

Math Club talk, December 1, 2008

**YOU MIGHT GO HOME AGAIN: RECURRENCE
AND TRANSIENCE OF SYMMETRIC RANDOM
WALKS IN THE FIRST THREE DIMENSIONS.**

AL BAERNSTEIN

Suppose you start at the origin of the real line, toss a fair coin, then move one step to the right or left according as the coin falls heads or tails. Repeat the process, starting from your new position, then repeat again and again, ad infinitum. This process has evident analogues in all dimensions. What is the probability that you will ever return to your starting point? In particular, will you return with probability 1, or is there a positive probability you will never return? We'll see that the answer depends upon the dimension of the world you live in.

Typeset by $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$