Introduction to Economic Epistemology

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Part 2

Three main questions will be addressed in the second part of this course

- Under what condition(s) is a piece of knowledge scientific? What is science?
- What role(s) do models play in economics?
- Can we speak of an empirical turn in economics since the 1990s ?

Plan

1. Philosophy of science in the twentieth century
2. Models in economics
3. The « empirical turn » in economics

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Chapter 1 Philosophy of Science in the 20th Century

Until the end of the 19th century, philosophers debated **the role of experience in the making of science**. But they shared the idea that it is possible to access the laws of the Universe and that this knowledge had been definitively acquired by Newton and his predecessors.

Ex: our space is Euclidean for Kant… This conviction was called into question with the development of non-Euclidean geometry during the 19th century (Poincaré, 1902) and the theory of relativity… For Einstein (1905, 1915), our space is curved and therefore non Euclidean.

Problem: how can we explain that science did not reach its completion with Newton?

More generally, this chapter discusses **the notion of scientific truth**. We will see that scientific activity is not the production of definitive truths, as common sense might suggest. In a certain sense, scientific knowledge always lives a precarious existence… The point is to understand this without giving up the idea of the importance of scientific knowledge (cf. conclusion). Debates that have nourished economists' reflections on their own practices!

1. Science as knowledge derived from the facts of experience

- **The commonsense view of science**

- « science is special because it is based on the facts »

Facts = claims about the world that can be established by a careful and unprejudiced use of the senses (hearing, seeing, touching) as opposed to claims based on the authority of a past scholar (Aristotle) or a sacred text (the bible).

Facts = secure and objective basis for science

If the reasoning used to elabortate theories and laws on the basis of these facts is sound, then the resulting knowledge will be true and objective.

Ex: « science is a structure built upon facts » (Davies, 1968).

- Modern science was born in the 17th century because facts started to be studied seriously.

Ex: Galileo, falling bodies and the Pisa tower.

- Who is Chalmers refering to ? Schools that developed conceptions of science giving pride of place to empirical facts :

1. **British empiricists** : John Locke (1632-1704), George Berkeley (1685-1753) and David Hume (1711-1776)

« Knowledge derived from ideas implanted in the mind by sense perception »

2. **Logical positivism** : Otto Neurath (1882-1945), Rudolph Carnap (1891-1970)… Vienna circle and *A Scientific Worldview* (1929)

A priori theory must be confirmed by observed facts

- Two main problems

1. What are facts and how can they be accessed to?

2. How can scientific theories be obtained on the basis of these facts?

Summary of the common sense view of science that we are going to examine critically :

(a) Facts are directly given to careful, unprejudiced observers via the senses.

(b) Facts are prior to and independent of theory.

(c) Facts constitute a firm and reliable foundation for scientific knowledge.

But, what are facts ?

A state of affairs (reality) – **perception** of this state of affairs – **statement** about this perception

Reality → Perception of reality → Observational statement

- **In the CSVS, perceptual experience is assumed to be direct and unambiguous**

- Common sense view of science (CSVS) assumes a normal observer with normal senses

Example: normal eyes and the experience of seeing

Vision/seeing: light rays are refracted by the lens of the eye onto its retina, where the image of the object looked at is formed. The optic nerves transmit to the cortex the information about the light arriving at different points of the retina. The cortex records the information and forms the perceived image.

⇒Assumption of CSVS: normal observers see the same thing if they are placed in the same conditions. Indeed, their eyes will transmit the same information to their respective cortexes.

