ecole Polytechnique).
- * (2008) Teaching assistant of an introductory course on Informatics for the Faculty of Humanities (20 hours) - University of Pisa.
- * (2005-2007) Volunteer teacher of Data Bases in the jailhouse “Don Bosco” of Pisa.

A SHORT OVERVIEW OF THE RESEARCH ACTIVITIES

Concurrency theory is devoted to develop formal tools, like (programming and modelling) languages, (semi-automatic) proof systems and proof techniques, for implementing and analysing concurrent computing systems. Many of these tools relies on *coinduction* which is the mathematical principle (dual to induction) that allows to prove properties on infinite structures like, for instance, the behaviour of an operative system. Another principle which is often fundamental to make effective the analysis of these systems, is *compositionality*: the behaviour of the whole system must be determined by the behaviours of its components.

In [LICS06, FOSSACS08, TCS09, APLAS11], I have studied general criteria to give compositional and coinductive semantics to different kinds of computational models (like process calculi, Petri nets, logic programming, term and graph rewriting). In some concrete cases (like the CCS [ICGT06, IC09] and the Mobile Ambients [FOSSACS09, MSCS12a]), my work has lead to a novel perspective on well-known results. In some others cases (like Petri nets [FOSSACS08] and concurrent constraint programming [FOSSACS11]), a compositional and coinductive semantics has been defined for the first time.

Minimization is a key step to make feasible the analysis of concurrent systems: it transforms a system into an equivalent one having a minimal number of states and transitions. In [ESOP09], I have developed an algorithm that allows to efficiently minimize concurrent systems by exploiting both coinduction and compositionality. In [SAC12], I have implemented this algorithm for the special case of concurrent constraint programming and, in [ICE12, SCP13], I have extended the algorithm to minimize with respect to a more abstract (weak) semantics.

Before concurrency, coinduction was implicitly used in *automata theory*. Indeed, the soundness of classical automata algorithms (such as Hopcroft's minimization) is often proved by coinduction. In [CONCUR09a, IC11, DK60, FOSSACS12], I show a coinductive (coalgebraic) perspective on standard concepts from automata theory, such as regular expressions and the Brzozowski's minimization algorithm [TOCL13]. This new perspective allows for generalizing these concepts: for instance, we can extend regular expressions to quantitative systems [IC11] or develop a Brzozowski's algorithm for Moore machines [DK60]. Beside coinduction, also compositionality can be fruitfully exploited in automata theory. This is first advocated in [FSTTCS10, IC12] where I show that standard types of automata (such as non-deterministic automata [FSTTCS10, LMCS13] and weighted automata [IC12]) are instances of *bialgebras*. This fact has several concrete consequences: for instance in [POPL13], I introduced a novel (more efficient) algorithm for checking language equivalence of nondeterministic automata.

PUBLICATIONS

Bibliometric indices. Citations: 468; H-index: 13 (according to GoogleScholar). Citations: 398, H-index: 12 (according to Arnet Miner).

