

HOT STREAKS: Sequence Overview

Summary of learning goals

To develop tests for randomness in order to distinguish between random and non-random results. Students use their understanding of randomness to investigate the existence or otherwise of the “hot streak” phenomenon in basketball.

Australian Curriculum: Mathematics (Year 9)

ACMSP226: Calculate relative frequencies from given or collected data to estimate probabilities of events involving 'and' or 'or'.

Summary of lessons

Who is this Sequence for?

This sequence is for students who are familiar with using spreadsheet programs to analyse data and who are ready to create their own methodologies to explore more complex datasets.

Lesson 1: Pick the Fake Data

Students choose between flipping a coin fifty times and recording the results or making up a fake sequence of “random” results. They then experiment with different statistical methods to find a strategy for identifying whether other students’ results are fake or truly randomly generated.

Lesson 2: Do Hands Get Hot?

Students learn about the hot hand phenomenon in basketball. Using their findings from Lesson 1: ‘Pick the Fake Data’, they explore different methodologies to prove whether the phenomenon exists.

We value your feedback after these lessons via our website.

Reflection on this sequence

Rationale

Randomness is a fundamental, but often misunderstood concept in statistics. Misunderstanding randomness lies at the heart of the gambler’s fallacy, which is the belief that if something happens more frequently than normal during a given period, it will happen less frequently in the future. This sequence looks at the reverse of this in the context of a hot streak in basketball—does success lead to more success?

reSolve Mathematics is Purposeful

- The sequence deals with the fundamental idea of randomness, which is essential for developing statistical reasoning.
- The sequence uses a very large data set to address a real-life problem of interest to sports statisticians.

reSolve Tasks are Inclusive and Challenging

- Students engage in a common activity of generating and analysing fake or random data as introduction to how large data sets might be analysed.
- Lesson 2 deals informally with the concept of conditional probability.

reSolve Classrooms Have a Knowledge Building Culture

- The use of spreadsheets allows students to compare data and make decisions about the randomness or otherwise of a given data set.

Further Reading

For discussion on appropriate methodology for testing the existence of the Hot Hand, see: Gilovich, Vallone & Tversky’s (1985) “The hot hand in basketball: On the misperception of random sequences”, Burns’ (2001) “The Hot Hand in Basketball: Fallacy or Adaptive Thinking?”, Korb & Stillwell (2003) “The Story of The Hot Hand: Powerful Myth or Powerless Critique”, Miller & Sanjurjo (2018) “Surprised by the Gambler’s and Hot Hand Fallacies? A Truth in the Law of Small Numbers”.

Eddie Woo’s book “Woo’s Wonderful World of Maths” (2018, Macmillan Publishers) discusses sequences of fake or random heads and tails in Chapter 18 “Conspiracy theory”.

Acknowledgements

The NBA data used in Lesson 2 is from basketball-reference.com.