Fourth lecture

Basics of scientific research

The goal to be achieved:

- The learner should be able to distinguish between various concepts related to the field of scientific research

-Preface

- - Inference
- - Extrapolation
- - Deduction

-Conclusion

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Fourth lecture

Introduction:

Conducting reliable scientific research requires following successive steps arranged in a logical, sequential order, in order to guarantee the researcher a satisfactory result. So the researcher must know these steps. He is trained to implement and master it with the aim of organizing effort with the best capabilities and using the best and most modern means, in addition to investing time in what is useful and helpful.

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A- Inference:

Linguistically: It is the request for evidence, and in custom it is used to establish evidence in general, from text, consensus, or otherwise, for a special type of evidence.

It was said that according to the custom of scholars, it is the reporting of evidence to prove the meaning, whether the effect is to the effect or vice versa. Al-Jurjani said: Inference is the reporting of evidence to prove the meaning, and the evidence in language is: the guide to what is desired.

As for reasoning: it is the inference of an unknown proposition from one or several known propositions, or it is arriving at an unknown attestative judgment by means of a known attestative judgment, or by observing two or more known attestative judgments, and some of them defined it as: proof that begins from recognized propositions and He walks towards issues that necessarily result from them without resorting to experience, and this approach may be by word or by calculation. If reasoning is practical, it is a logical mentality in which the researcher moves from one or several issues to another issue from which a conclusion can be drawn.

Terminologically: Al-Jassas defined it as seeking evidence and considering it in order to arrive at knowledge of the signified, and Al-Baqalani defined it, “As for reasoning, it may fall on consideration of the evidence and the contemplation required by it, and knowledge of the reality of what is being looked into, and it may also fall on questioning the evidence and demanding it.” Ibn Hazm defined it as: Inference is the request for evidence by knowledge of the mind and its results, or by a person who knows.

Al-Farra’ said: Inference is the request for evidence. Al-Juwayni defined it by saying: The respected scholars and the eminent imams differed regarding reasoning, which is: a meaning that is felt with the appropriate ruling for it in what is required by rational thought without the presence of an agreed-upon basis, and the injunctive reasoning is permissible in it.

Procedurally: It is demanding evidence and considering it to find solutions to the problems at hand, or the phenomena under study.

Principles of inference: This means the primary propositions deduced from others according to any inference, and therefore it is considered a starting point in every inference, and according to logic, its principles are “...

1- Axioms: An axiom is defined as: a definite statement that is self-evident and it is not possible to prove it, and it is considered true without proof by everyone

who understands its meaning. Axioms are those that have the following properties:

- It is evident in the mind without the need for proof.
- It is a preliminary issue that is not deduced.
- A general formal rule that all sciences share.

2- Postulates: This is an idea whose validity is confirmed and accepted without being clearly stated to the mind, but we accept it theoretically for its benefit and because it does not lead to a contradiction. Postulates are less certain than axioms, as they are not as clear as a statement of an axiom, but their validity is confirmed by the fact that every inference starting from them reaches correct, non-contradictory results, as you say: every human being seeks his happiness.

3- Definitions: They are a definition of the essence of the thing defined in precise terms, such that it becomes comprehensive and comprehensive, bringing together all the attributes of the thing and preventing the entry of other attributes or characteristics outside of it. Combination and prevention are the two characteristics that give the known thing its true identity. Definitions are primary issues on which all inferences are built that reach results that do not contradict science and reality. Unlike axioms and axioms, they are not considered a common general issue, but rather pertain to the thing alone and not any other thing. The things.

Inference tools: According to this approach, the researcher uses tools to extract theories and principles from primary issues or premises, which are:

- Mathematical proof: It is a logical process that proceeds from valid initial issues to other issues that necessarily result from them according to pure logical rules. In the process of proof, the validity of the premises is recognized because its goal is to prove the validity of the results resulting from the premises.

- Analogy: It is a logical process that starts from established premises that are true and arrives at results whose validity is not guaranteed. It is a result of an achievement, such that the results obtained are present in the premises in an implicit way. With this characteristic, it differs from mathematical proof whose results are new in that It was not included in the introductions, either explicitly or implicitly.

