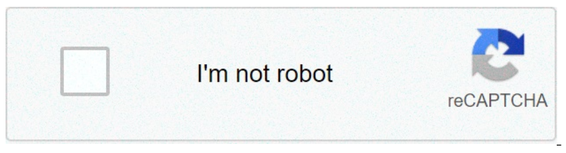


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# The logic of scientific discovery pdf

Image: Shutterstock In a world that seems to be at the mercy of "facts" that only support someone's preconceived notions of reality, perhaps we need less truthiness and more actual logic. The call is going out to all those who are compelled by logic and reason to step forward and give us all a grounded assessment of what needs to happen in the world today. If you're someone who rates high on the logic scale, you're the ideal choice to lead an organization or business through a difficult time. When emotion clouds judgment, and it seems like you're involved in a no-win situation, these are the moments where a totally logical person truly shines. You can gather information calmly until the logical conclusion presents itself. While there may be negatives and positives to all options available, you can find the solution with the optimal path for proceeding forward.Those who are more feeling-oriented will likely find your way of doing things to be cold, calculating and aloof. Similarly, you're likely to find their way of being in the world to be exhausting, illogical and extremely frustrating. After all, you've learned that you can't really argue with feelings, no matter how accurate your point of view actually is.Logically, there's a 74.9% chance that you'll proceed with this quiz if you've read this far. PERSONALITY What % Optimist Are You? 6 Minute Quiz 6 Min PERSONALITY Are You More of an Individualist or Collectivist? 5 Minute Quiz 5 Min PERSONALITY Are You a Good Friend? 5 Minute Quiz 5 Min PERSONALITY What % Outgoing Are You? 5 Minute Quiz 5 Min PERSONALITY What's Your Royal Name? 5 Minute Quiz 5 Min PERSONALITY What's Your 1789 Name? 6 Minute Quiz 6 Min PERSONALITY Are You a Millennial or Generation Z? 6 Minute Quiz 6 Min PERSONALITY What Core Superpower Should You Have? 6 Minute Quiz 6 Min PERSONALITY Are You Ruled by Your Ego or Your Soul? 7 Minute Quiz 7 Min PERSONALITY Are You Snobby, Introverted or Just Sad? 5 Minute Quiz 5 Min How much do you know about dinosaurs? What is an octane rating? And how do you use a proper noun? Lucky for you, HowStuffWorks Play is here to help. Our award-winning website offers reliable, easy-to-understand explanations about how the world works. From fun quizzes that bring joy to your day, to compelling photography and fascinating lists, HowStuffWorks Play offers something for everyone. Sometimes we explain how stuff works, other times, we ask you, but we're always exploring in the name of fun! Because learning is fun, so stick with us! Playing quizzes is free! We send trivia questions and personality tests every week to your inbox. By clicking "Sign Up" you are agreeing to our privacy policy and confirming that you are 13 years old or over. Copyright © 2021 InfoSpace Holdings, LLC, a System1 Company Back to Previous Page [PDF-533.56 KB] Details: urn:sha256:044e920b82a9e536d4a0410fb01e057ea1ef58cb06e0d9aedeed565f01ac0a34 By Brandon Specktor Scientists have uncovered an enormous fossil 'nursery' containing nearly 3,000 animal specimens from 518 million years ago, more than half of which are juveniles and babies. This section describes basic and clinical research activities supported or sponsored by the Federal government. Centers for Disease Control and Prevention (CDC) CDC conducts numerous epidemiologic studies to determine risk factors for incidence and progression of chronic kidney disease (CKD) and to research the burden of CKD in the general population and in special populations (e.g., mortality among people with CKD and incidence of kidney failure among people with diabetes, among other topics). CDC, in collaboration with the Veterans Affairs—Puget Sound Health Care System, is using CKD progression models to evaluate the natural history of the disease. The study aims to 1) estimate the rate of progression through the stages of CKD and the development of complications; 2) look at comorbidities and risk factors associated with disease progression and rate of progression to kidney failure; and 3) develop a comorbidity index to serve as prognostic tool in identifying CKD patients at high risk of progression to kidney failure. Contact Information Nilka Ríos Burrows, MPH, MT (ASCP) CKD Initiative Acting Team Lead CDC Division of Diabetes Translation Phone: 770-488-1057 Website: CDC's Longitudinal Study of Markers of Kidney Disease is a collaboration with the National Institute of Diabetes and Digestive and Kidney Diseases of the National Institutes of Health (NIH/NIDDK) to investigate using new kidney disease markers to diagnose early kidney function decline. The project aims to validate new kidney markers as early indicators of kidney disease to 1) improve diagnosis criteria for early kidney disease in high-risk populations; 2) advance prevention and treatment of CKD in patients with type 1 or type 2 diabetes, or elderly patients, for whom no current accurate marker of kidney disease is available; and 3) estimate the public health burden and trends of CKD. Contact Information Meda Pavkov, MD, PhD Phone: 770-488-1160 Website:  Last Updated: July 6, 2016 Food and Drug Administration (FDA) The FDA and the American Society of Nephrology (ASN) co-founded the Kidney Health Initiative (KHI), a public-private partnership, in 2012. The mission of KHI is to advance scientific