TARRAGON

SEQUENCE

By **Arun Lakra**
Directed By **Andrea Donaldson**

January 3 – February 12, 2017 in the Mainspace
Opens Wednesday January 11, 2017

RESOURCE GUIDE

Prepared by Christine Kinghorn with consultation by Anne Wessels

SEQUENCE RESOURCE GUIDE

ABOUT THE PLAY

Character List

Dr. Guzman: Female. Fifties.
Theo: Male. Fifties.
Mr. Adamson: Male. Twenties.
Cynthia: Female. Twenties.

Play Synopsis

Do you believe in luck? A man successfully bets double or nothing on the Super Bowl coin toss for twenty years in a row. A professor races the clock on a ground-breaking discovery to cure the disease that is causing her own progressive blindness. Two fascinating stories intertwine like DNA, examining the interplay between science, faith, probability and luck.

DEFINITIONS

Probability Theory
Probability theory is the branch of mathematics concerned with probability, the analysis of random phenomena. It analyzes mathematical ideas of non-deterministic events or measured quantities that may either be single occurrences or evolve over time in an apparently random fashion. The outcome of a random event cannot be determined before it occurs, but it may be any one of several possible outcomes. The actual outcome is considered to be determined by chance. Blaise Pascal and Pierre de Fermat are considered the fathers of modern probability theory.

Siegmund, David O. "Probability Theory." *Encyclopedia Britannica*, 12 September, 2014.
    Web. 15 December, 2016. https://www.britannica.com/topic/probability-theory

Cerebral Palsy
Cerebral Palsy (CP) is a neurological disorder caused by a brain injury or malformation that occurs while a child's brain is under development. CP primarily affects body movement and muscle coordination. The type of movement dysfunction, the location and number of limbs involved, as well as the extent of impairment, will vary from one individual to another. Although CP is incurable, it is non-life threatening and with the exception of children born with a severe case. Treatment and therapy help manage effects on the body.

"Definition of Cerebral Palsy." *CerebralPalsy.org*. Web. 15 December 2016.
    http://www.cerebralpalsy.org/about-cerebral-palsy/definition

DNA

DNA is the molecule that carries the genetic instructions used in growth, development, functioning, and reproduction of all known living organisms, and many viruses. Most DNA molecules are made up of two strands coiled around each other to form a double helix. These strands contain nucleotides that form sequences that make up genetic information for that particular DNA segment. Scientists can gather important information from these sequences, for example, they may notice a change in a sequence that could indicate a genetic disease.

Watson and Crick

American Biologist James Watson and English Physicist Francis Crick first proposed the complex double helix model of DNA in 1953. This model continues to be used by scientists who have made only minor changes as they continue to discover more about the human genome.

Fibonacci Sequence

The Fibonacci Sequence is a series of numbers in which each number is the sum of the previous two. (0), 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144…etc. The ratio between any two consecutive numbers in the sequence is equal to the Golden Ratio, or 1.618. When put into visual form, the Fibonacci sequence takes the shape of a spiral. This sequence appears in math, art, and even nature. Evidence of the Golden Ratio goes all the way back to Ancient Egypt.

Embryonic Stem Cell Research

A stem cell is a type of cell that has the ability to renew itself or divide itself into many more cells just like it. Scientists use stem cells to repair or replace tissue in the human body, as the cells have the ability to heal. They are currently being successfully used to treat many kinds of disorders or diseases. Scientists hope that with continued research, they will soon be able to treat blindness and spinal cord injuries. These potential treatments are already in early stage clinical trials. One restriction of stem cells is that they are already mature cells, and are only programed to make the same kinds of cells as the place they were found (for example bone, heart, or brain cells). Embryonic stem cells, on the other hand, are formed 4-5 days after fertilization when they are early-stage preimplantation embryos, and therefore have not been programmed to a specific function yet. Scientists can manipulate the embryonic stem cells to fulfill whatever they might need it for. There has been resistance to the use of embryonic stem cell research because of the controversy it has created with the pro-life movement. Since many embryonic stem cells end up discarded through this research, it has been argued that destruction of a human embryo is destruction of human life. The debate is focused around the question of when human life actually begins. Is it the moment of conception, or is it later in development?

Higgs Boson

The Higgs Boson is a theorized particle that is said to be one of the fundamental particles responsible for the creation of the universe at the moment of the big bang. Scientists at CERN created the Large Hadron Collider in order to study the possibility of the Higgs Boson, and to attempt to recreate the big bang, on a very, very small scale. In 2012 scientists at CERN announced that they believe they had finally discovered evidence of the Higgs Boson, which is sometimes referred to as the God Particle because of its relationship to the formation of the universe.

