

CHAPTER 1: THE NATURE AND COMPLEXITY

Key Concepts:
Science; Non-Science, Pseudoscience; Scientism; Knowledge types; Institution;
Authority; Tradition; Religious Beliefs; Myth; Common-sense knowledge; Science
as Ideology; Science as Proven knowledge; Science as pragmatic and progressive
value;

Exercise 1.1

Instruction

1. Science + is the systematic and logical approach in discovering how things are and also a study of reality.
2. * Non-Science - this is a system of information, methods, beliefs, predictive techniques and hypothesis that uses technical skills to do transformation and does not use nor observe Scientific methods.
3. * pseudoscience - A body of knowledge that purports to be Scientific or to be supported by science but fails to comply with Scientific method.
4. * Scientism - the belief that the Scientific method and the assumptions and research methods of the physical Sciences are applicable to all other disciplines and to others that are not valuable.
5. * Knowledge types
 - A posteriori knowledge - This is a type of knowledge we get directly from our own personal experience.
 - Empirical knowledge - A type of knowledge obtained through the senses.
 - A priori knowledge - A type of knowledge and facts that exist without the need to experience it.
- * Institution - An establishment, foundation, phenomenon or fact founded for a purpose.
- * Authority - and ethical concept to recognize an influence of a person, closely related to the notion.
- * Tradition - this refers to the doctrine, modes of conceptualization and practices passed down to one another.
- * Religious beliefs means the nature, concepts, arguments and practices of religious adherents in an article of faith.

- 10 * Myth - A Symbolic narrative or legendary story usually of unknown origin of a hero or event that is especially associated with religious belief or phenomenon.
- 11 * Common-Sense Knowledge - Unifies and synthesizes our sensation to give sense awareness or consciousness to our perceptions, common beliefs, opinions and ~~science as ideology~~ certainties.
- 12 * Science as Ideology - It is said to be an open system embedded in society and linked by a dense feedback loop which is powerfully influenced by external environment and shaped by cultural receptivity to dominant ideas which are the scientific hypothesis, theories and metaphors made by the scientist.
- 13 * Science as proven knowledge - Science was said to be a non-proven knowledge, but as time went on, faiths in and reputation in science lay in the belief that it is a proven knowledge as against mere given of the sense and intellect. And as it is said criticism is anathema. Looking at how Einstein's relativity theory turned the table against good aspect of the glory of Newton. Today Scientist still think that Scientific knowledge can be a proven knowledge.
- 14 * Science as pragmatic and progressive value - They tend to patronize keep what we call non-science because of the pragmatic value and utility in their daily and existential life. So those who would equate science to non-science, claim the science superiority to what is non science lay not in being true or more sound knowledge but in being more progressive and pragmatic and efficient in solving problems.

Exercise 1.2

Give two senses of the word science

1: Science is said to be a method for acquiring knowledge or studying and understanding the world.

2: Science is also seen as an institution comprising thousands or millions of experts engaged in development of human knowledge in various research centers and educational institutions.

Exercise 1.3

List kinds of knowledge

Factual knowledge

Conceptual knowledge

Procedural knowledge

Metacognitive knowledge

Exercise 1.4

List sources of knowledge

Experience

Imagination

Estimation

Reasoning

Observation

Intuition

Scientific empiricism

Authority

CHAPTER 2: SCIENCE: FEATURES AND METHODS

Key Concepts

Objectivity; Verifiability; Ethical Neutrality; Systematic Exploration; Reliability; Precision; Accuracy; Abstractness; Predictability; External World; Physical Laws; Uniformity of Nature; Simplicity (values in science); Hypothesis; Observation; Experiment; Trial and Error; Statistical Method; Sampling; Inductive leap; limitations of Method in Science;

Exercise 2.1

- 1 Instruction **Objectivity** :- this means the capacity to see and accept facts and figures as they are.
- 2 **Verifiability** :- data gathered through our sense organs, so that other observers can observe, weigh or measure the same phenomena for its accuracy.
- 3 **Ethical Neutrality** :- means that one must not allow his values to distort the design and conduct of his research.
- 4 **Systematic exploration** :- A certain sequential procedure or an organised plan or research for formulation of hypothesis, and collection and analysis of fact about the problem under study.
- 5 **Reliability** :- means that a scientific knowledge can or must be dependable and reproducible under any circumstances at any time or anywhere.
- 6 **Precision** :- means giving exact number or measurement for any scientific information. It should not be vague.
- 7 **Accuracy** :- this means truth or correctness of a statement or describing things in exact words as they are without jumping into unwarranted conclusions.
- 8 **Abstractness** :- this means a theoretical way of looking at things, something that exists only in idealized form, just like an abridgement or summary.
- 9 **Predictability** :- means an attempt to explain as a result of complexity of the subject matter and inadequacy of control.

10. External world :- The world consisting of all the objects and events which are experienceable or whose existence is accepted by the human mind and independent of human consciousness.
11. Physical laws :- These are statements of a fact that a particular phenomenon is certain under conditions surrounding it and can be detected by observation and experiment.
12. Uniformity of Nature :- Is the principle that the course of nature continues uniformly the same.
13. Simplicity :- This is a meta-scientific criterion by which Scientist evaluate competing theories for complexity of hypotheses and complexity of things.
14. Hypothesis :- means a tentative guess/statement which guide the process of Scientific research, analysis and classification on a problem.
15. Observation :- this is a careful study of causal sequences and situations for a verified result.
16. Experiment :- the provision of necessary evidence through the selection of appropriate analytic process of Scientific sampling techniques.
17. Trial and Error :- means the test ideas of hypothesis and system of thought for coherence, factual and logical consistency.
18. Statistical method :- the science of collection, analysis and classification of numerical data as a basis for induction.
19. Sampling :- Is the method in which we take the nature of certain materials as an indication or example.
20. Inductive leap :- for it to be examined for accuracy.
21. Inductive leap :- this means when a specific observations is used as a basis for a general conclusion which are mostly used through experimentation.
22. Limitations of method of science
- * the Sciences cannot prescribe values
 - * the Sciences are dependent upon man's sense organ
 - * the whole may have qualities absent in the parts
 - * there may be many interpretation concerning a research

Exercise 2.2

List 9 Features of Science

- Objectivity
- Verifiability
- ethical neutrality
- systematic exploration
- Reliability
- precision
- Accuracy
- Abstractness
- predictability

Exercise 2.3.

Enumerate 5 Assumptions of Science

- the existence of a theory Independent, external world
- the orderly nature of the external world
- the knowability of the external world
- the existence of truth
- the laws of logic

Exercise 2.4

Outline the Steps of Scientific Method.

0. Identification or awareness of a problem
1. Collection of available data
2. Observation will be done on the research
3. Hypotheses (what the results will likely be)
4. Analyzing the data
5. Conclusion/Verification on if the experiment is true