understanding of the kidney health and patient safety implications of new and existing medical products and to foster development of therapies for diseases that affect the kidney by creating a collaborative environment in which FDA and the greater nephrology community can interact to optimize evaluation of drugs, devices, biologics, and food products. Details regarding mission and organizational structure of KHI may be found on the KHI website. Member organizations include patient organizations, professional organizations, regulated industry (including both pharmaceutical and device companies), dialysis providers, academic research organizations, contract research organizations, research institutes, and other government agencies. Voting activities of the Board of Directors includes the endorsement of projects proposed by the membership. Criteria for project endorsement are: Adherence to KHI mission Impact potential Feasibility. KHI projects rely on the participation and sweat equity of KHI members to produce the project deliverables, however membership is not a requirement for participation in KHI workgroups. Since its inception in 2012, the founding partners (FDA and ASN) conceived of the three pilot projects undertaken immediately by KHI. One project is designed to address the paucity of data that exist to guide the drug dosing of critically ill patients with acute kidney injury receiving continuous renal replacement therapies (CRRT). Another project is designed to elucidate appropriate endpoints for lupus nephritis trials. A final pilot project already underway is a white paper intended to identify barriers to innovation in the kidney health space. The intent is that the white paper may serve as a roadmap for future KHI projects that will be generated by the KHI members. While participation in KHI workgroups is not restricted to KHI members, KHI holds annual stakeholders meetings for its members where proposed projects ideas are discussed and developed. KHI members are also able to submit project proposals through the KHI website. The annual membership fees vary depending on the size and type of organization, ranging from $30,000/year to free. Contact Information Patrick Archdeacon, MD Medical Officer, Center for Drug Evaluation and Research Phone: 301-796-3952 National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) The Chronic Renal Diseases Program supports basic and clinical research on renal development and disease, including: (1) causes, pathogenetic mechanisms, and pathophysiology; (2) morphological and functional markers and diagnostic measures, including biomarkers; (3) underlying mechanisms leading to progression of renal disease; (4) functional adaptation to progressive nephron loss; (5) natural history of progressive renal diseases; and (6) identification and testing of possible therapeutic interventions to prevent development or halt progression of renal disease. Research in this program includes the primary glomerulopathies and renal disease from systemic diseases that collectively account for more than 80 percent of all cases of treated end-stage renal disease. Contact Information Kevin Abbott, MD, MPH Program Director, Division of Kidney, Urologic, and Hematologic Diseases Phone: 301-594-7714 Website: The Chronic Renal Insufficiency Cohort (CRIC) Study is an ongoing prospective observational cohort study of approximately 4,000 men and women with chronic kidney disease (CKD). The study population includes about one-half African Americans and one-half is composed of persons with diabetes; two subgroups at increased risk for kidney failure (end-stage renal disease-ESRD). The objective of this nationwide study is to identify factors associated with rapid decline in kidney function and factors associated with worsening of pre-existing or development of cardiovascular disease. Information from the study will be used to plan future clinical trials to slow the progression of CKD and to reduce associated morbidity, including cardiovascular disease. The first cohort of CRIC Study participants, which included persons with mild to moderate CKD, were enrolled from 2003 to 2008. They are followed each year with in-person clinic visits with an interim telephone call. In July 2013 recruitment began for a second cohort (1,500 participants) of study participants with more preserved kidney function. All study participants will be followed until 2018 and possibly longer. A number of ancillary studies have been conducted (and many are ongoing) which examined a broad range of outcomes and risk factors of CKD. New ancillary studies continue to be implemented. Contact Information Kevin Abbott, MD, MPH Program Director, Division of Kidney, Urologic, and Hematologic Diseases Phone: 301-594-7714 Website: www.cristudy.org The CKiD study examines CKD progression and its effects in children recruited between ages 1-16. It aims to determine risk factors for progression of pediatric CKD and to examine the impact of CKD on neurocognitive development, risk factors for cardiovascular disease, and growth. The current phase of the study is scheduled to end in 2018. A description of the baseline characteristics of the cohort has been published by in the Clinical Journal of the American Society of Nephrology. Another manuscript summarizing findings through 2012 is published in the American Journal of Kidney Disease. This study has had more