

# Thinking like a Researcher

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In the medical discipline, the sphere of knowledge encompasses a vast arena of health and clinical presentations that form a distinct picture, which varies with each person's individuality. Furthermore, advancement in pharmacology instrumental technology, social sciences and public health, make this a never-ending story. Our attitudes towards matters are partially dependent upon how we acquire knowledge about them. There are two distinct ways of acquiring knowledge that is around us, especially about professional research in medicine <sup>1</sup>. Styles of inquiry have a very long-term impact on our personality and intellectual development. Each piece of information eventually guides us to appraisal and forming opinions.

An expectant mother was admitted to a hospital in an active labour state. Two of the residents rushed towards the patient to help her. Resident A noticed that the woman was in a severe condition and was suffering. To give her reassurance, the resident held the patient's hand firmly and consoled her. She could understand that the poor lady had been in terrible pain for quite sometime. While Resident B, after observing the apparent condition of the patient, quickly examined her. The patient was in obstructed labour and she was immediately shifted for a cesarean section.

All engaged style of inquiry requires a subjective human communication between self and the object of inquest. Opinions are formed with distinct emotional colours. This pattern of knowing is more a representative of us as human beings e.g.,

- \* The patient is uncomfortable.
- \* The newborn is normal.

An analytical style of inquiry requires objective vision and manipulation to gather knowledge. Tills is a systemic effort to develop an understanding of the phenomenon. This style enables us to form opinions with a minimal content of personal biases. This pattern of knowing is more a representative of us as intelligent beings e.g.,

- \* The patient has a temperature of 104°F.
  - \* The newborn has a birth weight of 2.9kg and APGAR score is 9, with no obvious congenital defects.
- For scientific understanding and expression, the learning of the analytic style of knowing is crucial. On the other hand engaged style generates interest in the theme and provides emotional reasons to carry out analytical style of knowing. A conscious awareness is important, regarding the style of learning so that it could be directed towards scientific inquiry more

