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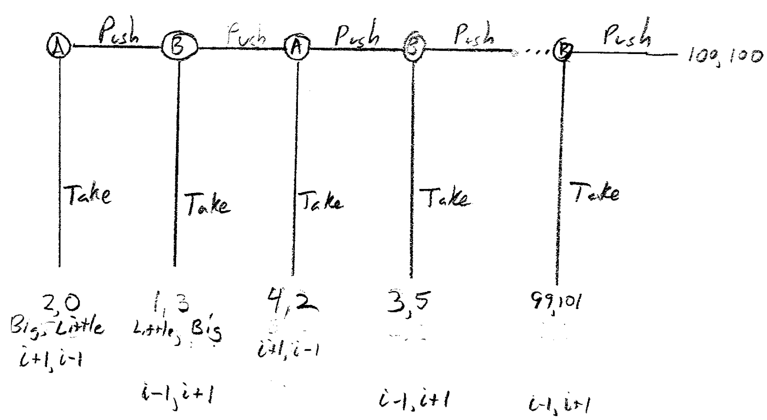
The Centipede Game

Consider the perfect-information game in the figure below, adapted from Rosenthal (1981, JET). Players A and B are seated at a table, and Player A has two plates in front of him, a big plate with one gold coins and a littler plate with no gold coins. He can take the big plate and get the coin on it, leaving the little plate for Player B, or he can push both plates across the table, in which case the referee will add one coin to each plate. In round 2, Player B can take the big plate and its 2 coins, or push both plates across the table, the referee again adding one coin to each pile. This continues until the 100th round, when if player B does not take the big plate and get 101 coins, leaving 99 for Player A, the referee splits the coins equally, each player getting 100 of them.

In the unique subgame perfect equilibrium, each player follows the strategy of always Take. The equilibrium outcome is for Player A to Take in round 1, for payoffs of (2,0). Yet in experiments people do Push for a while, to their benefit. Palacios-Huerta & Volij (2009, AER) survey the theoretical and empirical literature well. They found in their 6-round version of the Centipede Game that chess players do tend to Take early playing against each other, and Grandmasters *Always* Take in the first round. Playing against non-chess-players, though, even chess players choose Push more.

The lesson is that when games are iterated like this, common knowledge of the ability to do complicated inductive reasoning becomes very important to the result.



Palacios-Huerta, I. & Volij, O. (2009) "Field Centipedes," American Economic Review 99(4): 1619–1635.

Rosenthal, R. (1981) "Games of Perfect Information, Predatory Pricing, and the Chain Store," Journal of Economic Theory 25:92–100.