

RESEARCH STATEMENT

Original Creative Work

Citation: Noel Patson 2009, Recorded or Rendered Work, Web Exhibition, *Prime Walk* Wolfram Mathematica.

<http://demonstrations.wolfram.com/PrimeWalk/>

Research Background

In this demonstration a prime walk is depicted in 2 or 3 dimensions by walking straight ahead for each non-prime step and turning in the next direction out of a selected set of directions for each prime step. The path is coloured various hues along the way from beginning to end. You can select the number of possible directions and choose permutations of the directions when there are less than 9.

If 3D is selected so that a three-dimensional representation is presented then the "3D method for directions" pull-down menu allows for a choice of two ways of determining the set of possible directions in 3D. Usually the default of "SpringEmbedding" is the best choice, but for some bases, such as 9, 15 and 21 "SpringElectricalEmbedding" gives a better representation. When the base is less than 9, then permutations of the canonical ordering of the directions can be made with the "permutation of directions" slider.

Research Contribution

- Innovation – This presentation is the first time the prime numbers have been represented in this way. It is a fresh revelation of complex patterns arising from the application of simple rules on simple objects.

Research Significance

The demonstration has been through a rigorous review process[†].

[†] <http://demonstrations.wolfram.com/FAQ.html>

It is expected that the patterns arising from this visualization will reveal underlying properties of numbers and provide answers to long standing mathematical problems.

Author: Noel Patson

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