**Moral:** Be opinionated, but with evidence

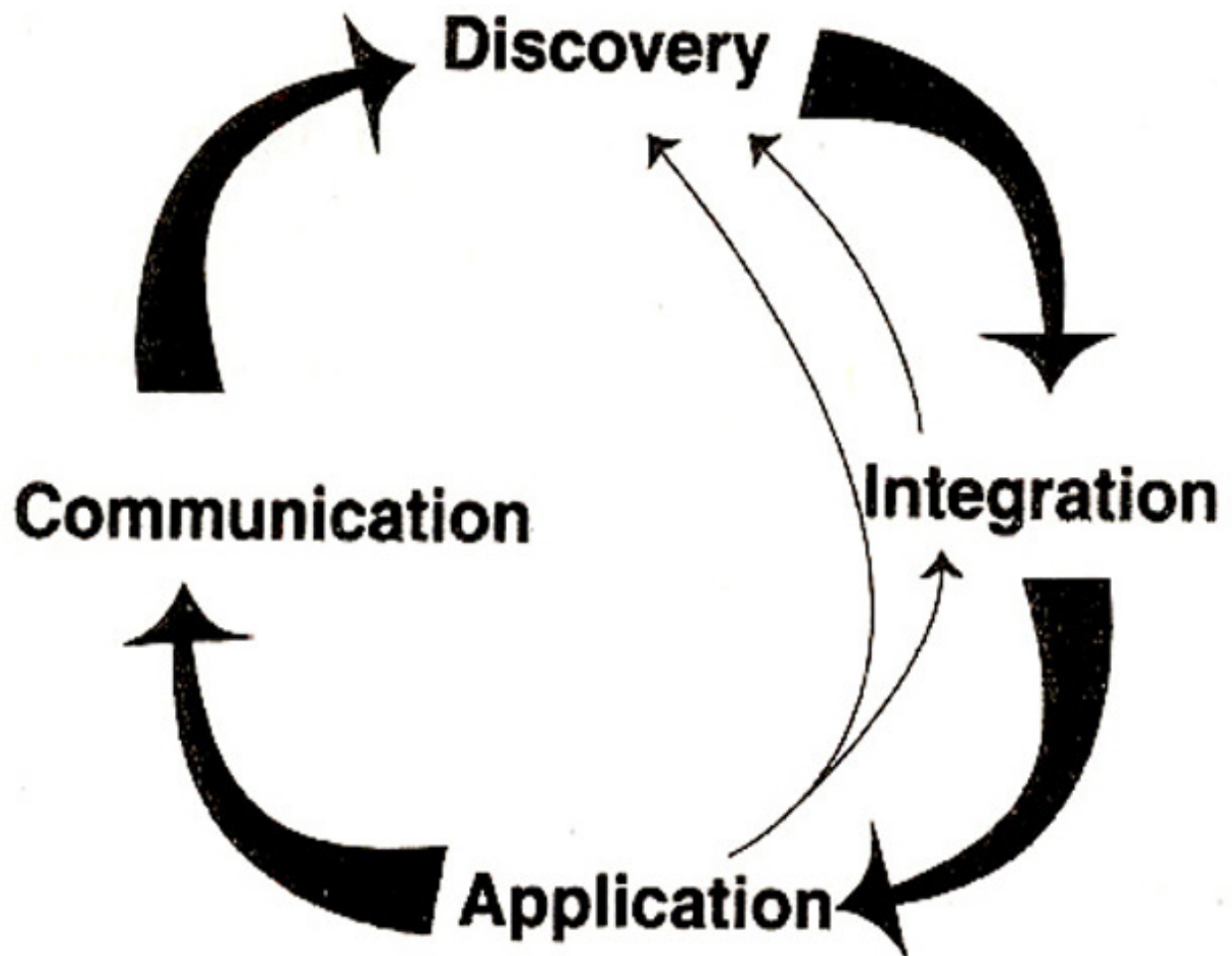
Explaining the horizon of knowledge is the prime objective in the fields of both philosophy and science. Both work to comprehend reality but with altered approaches. Philosophers try to understand the purpose and process of life through intuition, logical reasoning cogitation, abstraction and self—questioning. They inquire through literary criticism. They serve to answer metaphysical questions

What is right or wrong?

What is meant by life?

What is society?

According to Karl Marx (1818-83) "Philosophers have only interpreted the world, the point is to change it." Here comes the domain of the scientific researcher who observes reality through refining research topics, developing hypotheses and conducting experiments to establish scientific laws.



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**Figure 1. Continuum of distinct scholarly activity in medical research.**

Their discoveries then empower human beings to change the world around them. They serve to answer empirical queries.

Is socioeconomic deprivation a risk factor for depression?

Is there agreement between temperature measured at the mouth, axilla or rectum?

Traditionally scientific research in medicine involves a process of discovery. However, currently scientific research is viewed from two major perspectives. Basic research is carried out to improve the status of knowledge, and involves discovery and integration of the findings.