than seventy publications to date. Contact Information Ziya Kirkali, MD Program Director, Division of Kidney, Urologic, and Hematologic Diseases Phone: 301-594-7718 Website: www.statepi.jhsph.edu/ckid Veterans Affairs (VA) The VA is a major sponsor of scientific research in the United States; the VA research budget in 2013 was $581 million which supported a renal research portfolio of $19.1 million. The VA Cooperative Studies Program (CSP) is an arm of the VA research program that conducts multisite clinical trials examining issues important to Veteran health. For nearly two decades the VA CSP has been continuously conducting clinical trials in kidney related research, the results of which have been published in high impact journal such as the Journal of the American Medical Association (JAMA) and the New England Journal of Medicine (NEJM). Contact Information VHA National Kidney Program Website: This information was reviewed by KICC agency representatives. It may not reflect new or future agency activities. For more information, please contact the listed representatives. 1 Here's How a Genderless Virtual Assistant Is Undoing Gender Bias in Artificial Intelligence 2 How to Celebrate Independence Day Safely During the COVID-19 Pandemic 3 How Many Cups Are There in a Quart of Water? 4 Surprising Facts About Jackie Kennedy, America's Savvy First Lady 5 What Is Maslow's Hierarchy of Needs — & What are Its Advantages & Disadvantages? Deductive reasoning: The ability to come to a conclusion as based on a premise; deductive reasoning arrives at deductions that a deduced as based on a premise. Inductive reasoning: The ability to draw a generalization from a set of facts; inductive reasoning arrives at inferences that are inferred from a set of facts or observation. Abductive reasoning: Reasoning that is a type of inference that moves from observations and data to a hypothesis. Divergent thinking: This thinking focuses on the generation of multiple, creative solutions, rather than one "right" solution or answer to the problem, issue or concern. It is often referred to as "thinking out of the box" and inductive thinking. Convergent thinking: This thinking aims for a single, "correct" solution to a problem. It is not creative, but instead, this thinking is based on an established rule or principle. Convergent thinking is similar to analytical or deductive thinking with the left, or analytical, side of the brain. Critical thinking: Deep reasoning that facilitates the best decisions and to solve complex issues and problems Data: Pieces of information Empirical data: Data that is collected with one or more of the senses; data that is seen, heard, smelled, touched and/or tasted. Bias: An error in research that occurs as the result of some faulty research design, some faulty sampling technique or some faulty measurement. Bias is NOT intentional; it is an inadvertent error that has to be prevented to the greatest extent possible. Sample selection bias: A type of basis that which includes the inclusion or exclusion of some subjects in the sample Measurement bias: A type of basis which occurs when the researcher uses a measurement tool that is not consistent with the research question or hypothesis and/or the researcher inaccurately collects data Interviewer or researcher bias: A type of basis which occurs when the researcher inadvertently creates bias when they inject their own opinions, values, beliefs and even very subtle, nonverbal body language cues into the interview process. Design bias: A type of basis that occurs when the design of the study has inherent bias Response bias: A type of basis that occurs when the subjects of the research study answer a questionnaire or interview questions, for example, according to what they think the researcher wants to hear, rather than their own true beliefs and opinions Reporting bias can occur when the researcher errs in terms of how the results of the research are disseminated to others Conclusion: An inference or deduction Experiment: Scientific inquiry with the manipulation of a variable There are many ways of knowing including logical reasoning and alternative ways of knowing like intuition. In this section, you will learn about logical thinking and NOT alternative ways of knowing. Some of the logical ways of thinking and reasoning are: Deductive reasoning Inductive reasoning Convergent thinking Divergent thinking Critical thinking Deductive Reasoning Deductive reasoning, simply stated, is the use of our ability to come to a conclusion as based on a premise, fact or truth; deductive reasoning moves from the general to the specific or cause to effect. Deduction, or deductive reasoning, is accurate and highly useful when the facts, truths, or premises that it is based on are accurate and true. Faulty deduction occurs when one or more of the premises, truths and/or facts are faulty, inaccurate and/or not true. For example, a person may accurately conclude that it will rain when they hear thunder in their immediate geographic area and they see a black sky over head or when they conclude that their child is sick when their skin is warm, they have a temperature and they are sleepy. On the other hand, these conclusions would not be accurate when their eyeglasses are dirty and this makes the sky above look black when it is not and when the thermometer is broken and not taking an accurate temperature. Again, deductive