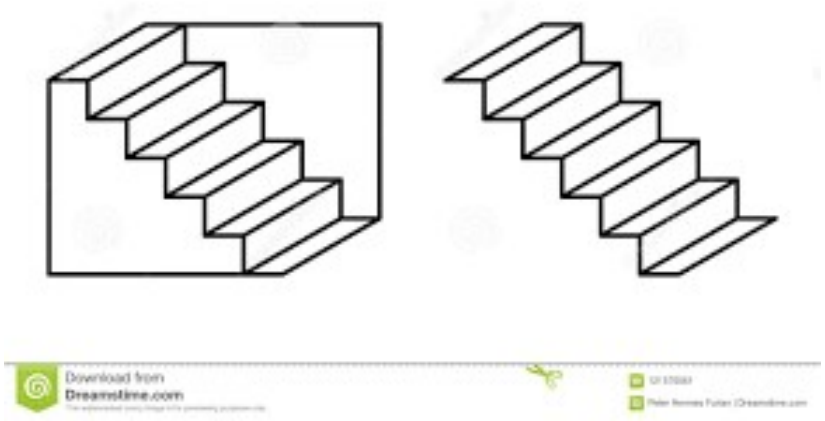
⇒**Is this really the case?**

- **Same state of affairs (reality) but different perceptions**

Norwood Russell Hanson (1958) *Patterns of Discovery*

Perceived images do not depend solely from the light rays that strike the eye !

Looking at the same object, we can experiment different perceptions.



Other examples:

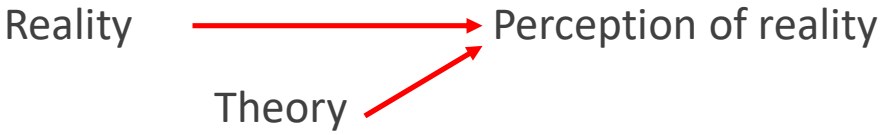
A game of cards with just one card that is modified.

Medical students learning to read x-rays pictures. (Michael Polanyi, 1973)

Economic students learning to read various graphs.

Interpretation : what we see depends on our expectations that is on our previous knowledge. Our prejudices counts in the physical experience of seeing ! There is no « unprejudiced observation ». The brain and the knowledge it contains intervene in the observation.

=> There is not direct access to reality via the senses



- **Facts are observation statements, a new source of difficulty**

- Knowledge is not produced directly on the basis of reality (state of affairs) perception. It is obtained from statements about perceptions or description of what we perceive with words.

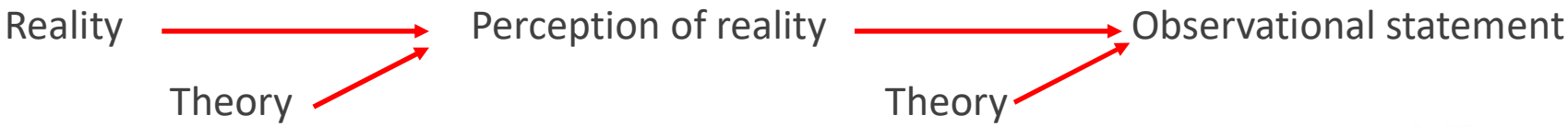
- These words carry a priori knowledge. Statements cannot be produced without a priori knowledge if not theories about the world.

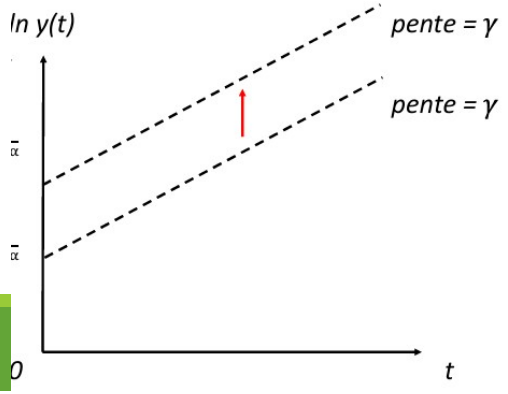
- Science is not derived directly from facts ! Facts are based on **observation and theory**.

Ex: “the gas does not want to light” → implicit theory: there are substances called gases and some of them burn. The notion of gas only goes back to the middle of the 18th century. Before that, there was only more or less polluted air. In the case of a scientific experiment this is even more obvious.

Ex: “The electron beam is repelled by the magnetic pole of the magnet”=> Scientific concepts do not derive their meaning directly from observation. Experience is apprehended through concepts already formed and conveyed by language. Facts are constructed.