Retinitis Pigmentosa
Retinitis Pigmentosa (RP) is one of the most common forms of inherited retinal degeneration. The disease causes severe vision impairment due to the progressive degeneration of the rod photoreceptor cells in the retina. Rod cells are almost entirely responsible for night vision, and are also necessary for peripheral vision. People with RP will first experience a loss of their peripheral vision, eventually leading to tunnel vision, and then blindness. There is currently no cure for RP, although there are many possible treatments currently being evaluated.

ADDITIONAL RESOURCES

The Drunkard's Walk: How Randomness Rules Our Lives
by Leonard Mlodinow

"Leonard Mlodinow vividly demonstrates how our lives are profoundly informed by chance and randomness and how everything from wine ratings and corporate success to school grades and political polls are less reliable than we believe.

By showing us the true nature of chance and revealing the psychological illusions that cause us to misjudge the world around us, Mlodinow gives us the tools we need to make more informed decisions. From the classroom to the courtroom and from financial markets to supermarkets, Mlodinow's intriguing and illuminating look at how randomness, chance, and probability affect our daily lives will intrigue, awe, and inspire".
"Leonard Mlodinow Books." (*Leonard Mlodinow.* Web. 15 December, 2016, http://leonardmlodinow.com).

Does God Play Dice?
A transcript from a lecture by Stephen Hawking

Hawking, Stephen. "Does God Play Dice?" *Stephen Hawking: The Official Website,* 2009. Web. 15 December 2016. http://www.hawking.org.uk/does-god-play-dice.html

"Hawking discusses whether the universe evolves in an arbitrary way, or whether it is deterministic. With laws of physics and math, is it possible that within in the universe,

there exists variables that are capable of leading it on unpredictable paths? Is the universe unfolding in a predictable way, or is God rolling the dice and seeing what comes up?" (Web. 15 December 2016. http://www.hawking.org.uk/does-god-play-dice.html).

ACTIVITIES

Beginning, Middle, End

Objective: To get students thinking about the importance or unimportance of order and sequence.

Materials: Pen and Paper for each student.

Directions:
1. Ask each student to write a short story with clearly labeled paragraphs representing the beginning, middle, and end.

2. Divide the class into small groups. Ask each group to read their stories to each other. When they are finished, they must pick one of the stories that they are going to act out.

3. Groups will act out the story, but they must do so in an order that is not beginning, middle, end. Give them time to rehearse, and ask them to try to create interesting transitions between their scenes.

4. When each group presents their scene, the audience will try to guess what order they told their story in.

Discussion:
Was it important to the story to be told in the correct sequence, or was the audience able to understand it out of order?

Dice Rolling

Objective: To introduce students to the concept of probability and its basic applications.

Materials: 2 dice (each a different colour)
        Paper
        Pencil
        Ruler
        Pencil Crayons (optional)

Directions:

1. Roll the dice 72 times, and record the sum of the two numbers each time in a chart with a column for each possible outcome (2 to 12), a column to keep a running tally of each outcome, and a column to write the final total of each tally.

2. Once this is done, transfer the results into the form of a bar graph where the x-axis equals the sum of the roll and the y-axis equals the frequency in which is occurred.

3. Discuss the results of your rolls. Do you see a pattern? What causes the pattern?

4. Calculate the probability of rolling each number. Probability equals the number of ways a single event can occur divided by the number of possible outcomes overall. For example, the number of ways that you could roll an 8 divided by the number of different results you could get in total. Remember that a red 2 and a blue 6 is different than a blue 2 and a red 6.

Discussion:
1. Did your results from the first experiment match the probability of rolling each number?
2. Where there any chance events or odd patterns that emerged from your experiment?

DISCUSSION QUESTIONS

Pre Show
1. What do you think makes someone lucky or unlucky?
2. Do you think luck is something that you can change?
3. Think of a moment in your life when you felt lucky or unlucky. Do you think it was earned, or that you did something to deserve it?
4. Are there common tasks that you do every day that have a regular sequence to them? Ex. Always washing your face before brushing your teeth. What would happen if you deviated from this pattern?

Post Show
1. How do you think these two moments in time are related?
2. Do you think one of these moments had to occur in order for the other to take place, or are they mutually exclusive? Which came first?
3. What do you think happens at the moment of the gunshot?
4. The play finishes by circling back to the way it began. Do you think it would occur in the exact same way if it were to continue on, or do you think there are variables that would change it?
5. Do you think Theo Adamson is the world's luckiest man?
6. Do you think there is a relationship between luck and superstition?
7. Dr. Guzman says that if you played every note in Beethoven's 5th symphony, it is no longer a symphony. Mr. Adamson believes that order is subjective. Can you think of

something in which the order is not subjective, and does not need an order or sequence to exist? Is there something you believe that an order is necessary for, and therefore would not exist without it?

8. What are some of the ways that sequence or order appears in the show either through text, movement, or the set.

9. If you were Theo or Dr. Guzman and could pose one question to your younger self, what would that be?