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Why Statistics Matter?

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The question of why statistics matter in science needs to be understood before its full implementation potential is unleashed.

The banner features the Explorable logo and the text 'Quiz Time!' in a white, handwritten-style font. Below this, there are three white-bordered cards on an orange background. The first card shows a pair of red roller skates on a wooden deck with the text 'Quiz: Psychology 101 Part 2'. The second card shows a fan of colorful pencils with the text 'Quiz: Psychology 101 Part 2'. The third card shows a Ferris wheel at sunset with the text 'Quiz: Flags in Europe'. To the right of the cards is a white button with the text 'See all quizzes =>'.

Scientific History

In the very early stages of development of science [1], starting with Kepler, Galileo [2] and Newton [3], scientific theories were not statistical in nature, but hard physical rules that had to be followed by all objects. Gravity, for example, was not a statistical phenomenon, but everything in the universe follows the laws of gravity.

However, even during an early time, there were scientific laws that were statistical in nature, most notably the second law of thermodynamics. The question of why statistics was involved in such a scientific law had puzzled scientists and philosophers alike.

For example, if I have a two chambered piston separated by a wall and have nitrogen on one side of the partition and oxygen on the other, you would know that if I remove the partition and wait for a long enough time, the composition will become homogeneous. You will not expect, for example, that the gases remain as they are or interchange their places. The reason for this is because such a phenomenon will be statistically too improbable to occur.

Modern Standing: Social Sciences

In today's scientific research [4], statistics is an integral part of physical sciences and social sciences. The question of why statistics is used in social sciences is easy to answer – most social phenomena are statistical in nature.

Thus, if a social scientist concludes that the people of America spend more time on the internet compared to people in China, it doesn't mean that every American spends more time on the internet than every Chinese. It simply means that on an average [5], an American spends more time on the internet than a Chinese.

Modern Standing: Physical Sciences

Statistics is also used in a number of areas of physical sciences. In communication devices, which are central to the technological revolution today, statistics is used to filter out noise and enable a better communication. The study of turbulent flow, such as in the wakes of airplanes, involves the use of statistical methods because the flow is chaotic. Most quantum mechanical phenomena are statistical by nature.

Students of science need to ask themselves why statistics is used in their disciplines and how they can learn and benefit from it. Statistical analysis provides credibility to a theory and is central to the general acceptance of most statements. Statistics also helps condense the data and present it in a manner understandable by everybody. Statistics today is central to almost all scientific disciplines.

Source URL: <https://explorable.com/why-statistics-matter>

Links

[1] <https://explorable.com/history-of-the-scientific-method>

[2] <https://explorable.com/galileo-galilei>

[3] <https://explorable.com/isaac-newton>

[4] <https://explorable.com/what-is-research>

[5] <https://explorable.com/arithmetric-mean>