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Random walks on binary sequences, classical fractals and groups

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Starting with an infinite sequence of bits $111\dots$, we repeatedly choose i at random from $1 \dots d + 2$ and switch the bit after the i -th 1.

The resulting random walk is recurrent when $d = 0, 1, 2$, and is transient for $d > 3$.

The graphs of this and closely related walks outline interesting fractals, such as the Sierpinski gasket, Julia sets of polynomials and some known deterministic analogues of long-range percolation graphs.

Our recurrence result and its more advanced cousins (*joint with G. Amir and O. Angel*) solve some open problems in group theory.