# 5.1.  PICK THE LARGEST NUMBER

Thomas M. Cover

Departments of Electrical Engineering
and Statistics
Stanford University
Stanford, CA 94305

Player 1 writes down any two distinct numbers on separate slips of paper. Player 2 randomly chooses one of these slips of paper and looks at the number. Player 2 must decide whether the number in his hand is the larger of the two numbers. He can be right with probability one-half. It seems absurd that he can do better.

We argue that Player 2 has a strategy by which he can correctly state whether or not the other number is larger or smaller than the number in his hand with probability *strictly greater than one-half.*

**Solution:** The idea is to pick a random *splitting number* $T$ according to a density $f(t)$ , $f(t) > 0$ , for $t \in (-\infty, \infty)$ . If the number in hand is less than $T$ , decide that it is the smaller; if greater than $T$ , decide that it is the larger.

**Problem:** Does this result generalize?  Does it apply to the secretary problem?