

Meeting: 1003, Atlanta, Georgia, AMS CP 1, AMS Contributed Paper Session

1003-90-590 **Klay T Kruczek*** (kruczekk@wou.edu), 345 Monmouth Avenue, Monmouth, OR 97361. *Pairing Strategy Draws in 2-player N^d Tic-Tac-Toe.*

We will discuss the N^d Tic-Tac-Toe game played on a hypercube of edge size N and dimension d . By the Strategy Stealing Argument, Player 2 can only hope for a draw in any fair game played on a hypergraph. We are not interested in when Player 2 can force any draw, but rather we want to know when Player 2 can force a *Pairing Strategy Draw* or *PSD*, where he pairs off a subset of the points so that each winning line in the game is assigned a pair of points. (Of course, the winning line must contain both points in the pair assigned to it.) Given a d , we want to know for which values of N does a PSD exist. Because we need the number of points to be at least twice the number of lines, the best one can hope for is that if $N \geq \frac{2}{\ln 2}d$, then a PSD exists. This roughly translates to $N \geq 2.8825d$. The previously best known result, shown by Beck, was $N \geq 4d - 2$. We are able to show if $N \geq 3d - \frac{4}{21}\sqrt{d} + 4$, then a PSD exists. To achieve this result, we find a fractional weighting of all point-line combinations, so that each point is assigned a weight of at most one and a line is assigned a weight of at least two. (Received September 23, 2004)