Ex: in economics, that facts are built upon theory is quite obvious. Think about unemployment or gdp.





- **The faillibility of observation**

Until here we assumed that observation or fact gathering precedes theory or the elaboration of knowledge. We have seen how naïve this view is. So it must be abandoned. Facts require a theory to be produced.

What if we accept that we start with an a priori theory ? Can we save the idea that facts are the ultimate basis of scientific knowledge ?

On the basis of a priori theory, different observational statements can be framed (statements about facts/reality). Facts allow to know which are “confirmed” or true and which are refuted hence false.

In this way, science, in the end, would still depend on facts !

Is this so ?

Can we securely established the truth of an observation statements on the basis of observation?

Problem 1. We have seen that when observing reality, we may perceive different things. There may be disagreement over what can truly be observed.

Problem 2. To say what we observe, we must use a priori knowledge. Stating what we observe will depend on a priori knowledge. If this knowledge is false, our observation may be false.

In both cases, we cannot be sure that what we observe shows the truth or the falsity of an observational statement. The observation is faillible. We cannot be sure that it is true or if what we see is the reality.

Ex: size of Venus as predicted by the theory of Copernicus

Ex: “earth is stationary” vs “earth is spinning around its axis”

Ex: in economics, when considering the statistics about unemployment, a New Classical and an old Keynesian economist will see different thing. The first one sees the number of people dedicing to find a better job. The second one sees the number of people suffering from “involuntary unemployment” and searching for any job.

2. Observation as practical intervention

- Common underestanding of observation: **passive** + **private**

⇒You just open your eyes and see / what you see is and individual (private) matter.

- **Actually observation is active:** to see, hear, touch you often need to do a lot of things…

Ex: to be sure of what we see through a window, we will move our head, go closer to the window or maybe open the window…

Ex: first uses of microscope by Robert Hooke and Henry Power to observe the eyes of flies. What was the exact form of these eyes ? A lattice covered with holes, pyramids, cones ? => Actions to see better using lights…

“He endeavoured to eliminate spurious information arising from dazzle and complicated reflections by illuminating specimens uniformly. He did this by using for illumination the light of a candle diffused through a solution of brine. He also illuminated his specimens from various directions to determine which features remained invariant under Such changes. Some Of the insects needed to be thoroughly intoxicated with brandy to render them both motionless and undamaged.”

- **Observation is public**

"These [drawings of insects] were and are public, not private. They can be checked, criticised and added to by others."

Observation is a collective endevour !

⇒"The point that action can be taken to explore the adequacy of claims put forward as observable facts has the consequence that subjective aspects of perception need not be an intractable problem for science."

⇒Actions can be taken to minimize the individual bias of perception and arrive at an agreement on what is seen or heard. Also in many cases, what we observe is uncontroversial like reading the temperature on a thermometer for instance.

Ex: the discovery of the moon of Jupiter by Galileo (and his sliding scale).

- **Observable facts objective but fallible**

"An observation statement constitutes a fact worthy of forming part of the basis for science if it is such that it can be straightforwardly tested by the senses and withstands those tests."

If an observation statement resists many tests, it can become a basis for science.

But, then there can always be a new test that show the statement to be false. The statement of observation remains fallible.

The new test may result from advance in knowledge or in technology.

3. Experiment

- **Not just facts but relevant facts**

Science is not based on any observation.

Assume: secure facts can be established by careful use of the senses (we put aside the problems of perception and the fallibility of observation raised before).

Problem: do facts in the previous sense (observation statement) provide the basis for science. No.

- Science raise questions. We need facts that answer these questions, not any facts.

- To answer a scientific question about a phenomenon, scientists are confronted to superimposed or complicated interacting processes. To find explain a phenomenon, you need to eliminate disturbing factors. => **You need to run an experiment!**

Ex: Galileo's law of fall and a falling leaf. Gravity but wind, air resistance, deterioration of the leaf as it falls…