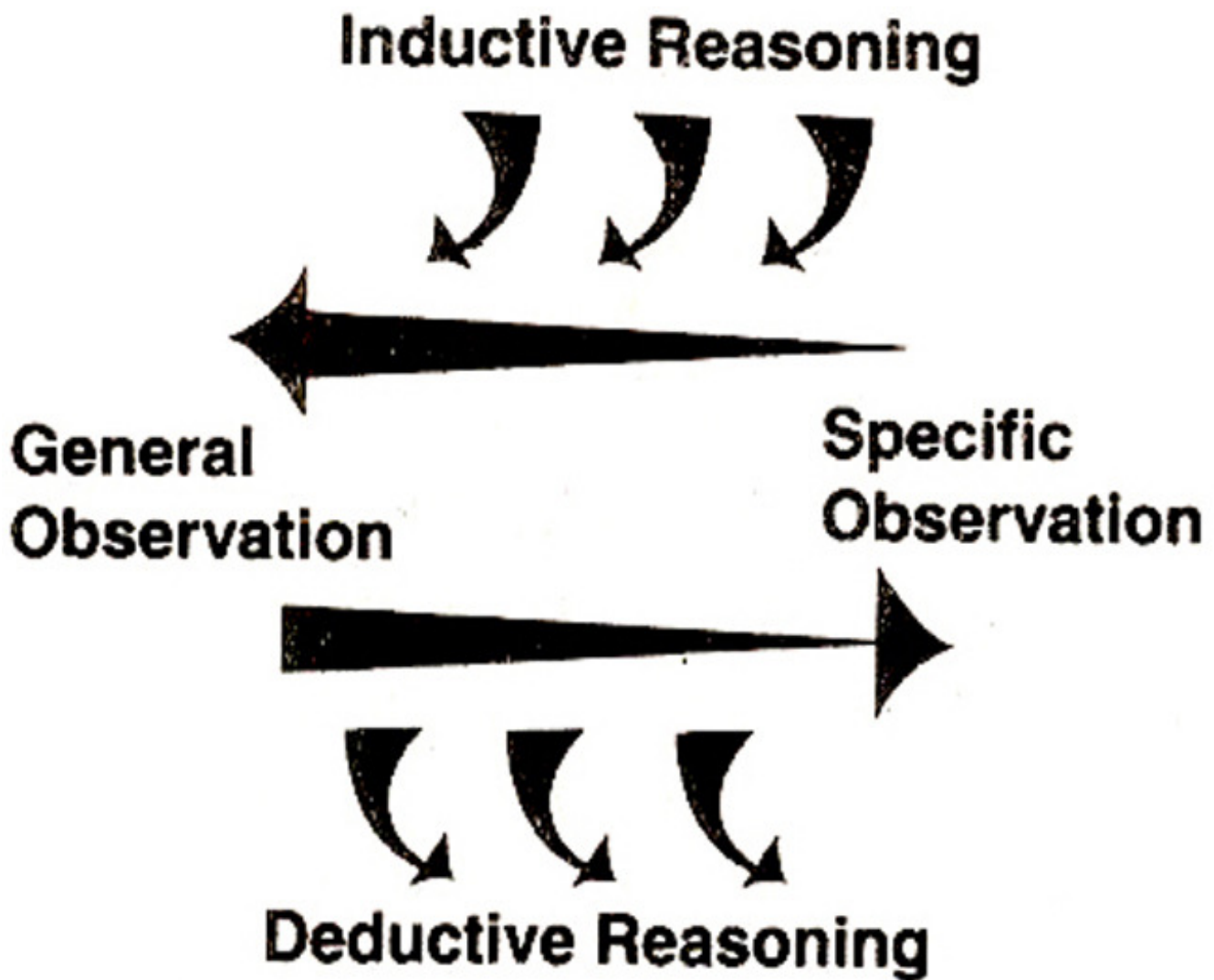


Figure 2. Deductive vs inductive reasoning.

Applied research is to utilize the knowledge to solve problems and involves the application and communication of the research<sup>2</sup>.

The process of discover, involves different sets of interactions among the spirit of curiosity, flexibility, receptiveness in attitudes and sometimes existence of problem<sup>3</sup>. The discovery is a continuous process, and not a onetime stagnant landmark. It is like those thirsty travelers who first thought they had discovered water in the desert. Upon reaching that point, they found there was no water. That miracle was called a “mirage”. It was explained as a phenomenon related to optical illusion. However, this explanation was challenged later on. Instead of an illusion, it was termed a real physical phenomenon created by resistance to light by warm and cold airwaves<sup>4,5</sup>. Discovery should not be considered as the ultimate truth. Such kind of regimented pretensions in research thinking and methodology would not only produce a mental block, but also discourage an investigative urge in us.

The Curies discovered radium in 1898.

Radium emits alpha and beta radioactive waves, which can damage human tissue.

First use of radium salts was in the “lurninizing industry” for painting clocks and watch dials.

In the 1920’s it was observed that sarcoma and bone ailments are common among the workers of that

industry.

Even though the above facts are important, they are also scattered and require some integration or connectedness for verification through cross-referencing of facts to build a comprehensive idea. It is like small pieces of a jigsaw puzzle, each one having a picture of a different house on it but unless you unite all of them, you never know how the complete city will look like. This kind of synthesis brings together different disciplines and gives new meaning to the findings and a comprehensive understanding of scientific phenomenon is developed.

