Losing to win

By I.P. (15-1-00)

It's a gift to born losers. Researchers have demonstrated that two games of chance, each guaranteed to give a player a predominance of losses in the long term, can add up to a winning outcome if the player alternates randomly between the two games.

This striking new result in game theory is now called Parrondo's paradox, after its discoverer, Juan M.R. Parrondo, a physicist at the Universidad Complutense de Madrid in Spain. Gregory P. Harmer and Derek Abbott of the University of Adelaide in Australia use a combination of two losing gambling games to illustrate this counter intuitive phenomenon in the Dec. 23/30, 1999 Nature.

The two games involve tossing biased coins. In the simpler game, the player gambles with a coin that's been loaded to make the probability of winning less than 50 percent. The second, more complicated game requires two biased coins. One of the coins wins slightly more often than it loses, and the other loses much more often than it wins. The game is set up so that even though the winning coin is tossed

Played repeatedly, each game on its own gradually depletes a player's capital. It turns out, however, that randomly switching between the games results in a steady increase in capital.

Alternating between the games produces a ratchet like effect. Imagine an uphill slope with its steepness related to a coin's bias. Winning means moving uphill. In the single coin game, the slope is smooth, and in the two coin game, the slope has a sawtooth profile. Going from one game to the other is like switching between smooth and sawtooth profiles. In effect, any winnings that happen to come along are trapped by the switch to the other game before subsequent repetitions of the original game can contribute to the otherwise inevitable decline.

"There are actually many ways to construct such gambling scenarios," Harmer and Abbott note. The researchers also suggest that similar strategies may operate in the economic, social, or ecological realms to extract benefits from what look like detrimental situations.

more often, that is outweighed by the much lower probability of winning with the other coin.

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