

Prescribed Title 4: “Areas of knowledge always rely on a systematic process of trial and error to aid the production of knowledge?” Discuss this claim with reference to two areas of knowledge

However, a systematic process of trial and error only provides scientists with a high degree of certainty, not absolute certainty, which may not necessarily help make accurate predictions. While scientists aim to explain and predict how the universe works, natural phenomena occurs. A systematic process of trial and error helps eliminate inaccurate knowledge, but some aspects of the natural world cannot be accurately predicted. Scientific theories are not the truth, so they are scrutinised thorough investigation to verify their reliability¹. Through trials, experience is gained, which provides a better understanding of the natural phenomenon being studied². When shared amongst the scientific community, can contribute to other investigations. However, since nature is unpredictable³, it is hard to forecast the future. Through a systematic process of trial and error, geologists use inductive reasoning to create associations between primary factors, such as magnitude and seismic waves, to predict the occurrence and intensity of earthquakes. This process helps observations to form patterns and generalisation to make predictions⁴. However, this didn't beneficial during an Italian earthquake in 2009 that geologists could not predict, resulting in 300 deaths⁵. Alan Leshner, chief executive officer of the American Association for the Advancement of Science said, "There is no accepted scientific method for earthquake prediction"⁶. Geologists can calculate the probability of an earthquake. Still, they cannot verify its occurrence which is beyond their control, highlighting the limitations of knowledge gained through this process. Hence, a systematic process of trial and error may not be necessarily helpful in making accurate conclusions about the natural sciences due to the uncertainty of the universe.

¹ Gottlieb-Cohen, Sara. "Science Means Not Knowing." *Scientific American Blog Network*, Scientific American, 19 July 2019, blogs.scientificamerican.com/observations/science-means-not-knowing/.

² Gottlieb-Cohen, Sara. "Science Means Not Knowing." *Scientific American Blog Network*, Scientific American, 19 July 2019, blogs.scientificamerican.com/observations/science-means-not-knowing/.

³ Rosenthal, Seth, et al. "Is Nature Stable, Delicate, or Random?" *Yale Program on Climate Change Communication*, 15 May 2017, climatecommunication.yale.edu/publications/nature-stable-delicate-random/.

⁴ Bradford, Alina. "Deductive Reasoning vs. Inductive Reasoning." *LiveScience*, Purch, 25 July 2017, www.livescience.com/21569-deduction-vs-induction.html.

⁵ Duhaime-Ross, Arielle. "Manslaughter Conviction Overturned for Italian Geologists, but Other Scientists Are Still Fearful." *The Verge*, The Verge, 11 Nov. 2014, www.theverge.com/2014/11/11/7193391/italy-judges-clear-geologists-manslaughter-laquila-earthquake-fear.

⁶ *Can You Predict Earthquakes?*, 2018, www.usgs.gov/faqs/can-you-predict-earthquakes?qt-news_science_products=0#qt-news_science_products.