

GENERAL REMARKS. In Weber we saw an assumed contrast between social science and natural science. It was drawn, sometimes implicitly and hesitantly, along different dimensions. Natural science was said to be not concerned with values. Explanations in natural sciences pursued maximal generality. Better prediction was said to characterise its ultimate goal (or at least one of them).

It is, therefore, interesting to see where things actually stand with natural science. In particular, is there a difference in terms of value judgements in social and natural science—and thus, is there a contrast in their respective conceptions of objectivity?

We are here looking at a remarkable and wholly original work that anticipated in great detail many (maybe most) of the ideas usually associated with a much more famous oeuvre by Thomas Kuhn. Unlike Kuhn, Fleck examines one (or rather two) case studies, the theory of syphilis (and infectious disease generally) and the Wassermann reaction.

THE CONCEPT OF SYPHILIS. It is common to dismiss history of science as irrelevant to science properly speaking. History appears to a working scientist as a collection of trials, errors, totally false, misguided opinions, novel trials, and so forth, finally culminating in the modern state of science that reveals facts, tells us how things are. Fleck begins (in our selection) with the claim that the very concept of syphilis should be established in the course of a historical research. This sounds extremely counter-intuitive. Couldn't we offer this definition:

Definition 1 (Causal definition). Syphilis is a disease caused by a certain kind of causative agent? Indeed, the modern understanding of syphilis can be traced to the discovery of exactly such an agent, the bacteria *Spirochaeta pallida* (from the family of spiral-shaped spirochaete). So we could say that syphilis is a disease caused by *Spirochaeta pallida*. In fact, this is the formulation often found in modern discussions of syphilis.

But this kind of definition would be *anachronistic*. First of all, Fleck insists, *Spirochaeta pallida* itself should be defined as a bacteria related to syphilis. This is because it was individuated and produced (as pure culture) in the course of searching for 'syphilitic blood'. Secondly, this assumes the concept of syphilis as an infectious disease. Yet in olden times syphilis was thought to be a 'carnal scourge', a punishment for sexual transgressions. Should we say that the early users had a different concept of syphilis? Perhaps then we could define 'syphilis' perceptually, identify with it certain perceptually accessible symptoms. But this again gets things in reverse: what is perceivable today, with modern techniques and instruments, was not perceivable before.

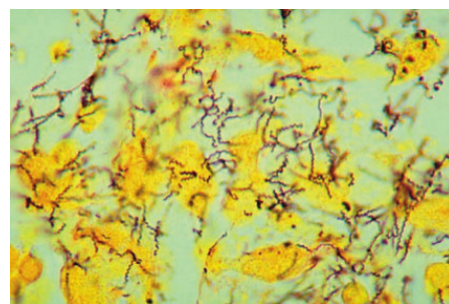


Figure 1: *Spirochaeta pallida*

The only right way to define syphilis, i.e. to understand what it is, is to follow the historical origins of its concept. But wouldn't this simply be to address the problem of *discovery* and ignore the problem of *justification*? Epistemology is concerned with the latter, the objection runs, and so can ignore the former. Yet this approach, narrowly focussing on internal consistence, ignores the fact that every system appeared consistent to its practitioners, while every alien system appeared to them contradictory and empirically worthless. In the course of a historical investigation we can understand better what counts as scientific truth and scientific fact.

PROTO-SCIENCE. Scientific ideas originate in the proto-ideas raised in unsystematic and often non-empirical manner (without conducting observation and experiments) by earlier thinkers.

Example 2. Modern atomic theory bears striking resemblance, in its general outlook, to the ideas of ancient materialists. And yet, those materialists advanced views based on no real observation, having no idea of experiment at all.

Example 3. The concept of infectious disease was anticipated long before the invention of microscope. It was just a speculation, but a very prescient one! See the striking Varro quote.

It is, however, hard or impossible to decide whether these proto-ideas were true. With syphilis, there has long been a speculation about a 'befouled', 'corrupted' blood. Now these predicates

are not scientific of course. And then, what of 'blood' itself? Ancient thinkers had no idea of the constitution of blood or of its functional role. Did even the term 'blood' mean the same on their lips as it means on ours, or at least on the lips of the modern experts?

At all events, it is wrong to evaluate these proto-ideas from the current standpoint. It is, e.g., wrong to say that Democritus discovered the atoms. The problem is not only that there was no 'discovery'. To understand his concept of atom we have to put it in the contemporary context. It will obviously be very far removed from the modern atomic theory.

THOUGHT COLLECTIVES AND THOUGHT STYLES. Knowledge is not a relation between the knower (the subject) and given reality (the object). One can know something only on the basis of accumulated prior knowledge. In practice this means that the knower must be part of the community of researchers. This membership is not merely instrumental. It is not only that the community technologically enables the individual to conduct his research. Rather, the community—the *thought collective*—supplies the individual with a particular *thought style*. Every discovery, every scientific claim is bound to a thought style. What could that mean?

Consider the discovery of *Spirochaeta pallida* and of its role as syphilis' causative agent. This kind of discovery would have been impossible if the researchers (Schaudinn) have not already had the idea that diseases are transmitted by bacteria. Recall here that syphilis was at some point thought to arise due to 'unclean' thoughts, sinful desires. First, then, there must already be agreement on the general nature of infectious diseases. Then there must be knowledge of bacteria as causative agents. Also, such bacteria cannot be observed with a naked eye. Observation requires instruments and training.

All of these conditions should show that discovery is a community effort, impossible for to conduct for just one heroic individual. More than that, the effort is not additive, as when different individual cognitions are combined together (say, to increase computational power). The effort is such that each individual cognition is *shaped* by other cognitions and by their joint intellectual tradition, their norms, habits, work attitudes. In this sense a thought collective cannot be resolved into a sum of individuals: these individuals are affected by the thought style determined by the given thought collective.

IMPERCEPTIBILITY OF THOUGHT STYLE. Thought style permeates the intellectual activity of individual researcher. Yet its influence is not perceived by him. How can this be so? To be aware of the dominant thought style, the researcher has to be able to compare it with *other* thought styles. This is a general situation. I am aware that I am a man because I am aware of non-men. I am aware that I speak English because I am aware of non-English speakers. Moreover, I can imagine how *I* could have spoken a non-English. But with thought styles, there are no alternatives. Every tradition opposed to the dominant thought style is declared false or even absurd. There is no possibility for a researcher to stand outside his thought style (and thought collective) and recognise the validity of other thought styles.

TENACITY OF OPINION. Thought collectives are essentially conservative.

CONTINUITY.

OBSERVATION, FACT, TRUTH.

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