Journals

- [MSCS14] J. Rot, F. Bonchi, M. Bonsangue, D. Pous, J. Rutten and A. Silva. Enhanced Coalgebraic Bisimulation. To appear in *Mathematical Structures in Computer Science*.
- [TOCL13] F. Bonchi, M. Bonsangue, H.H. Hansen, P. Panangaden, J. Rutten and A. Silva. Brzozowski minimization algorithm (co)algebraically. To appear in *Transactions on Computational Logic*.
- [LMCS13] A. Silva, F. Bonchi, M. Bonsangue and J. Rutten. Generalizing determinization from automata to coalgebras In *Logical Methods in Computer Science*, v.9, (1), LMCS-2013.
- [IC12] F. Bonchi, M. Bonsangue, M. Boreale, J. Rutten and A. Silva. A coalgebraic perspective on linear weighted automata. In *Information and Computation*, v.211, pp.77-105, Elsevier, 2012.
- [MSCS12a] F. Bonchi, F. Gadducci and G.V. Monreale. RPOs Semantics for the Calculus of Mobile Ambients. To appear in *Mathematical Structures in Computer Science*.
- [MSCS12b] P. Baldan, F. Bonchi, F. Gadducci and G. Monreale. Concurrency Can't Be Observed, Asynchronously. To appear in *Mathematical Structures in Computer Science*.
- [JAR11] F. Bonchi, M.G. Buscemi, V. Ciancia, and F. Gadducci. A presheaf environment for the calculus of explicit fusions. In *Journal of Automated Reasoning*, v.49, (2), pp. 161-183, Springer 2012.
- [IC11] F. Bonchi, M. Bonsangue, J. Rutten and A. Silva. Quantitative Kleene Coalgebra. *Information and Computation*, v.209, (5), pp. 822-849, Elsevier, 2011.
- [LMCS11] F. Bonchi and U. Montanari. Symbolic and Asynchronous Semantics via Normalized Coalgebras. In *Logical Methods in Computer Science*, v.7, (2), LMCS-2011.
- [JSC11] P. Baldan, F. Bonchi, A. Corradini, T. Heindel and B. König. A Lattice Theoretical Perspective on Adhesive Categories. *Journal of Symbolic Computation*, v.46, (3), pp. 222-245. Elsevier 2011.
- [TCS09] F. Bonchi, U. Montanari. Reactive Systems, (Semi-)Saturated Semantics and Coalgebras on Presheaves. In *Theoretical Computer Science*, v.410, n.41, pp. 4044-4066. Elsevier, 2009.
- [FI09] F. Bonchi, A. Brogi, S. Corfini, and F. Gadducci. A net-based approach to web service's publication and replaceability. In *Fundamenta Informaticae*, v.94, (3), pp. 305-330. IOS Press, 2009.
- [IC09] F. Bonchi, F. Gadducci and B. König. Synthesising CCS Bisimulation using Graph Rewriting. In *Information and Computation*, v.207, (1), pp.14-40. Elsevier, 2009.
- [FI08] F. Bonchi, A. Brogi, S. Corfini, and F. Gadducci. On the use of behavioural equivalence for Web services' development. In *Fundamenta Informaticae*, 89, (4), pp. 479-510. IOS Press, 2008.

Conferences

- [FOSSACS14] F. Bonchi, P. Sobocinski, F. Zanasi. Interacting Bialgebras are Frobenius. To appear in the proc. of the *15th International Conference on Foundations Of Software Science And Computation Structures*.
- [APLAS13] F. Bonchi, G. Caltais, D. Pous and A. Silva. Brzozowski's and Up-to Algorithms for Must Testing. In the proc. of the *11th Asian Symposium on Programming Languages and Systems LNCS 8301*, pp. 1-16. Springer, 2013.
- [CALCO13] F. Bonchi and F. Zanasi. Saturated Semantics for Coalgebraic Logic Programming. In the proc. of the *5th Conference on Algebra and Coalgebra in Computer Science, LNCS 8089*, pp. 80-94. Springer, 2013. *Note*: selected for a special issue of *Logical Methods in Computer Science*. and winner of the Best Paper Award.
- [PPDP13] L. Pino, F. Bonchi and F. Valencia. Efficient computation of program equivalence for confluent concurrent constraint programming. In the proc. of the *15th International Symposium on Principles and Practice of Declarative Programming*, pp. 263–274. ACM, 2013. *Note*: selected for a special issue of *Science of Computer Programming*.