- Mental experimentation: This is when the researcher performs all the hypotheses and experiments inside his mind that he is unable to do outside. It differs from the experimental method, as it is based on observation and external, material experience, while mental experimentation is only inside the mind.

It may express imagination, which is what distinguishes poets and novelists, but for them, mental experimentation has no scientific value, but rather only has artistic, literary and moral value. The mental experimentation intended here is scientific mental experimentation, as there are some situations in which a person cannot perform... Experiments on it, then he performs all these operations inside his mind in a logical, scientific way.

- Synthesis: It is a scientific logical process that proceeds from correct premises to certain results, and these correct premises are the result of a logical inferential process, so these results are combined to reach other results, and so on.

B- Extrapolation:

This research is based on studying some parts of the phenomenon, subjecting them to observation and experimentation, and arriving at results that apply to all similar cases that do not fall within the scope of observation and experimentation. That is, the researcher can predict what might happen in similar cases, meaning he studies part of the phenomenon. The original society then attempts to generalize the results to all members of society "from the part to the whole," meaning it moves from the known to the unknown, issuing general rulings and revealing laws.

Types of induction

1- Complete induction: It is the confirmation of a partial ruling due to its stability in the whole, like every distinct body... the body is shared between particles, and the extrapolation of all the particles of the body is limited to animals, plants, and inanimate objects. Each of them is distinct, and this extrapolation helps judge with certainty the whole (the body that is common to the particulars), so each part of that whole is judged in the same way as the whole is judged.

2- Incomplete induction: This is the induction that arrives at the conclusion by observing some cases that belong to a specific category. While complete induction adopts the result it reaches regarding all cases that fall within the framework of a certain category (examination of the sample in incomplete induction), the results it reaches in incomplete induction are merely conclusions that differ in their probability of being true. For example, if a chemist wants to know the extent of the effect of pressure on gases, he conducts an experiment on some gases. When he sees that the greater the pressure on these molecules that are the subject of the experiment, their size decreases, and whenever the pressure decreases, their size increases by a certain percentage under a certain temperature, he takes this natural phenomenon that he observed during the experiment as a general rule for all gases. In light of this, he establishes his

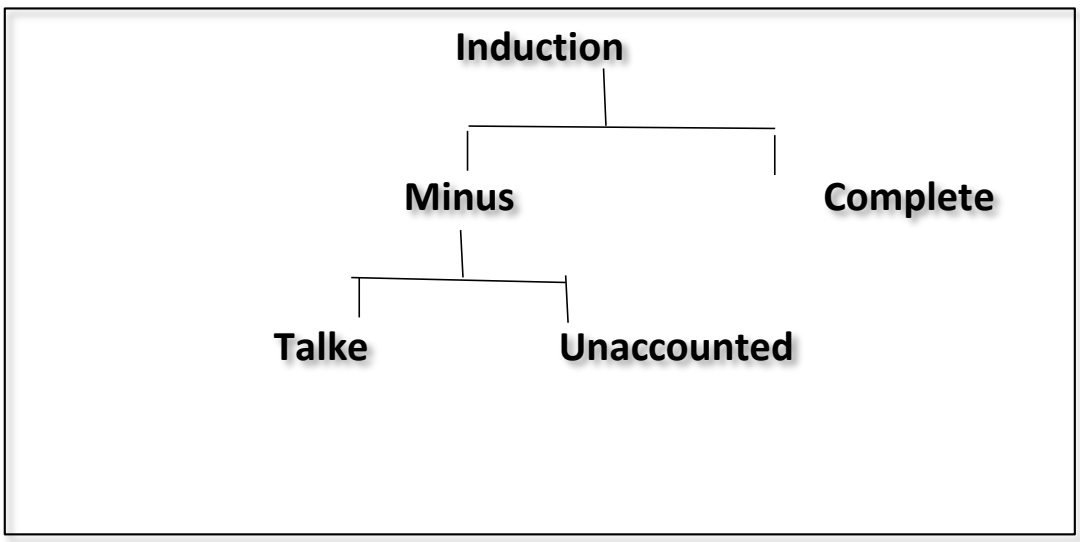
general rule: (If the pressure on it is increased, its volume decreases, and if the pressure on it is decreased, its volume increases by a certain percentage under a certain temperature). Likewise, whenever a mathematician wants to know: Are the degrees of the two base angles in an isosceles triangle equal or not? . . . He establishes the proof on one or two examples, and from there he generalizes the ruling to all parts of an isosceles triangle, so he establishes the following general rule (every isosceles triangle, its base angles are equal).

