A Mean Field Competition

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We introduce a mean field game with rank-based reward: competing agents optimize their effort to achieve a goal, are ranked according to their completion time, and paid a reward based on their relative rank. On the one hand, we propose a tractable Poissonian model in which we can describe the optimal effort for a given reward scheme. On the other hand, we study the principal–agent problem of designing an optimal reward scheme. A surprising, explicit design is found to minimize the time until a given fraction of the population has reached the goal, and the solution appears to be time-inconsistent.