- [POPL13] F. Bonchi and D. Pous. Checking NFA equivalence with bisimulations up to congruence. In the proc. of the *The 40th Annual ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages*, pp. 457-468. ACM, 2013. *Note*: selected for Research Highlights of *Communications of the ACM*.
- [MFPS12] F. Bonchi, M. Bonsangue, G. Caltais, J. Rutten and A. Silva. Final Semantics for Decorated Traces. In the proc. of *28th Conference on the Mathematical Foundations of Programming Semantics. Electronic Notes in Theoretical Computer Science*, v.286, pp. 73-86. Elsevier, 2012.
- [DK60] F. Bonchi, M. Bonsangue, J. Rutten and A. Silva. Brzozowski’s algorithm (co)algebraically. In *Logic and Program Semantics* (festschrift for Dexter Kozen). *LNCS 7230*, pp. 12-23. Springer, 2012.
- [FOSSACS12] J. Adámek, F. Bonchi, M. Hülsbusch, B. König, S. Milius and A. Silva. A Coalgebraic Perspective on Minimization and Determinization. In the proc. of the *15th International Conference on Foundations Of Software Science And Computation Structures. LNCS 7213*, pp. 58-73. Springer, 2012.
- [SAC12] A. Aristizábal, F. Bonchi, L. Pino and F. Valencia. Partition Refinement for Bisimilarity in CCP. In the proc. of the *27th Symposium On Applied Computing*, pp. 88-93. ACM, 2012.
- [APLAS11] F. Bonchi, F. Gadducci and G. Monreale. Towards a General Theory of Barbs, Contexts and Labels. In the proc. of the *9th Asian Symposium on Programming Languages and Systems, LNCS 7078*, pp. 289-304. Springer, 2011.
- [FOSSACS11] A. Aristizábal, F. Bonchi, C. Palamidessi, L. Pino and F. Valencia. Deriving Labels and Bisimilarity for Concurrent Constraint Programming. In the proc. of the *14th International Conference on Foundations Of Software Science And Computation Structures, LNCS 6604*, pp. 138-152. Springer, 2011.
- [FSTTCS10] A. Silva, F. Bonchi, M. Bonsangue and J. Rutten. Generalizing the powerset construction, coalgebraically. In *IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science, Leibniz International Proceedings in Informatics (LIPIcs) 8*, pp. 272–283. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik, 2010.
- [APLAS10] P. Baldan, F. Bonchi, F. Gadducci and G. Monreale. Concurrency Can’t Be Observed, Asynchronously. In the proc. of the *8th Asian Symposium on Programming Languages and Systems, LNCS 6461*, pp. 424-438. Springer, 2010. *Note*: selected for a special issue of *Mathematical Structures in Computer Science*.
- [ICGT10] F. Bonchi, F. Gadducci, G. Monreale and U. Montanari. Saturated LTSs for Adhesive Rewriting Systems. In the proc. of the *4th International Conference on Graph Transformation, LNCS 6372*, pp. 123-138. Springer, 2010.
- [CONCUR09a] F. Bonchi, M. Bonsangue, J. Rutten, A. Silva. Deriving syntax and axioms for quantitative regular behaviours. In the proc. of the *20th International Conference on Concurrency Theory, LNCS 5710*, pp. 146-162. Springer, 2009. *Note*: selected for a special issue of *Information and Computation*.
- [CONCUR09b] P. Baldan, F. Bonchi and F. Gadducci. Encoding asynchronous interactions using open Petri nets. In the proc. of the *20th International Conference on Concurrency Theory, LNCS 5710*, pp. 99-114. Springer, 2009.
- [CALCO09] F. Bonchi, U. Montanari. Coalgebraic Symbolic Semantics. In the proc. of the *3th Conference on Algebra and Coalgebra in Computer Science, LNCS 5728*, pp. 173-190. Springer, 2009. *Note*: selected for a special issue of *Logical Methods in Computer Science*.
- [ESOP09] F. Bonchi, U. Montanari. Minimization Algorithm for Symbolic Bisimilarity. In the proc. of the *18th European Symposium on Programming, LNCS 5502*, pp. 267-284. Springer, 2009.
- [FOSSACS09] F. Bonchi, F. Gadducci and G.V. Monreale. Reactive Systems, Barbed Semantics, and the Mobile Ambients. In the proc. of the *12th International Conference on Foundations Of Software Science And Computation Structures, LNCS 5504*, pp. 272-287. Springer, 2009.
- [ICGT08a] F. Bonchi, F. Gadducci and T. Heindel. Parallel and Sequential Independence for Borrowed Contexts. In the proc. of the *4th International Conference on Graph Transformation, LNCS 5214*, pp. 226-241. Springer, 2008.
- [ICGT08b] F. Bonchi. Abstract Semantics by Observable Contexts. In the proc. of the *4th International Conference on Graph Transformation, LNCS 5214*, pp. 478-480. Springer, 2008.