Sections of incomplete induction:

Incomplete induction is also divided into two parts: reasoned induction and unreasoned induction.

1- Reasoned induction: It is what makes a ruling generalized on the basis of belief in the existence of a reason for the ruling in all its details. As in the advanced gas and triangle examples. The chemist only generalized the ruling to all gas particles because he believes that the natural phenomenon in the gas that he saw during the experiment is a type of natural change. He also believes that every natural change must be based on a cause and by observing the experiment repeated on different types of gases. End quote. Until the increase in pressure is the reason for the decrease in volume. The lack of pressure is the reason for the increase in volume, and since he also believes that gases of all types are of the same nature in that they are gases, he established his general rule. On the basis of his belief in the unity of cause and the unity of nature in all gases. He established his general rule mentioned above. And so is the sports world. . . Etc. and other scientists in various fields of mathematical, natural, social and other sciences.

2- Unreasoned induction: which does not rely on reasoning to generalize its rulings, as is the case in most statistics and scientific classifications.



C- Deduction:

Language: It indicates extraction in the language of the Arabs. Ibn Faris said: The article (Nun, Ba, and Ta) is a word that indicates the extraction of something, and it extracted water, extracted it, and the water itself, if it is extracted, is called Nabataeans, and it is said: The Nabataeans named it because they extracted water. The predicate of this word is white under the armpits of the horse, and a horse is exposed, as if that white is similar to the water of the horse.

Terminologically: Concerning the refinement of names, the scholars said: deduction is the extraction of what is hidden, what is intended by it from the word. They were called Al-Nabat and Al-Istanbat due to their extraction of the springs of the earth, such that no one else can be guided to them as they were guided.

Ibn Jarir said: And every extractor of something that was hidden from the sight of the eyes... has a "strainer." It is said: "The rakiyya extracts its water, and if you extract its water, I extract it," and "nabat" means "the water extracted from the earth," and from it is the poet's saying: His fortune is close, and what his enemy gets... he has a bad luck, Abi Al-Hwan Qutub.

Abu Al-Muzaffar Al-Sam'ani said: Derivation is the extraction of knowledge.

It is also called the "method of analogy," and it goes in the opposite direction to the inductive thinking followed by empiricists. This method moves the research scientist in a logical manner from principles and results that are based on axioms and scientific axioms to details and to specific individual conclusions, and the thinking is based on Deductive reasoning is based on the rule that "what is true of the whole is also true of the part, given that the part falls logically within the whole or within the whole." For this purpose, a method called analogy is used, and it starts or relies on known facts. The inductive method begins with the particulars in order to arrive at a conclusion. Scientific laws and axioms, while deduction or analogy begins with the laws to extract facts from them.

Procedurally: it is to extract the fixed, hidden thing that no one can find.

Characteristics of deduction:

- Its reliance on the basis of analyzing each part, where each phenomenon is studied from its wholes to its details and from its generalities to its specificities.
- An ideal philosophical approach that studies the phenomenon as it should be, and not as it exists in lived reality.

Deduction steps:

The philosopher Professor Youssef Karam summed it up in his book "The History of Greek Philosophy," where he said, "Plato used to lay down the principles and extract his results without resorting to experimentation, as if the sons of Adam were abstract units or geometric shapes, and as if human natures obeyed the law as clay obeys the hand of sheep." "Youssef Karam's statement explains the methodological steps that Plato followed in his application of the deductive approach to some political phenomena. In his approach, he starts from principles and preconceived ideas based mainly on axioms, beliefs, and hypotheses, and then he tries to prove them without relying on experience in order to reach To the scientific truth about the studied phenomenon.

Criticisms of the deductive approach:

The study must start from what is partial and specific in order to then reach what is comprehensive and general, and not the other way around. Therefore, it is not possible to rely on the deductive approach in political and social research because it requires following a rule of analysis that begins to study phenomena from the micro to the macro.

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Conclusion

From the above, it is clear that the qualities that the researcher must possess contribute greatly to his control over the research topic and achieving the goals set for it, based on adherence to the characteristics and basics of scientific research.

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