Workers in the “luminizing industry”, were in the habit of swallowing radium containing paints, while correcting the tip of the paint brush with lips.

Tile swallowed radium got deposited in the bone and its continuous radioactive emanation by alpha particles resulted in disease related to bone and bone marrow.

Application of phenomenon that has been discovered and integrated to solve tile problem, is also a specialized field. Tile clinical relevance and study of that phenomenon in real life situations not only justifies its practical use, but also raises concerns for further curiosity for discovery and integration to improve basic knowledge.

After the Second World War, special protective measures were introduced in the “luminizing industry e.g., glass screens, exhaust ventilation, rubber apron and gloves. Furthermore, pens and solid applicators were brought into use to replace brushes<sup>6</sup>.

To achieve the ultimate aim of medical research, the findings should reach the consumer in a comprehensive and understandable form. Effective communication of medical research keeps that continuity of knowledge intact and provides inspiration to fellow researchers. Transformation of medical findings into a consumer friendly and accessible package is important for the extension of knowledge, along with proper advocacy to raise the awareness.

**Moral:** Discovery, integration, application and communication are classifications of research on the basis of distinct scholarly activities involved.

It is clear that philosophy and scientific research are two different and distinct disciplines, but deep down at the genesis level both show commonalities and are more receptive to each other's ideology. In philosophy, Epistemology deals with how people develop knowledge of the external world<sup>7</sup>. Its concept of Empiricism is very much acceptable in the scientific world, and holds a strong basis for medical research. This doctrine is based on the supposition that the only source of knowledge is experience. So an empirical statement is that which can be tested by evidence drawn from experience.

The patient has a blood pressure of 140/90.

Ethanol is a colourless, inflammable liquid of density 0.789 and is used for antiseptics.

Again, the testing of scientific evidence is based on the philosophical pattern of thinking. Logical Reasoning is systematic - formally thought out purposive answers questions used in scientific and sociological research. They commonly form the basis for the clinical problem solving and unknowingly they are very much a part of our daily life conjunctures. There are two main methodologies of logical reasoning: deductive and inductive<sup>8</sup>. Deductive reasoning is a specific statement of observation, that is extracted or deduced from a general statement of observation or theory. In fact it is the direct application of available knowledge to generate new one.

Corticosteroid inhibits the inflammatory process in body tissue.

Inflammation occurs through destruction of body tissue in rheumatoid arthritis.

Corticosteroid therapy inhibits the progression of rheumatoid arthritis by its anti-inflammatory action<sup>9</sup>.

Inductive reasoning is a statement of small specific observations, identified as reflections of large general observation. It is a process of identification of common traits amongst phenomenon. The probability of statement of specific observation is increased by accumulation of favourable evidence. The new knowledge is confirmed by the available knowledge.

Use of corticosteroid results in reduction of inflammatory process in rheumatoid arthritis.

Corticosteroid utility also inhibits other anti-inflammatory conditions in the body tissue. Corticosteroid inhibits the inflammatory process in body tissue.

In inductive reasoning, the premise or context of the problem is derived from specific observations, so that the probability of truth of general statement would be higher as long as it is made within that specific context. While in deductive reasoning the premise or context of the problem is derived from the general statement, so the probability of the truth of specific statement would be high as long as it is made within that general context. For example, if somebody has seen people with black coloured eyes, then his comments would be that human eye colour is always black. His statement is justified as long as he does not discover people with different eye colours. So the generalization is made only on the basis of accumulated evidence which form the premise.

Acquisition scientific thinking skills require deliberate effort and time. The emphasis should be on understanding and learning skills rather than ranking them. In scientific research every pattern of thinking has significant utility but with certain limitation. These limitations are responsible for creating uncertainties in knowledge and eventually in the medical profession. However our focus should be on how we can fully utilise these thinking strategies to achieve our research goals.

**Moral:** Knowledge rests not upon truth alone, but upon error also. - Carl C. Jung

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