reasoning is accurate and highly useful when the facts, truths, or premises that it is based on are accurate and true; and faulty deduction occurs when one or more of the premises, truths and/or facts are faulty, inaccurate and/or not true. Inductive Reasoning Inductive reasoning, in contrast to deductive reasoning, is the use of our ability to draw a generalization and inferences from a set of facts. Inductive reasoning moves from the specific to the general and this type of reasoning is used when a person is looking at, or observing, a problem, or phenomenon to determine why this problem or phenomenon is occurring. For example, if you repeatedly observe that your infant is crying incessantly despite all of your efforts like feeding and changing the infant, you will want to discover why this infant continues to cry. You may conclude that, for some reason, the infant may possibly be in pain. Abductive Reasoning Abductive reasoning is a type of inference that moves from observations and data to a hypothesis. Divergent thinking is the opposite of convergent thinking. Divergent thinking concentrates on the development of multiple, creative solutions, rather than one "right" solution or answer to the problem, issue or concern, and which is the focus of convergent thinking. Divergent thinking is often referred to as "thinking out of the box" and as inductive thinking because inductive reasoning is often used for divergent thinking. Divergent thinking uses the right, or creative, side of the brain. Convergent Thinking Convergent thinking aims for a single, "correct" solution to a problem. It is not creative, but instead, this thinking is based on an established rule, conventional thought or principle. Convergent thinking is the opposite of divergent thinking. Convergent thinking is used with deductive reasoning and it uses the left, or analytical side, of the brain. Critical Thinking Critical thinking is best described as deep contemplation and thought that is often needed to solve complex issues and problems. Critical thinking entails lots of questioning with 'why', 'how', 'what-else', and 'what-if' questions to explore options and solutions to these complex and difficult problems and issues. Logic and Reasoning Logical reasoning uses the intellect to examine statements and arguments to arrive at some conclusion which is using deductive reasoning, rather than inductive reasoning. Abductive reasoning, very different from deductive reasoning and somewhat different from inductive reasoning is a type of inference that moves from observations and data to a hypothesis. Data Simply stated, data is information. Data is collected and analyzed for scientific experiments and other research. Data is often classified as empirical data. Empirical data is data that is collected using one of the senses which include the sense of: Sight Hearing Smell Taste Touch Bias Bias is an error in research that occurs as the result of some faulty research design, some faulty sampling technique or some faulty measurement. Bias is NOT intentional; it is an inadvertent error that has to be prevented to the greatest extent possible. The types of bias are: Sample selection bias which includes the inclusion or exclusion of some subjects in the sample Measurement bias which occurs when the researcher uses a measurement tool that is not consistent with the research question or hypothesis and/or the researcher inaccurately collects data Interviewer or researcher bias which occurs when the researcher inadvertently creates bias when they inject their own opinions, values, beliefs and even very subtle, nonverbal body language cues into the interview process. Blind research design helps to avoid this bias Design bias occurs when the design of the study has inherent bias Response bias occurs when the subjects of the research study answer a questionnaire or interview questions, for example, according to what they think the researcher wants to hear, rather than their own true beliefs and opinions Reporting bias can occur when the researcher errs in terms of how the results of the research are disseminated to others RELATED TEAS SCIENTIFIC REASONING CONTENT Alene Burke RN, MSN is a nationally recognized nursing educator. She began her work career as an elementary school teacher in New York City and later attended Queensborough Community College for her associate degree in nursing. She worked as a registered nurse in the critical care area of a local community hospital and, at this time, she was committed to become a nursing educator. She got her bachelor's of science in nursing with Excelsior College, a part of the New York State University and immediately upon graduation she began graduate school at Adelphi University on Long Island, New York. She graduated Summa Cum Laude from Adelphi with a double masters degree in both Nursing Education and Nursing Administration and immediately began the PhD in nursing coursework at the same university. She has authored hundreds of courses for healthcare professionals including nurses, she serves as a nurse consultant for healthcare facilities and private corporations, she is also an approved provider of continuing education for nurses and other disciplines and has also served as a member of the American Nurses Association's task force on competency and education for the nursing team members. Latest posts by Alene Burke, RN, MSN (see all)