

Some achievements

Paolo Penna

Below I report some of the results that have been obtained and that are related to the [research plan](#) I wrote in 2011.

Truthfulness and inapproximability. In [\[ACP12\]](#) we study the power of randomization in solving non-utilitarian mechanism design problems. We show that for certain (extremely simple) scheduling domains, randomized mechanism can compute the *exact* makespan, while a lower bound for deterministic ones is known. Further results show a separation between truthful-in-expectation and universally truthful (in one case players care only about their expected utility, in the other case they are more powerful and somehow know in advance the randomness used by the mechanism).

Collusion. In [\[MPW14\]](#) we investigate the existence of *bribeproof* mechanisms. These mechanisms guarantee that players cannot never benefit cheating or by bribing other players (i.e., by offering money to cheat). This work provides a rare example of such mechanisms, though for a restricted domain. Prior results show that bribeproofness is essentially impossible to achieve in more general domains.

Repeated games, mechanism design, protocol analysis. In [\[FP13\]](#) we investigate the robustness of best-response mechanisms to the players mistakes (or noise). The results show how assuming that players are never mistaken (fully rational) does affect the important properties that one typically desires: Convergence or self-stabilization, and incentive compatibility.

In [\[AFP+13\]](#) we study a classical noisy best-response dynamics in which the probabilities of making a mistake is related to the loss that the mistake causes the player. The focus of our work is on the *schedule* of the players moves and, in particular, the scenario in which all players update their strategies

simultaneously. The study of long-run equilibria and related mathematical tools provide an interesting characterization in terms of *social games*, roughly speaking, the situation in which players are nodes of a social networks and they only interact (play) with their neighbors.

References

- [ACP12] Vincenzo Auletta, George Christodoulou, and Paolo Penna. Mechanisms for scheduling with single-bit private values. *Proc. of the 6th Int. Symposium on Algorithmic Game Theory (SAGT)*, 2012. Journal version in *Theory of Computing Systems*.
- [AFP⁺13] Vincenzo Auletta, Diodato Ferraioli, Francesco Pasquale, Paolo Penna, and Giuseppe Persiano. Logit dynamics with concurrent updates for local interaction games. In *Proc. of the 21st Annual European Symposium on Algorithms (ESA)*, 2013. Journal version in *Algorithmica*.
- [FP13] Diodato Ferraioli and Paolo Penna. Imperfect best-response mechanisms. In *Proc. of the 6th Int. Symposium on Algorithmic Game Theory (SAGT)*, 2013. Journal version in *Theory of Computing Systems*.
- [MPW14] Matúš Mihalák, Paolo Penna, and Peter Widmayer. Bribe-proof mechanisms for two-values domains. Working paper, 2014.