- [UGO65] F. Bonchi, M.G. Buscemi, V. Ciancia, and F. Gadducci. A Category of Explicit Fusions. In *Festschrift for Ugo Montanari*, LNCS 5065, pp. 544-562. Springer, 2008.
- [PN08] F. Bonchi, A. Brogi, S. Corfini, and F. Gadducci. Compositional Specification of Web Services via Behavioural Equivalence: A Case Study. In the proc. of the *29th International Conference on Application and Theory of Petri Nets and other Models of Concurrency*, LNCS 5062, pp. 52-71. Springer, 2008. *Note:* selected for a special issue of *Fundamenta Informaticae*.
- [FOSSACS08] F. Bonchi and U. Montanari, Symbolic Semantics Revisted. In the proc. of the *11th International Conference on Foundations Of Software Science And Computation Structures*, LNCS 4962, pp. 395-412. Springer, 2008.
- [CONCUR07] F. Bonchi and U. Montanari, Coalgebraic Models for Reactive Systems. In the proc. of the *18th International Conference on Concurrency Theory*, LNCS 4701, pp. 364-379. Springer, 2007.
- [FSEN07] F. Bonchi, A. Brogi, S. Corfini, and F. Gadducci. A Behavioural Congruence for Web Services. In the proc. of the *IPM International Symposium on Fundamentals of Software Engineering*, LNCS 4767, pp. 240-256. Springer, 2007. *Note:* selected for a special issue of *Fundamenta Informaticae*.
- [ICGT06] F. Bonchi, F. Gadducci and B. König. Process Bisimulation via a Graphical Encoding. In the proc. of the *International Conference on Graph Transformation*, LNCS 4178, pp. 168-183. Springer, 2006.
- [LICS06] F. Bonchi, B. König, and U. Montanari. Saturated semantics for reactive systems. In the proc. of the *In Twenty First Annual IEEE Symposium on Logic in Computer Science*, pp. 69-80. IEEE Computer Society, 2006.

Workshops

- [ICE12] A. Aristizábal, F. Bonchi, L. Pino and F. Valencia. Reducing Weak to Strong Bisimilarity in CCP. To appear in the proc. of the *5th Interaction and Concurrency Experience*.
- [SOS09] F. Bonchi, F. Gadducci and G.V. Monreale. On Barbs and Labels in Reactive Systems. *Electronic Proceedings in Theoretical Computer Science*, CoRR, abs/1002.2869, 2010.
- [EXPRESS08] F. Bonchi, F. Gadducci and G.V. Monreale. Labeled Transitions for mobile ambients (as synthesized via a graphical encoding). *Electronic Notes in Theoretical Computer Science* v.242, n.1, pp. 73-98. Elsevier 2009.
- [ACCAT07] F. Bonchi and U. Montanari, G-Reactive Systems as Coalgebras. *Electronic Notes in Theoretical Computer Science*, v.203, pp. 3-17. Elsevier, 2008.
- [LIX] F. Bonchi and U. Montanari, A Coalgebraic Theory of Reactive Systems. *Electronic Notes in Theoretical Computer Science*, v.209, pp. 201-215. Elsevier, 2008.
- [GTVC06] F. Bonchi and T. Heindel, Adhesive DPO Parallelism for Monic Matches. *Electronic Notes in Theoretical Computer Science* v.175, n.4, pp. 51-61. Elsevier, 2007.

Edited Volumes

- [SIIES09] F. Bonchi, D. Gorla, B. Klin. Joint Special Issue of ICE, EXPRESS and SOS 2009. *Mathematical Structures in Computer Science* v.22 (2). Cambridge University Press, 2012.
- [ICE09] F. Bonchi, D. Grohmann, P. Spoletini and E. Tuosto. Proceedings of the Second Interaction and Concurrency Experience. *Electronic Proceedings in Theoretical Computer Science* v. abs/0912.0759. Elsevier, 2009
- [ICE08] F. Bonchi, D. Grohmann, P. Spoletini, A. Troina and E. Tuosto. Proceedings of the first Interaction and Concurrency Experience. *Electronic Notes in Theoretical Computer Science* v.229, n.3. Elsevier, 2009.

Submitted Papers

- [LICS14] F. Bonchi, D. Petrisan, D. Pous and J. Rot. Coinduction up-to in a fibrational setting. Submitted to *LICS14*
- [CMCS14] F. Bonchi, S. Millius, A. Silva and F. Zanasi. How to Kill Epsilons with a Dagger: A Coalgebraic Take on Systems with Algebraic Label Structure. Submitted to *CMCS14*
- [SCP13] A. Aristizábal, F. Bonchi, L. Pino and F. Valencia. Reducing Weak to Strong Bisimilarity in CCP. Submitted to *Science of Computer Programming*.
- [TOCL14] F. Bonchi, F. Gadducci and G.V. Monreale. A General Theory of Barbs, Contexts and Labels. Submitted to *Transactions on Computational Logic*.