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Popper is one of the many claiming that he has solved the problem of induction. He was able to retain both some kind of soundness and validity for the inferences and at the same time he retains importance of experience.

Not only his solution to the problem of induction is interesting but also, he showed where one of the solution might lead us: in the field of science may lead us to solve other problems.

So, is interesting to use Popper not only for the type of logical reasoning he provides but we can see how logic is contextualized and how logic is able to tell us something about how logic can be applied in other fields.

Not just a self-fulfilling thing

**Popper** 🡪 *one of the greatest philosophers of science of the 20th century (….) also a social and political philosopher of considerable stature, a self-professed critical-rationalist, a dedicated opponent of all forms of scepticism, conventionalism, and relativism in science and in human affairs generally and a committed advocate and staunch defender of the ‘Open Society*

Open Society: book

He was born and educated in Vienna at the beginning of 20th century (city lot of innovations): really famous and deeply criticized. He is a man of his times and places

In 1946/47, he moved to England, where he found a total different milieu 🡪 started working in the London School of Economics as a professor of logic and scientific method. From this point his reputation and importance became huge. Most of his prolific time.

He was a quite rigid and isolated person: he didn’t accept criticisms. He set up ‘the Popper seminar’ at the LSE: seminars discussing his views where you could not really criticize or oppose to his views (you could be thrown out or you would incur in his anger). He was not much loved

He kept working even after the retirement

He really believed he solved the problem of induction. Why? And why his solution is better than any other solution?

First of all, in order to solve problem, we need to reformulate Hume’s formulation of the problem of induction.

1. Traditional formulation: according to Popper is the attempt to answer to ‘What is the justification for inductive inferences (the belief that the future will be, largely, like the past)? 🡪 this type of formulation is wrong because it is uncritical, because somehow it assumes that the future resembles the past, as something given.

It arises from, roots of traditional formulation:

* **Hume’s criticism of induction**: it is actually two problems: a logical one (= it leads us to claim that we cannot justify induction from a logical perspective) and a psychological one (= it tries to answer the question “how do we formulate our beliefs/expectations?” 🡪 *habits*, *custom*, not by reason so not a logical solution). He is forced to embrace an irrationalist epistemology: Repetition = no argument; Reason = is marginalized, it plays minor role in belief formation.
* the **common-sense theory of knowledge**: it says that there is nothing in our intellect which has not entered it through experience/sensation/perceptions (*empirical view of knowledge*). And yet, Popper said, we know that we o form expectations and beliefs about things in the world before we actually perceive them: we made expectation about things yet to happen (finding regularities for instance, based on our perceptions even if they are yet to be perceived). How are they arisen? The common-sense view of logic takes for granted that beliefs in regularities are justified by repeated observations.

1. Popper’s reformulation as critical because he tries to see what is the problem behind the traditional formulation: it entails looking at *the problem which lies behind* the traditional formulation.

**Russel** then said that if we cannot find the solution of this problem, we cannot draw a line between rationality and irrationality. *“the lunatic who believes that he is a poached egg is to be condemned solely on the ground that he is a minority’*.

According to Popper, Hume is right about the logical problem, but Popper dislikes the formulation of the psychological problem. He dislikes the fact that Hume tried to solve the logical problem by introducing the psychological one and then offering a kind of psychological solution to the logical problem

Popper also do not like the justification of induction based on repetitions: the repetition is not always a crucial part, it does not always need to form expectation.

*Ex*: *puppies sniffing a cigarette* 🡪 unpleasant type of encounter for the puppies 🡪 day after, even before lighting the cigarettes, the puppies reacted to the cigarettes: there was no need of repetitions.

= empirical evidence that Popper is trying to make

But there is also a more logical, philosophical point to be made: Hume’s idea of repetition is crucially related to the idea of **similarity**/**resemblance**, so it is the repetition of similar events that creates expectations about the future, forming our habits. But, says Popper, what he does not realize within is psychological theory is that repetition is just **for us**, they should have effects of repetition only in the particular: we interpret events being similar. We respond to situations that we interpret as being similar.

How does Popper explain this type of scenario? “*The kind of repetition envisaged by Hume can never be perfect; the cases he has in mind cannot be cases of perfect sameness; they can only be cases of similarity. They are repetitions only from a certain point of view (….). But this means that, for logical reasons, there must always be a point of view – such as a system of expectations, anticipations, assumptions, or interests – before there can be any repetition; which point of view, consequently, cannot be merely the result of repetition*”

We need to replace the events which are similar with the interpretation of similar events. Similarity for us is the result of a response involving some interpretations and some anticipations on our past.

Also the first repetition is formed on similarity for us and therefore for previous expectations.

Without waiting for expectations and similarity to settle down we actively impose regularities upon the world, we try to discover regularities and similarities 🡪 without waiting for the premises, we jump to conclusions, which we will discard later if they are proved to be wrong, if they get contradicted. 🡪 **We proceed by trial and error.**

We have inborn responses to things which sometimes we are not conscious of (ex. *Baby that expects to be fed*). Our mind is made that way, but our expectations are not logically valid a priori, they might be mistaken: one of them is the expectation of finding regularities; we expect them to be there, but we can be misled, this is not something given. (Bit of Kantian: we impose regularity to the world)

* Hume is wrong, according to Popper, but why is it important to move on and try to embrace this alternative view?

What is the advantage of subscribing to this alternative perspective?

It becomes useful if we think in the scientific context: in scientific reasoning (and other human activities), we indulge in this propensity of finding regularities, discovering order, and creating expectations.

If we take this propensity dogmatically, this will lead us to very dogmatic and stiff being, not creative individuals. But the dogmatic is not so much the propensity that we have but the attitude of sticking to it, no matter what evidence we find that may be at odds with our expectations.

Procedure of trial and error 🡪 should be our method

Following the procedure of trial and error, that is the correct procedure for the scientific reasoning, becomes the method for conjectures and refutation: critical attitude to revise our beliefs and expectations, by letting doubts to come in and try to test our doubts, as well as our expectation, so to see if we’re going to the right direction or not.

How is this critical attitude pursued, particularly in science (=that we aspect as an open discipline to evidence, ideas, innovations and so on 🡪 this is the reason why humans love induction, is an ampliative method, inclusive, it takes a leap toward the future)?

**Trial and error procedure** (=everyday psychological attitude) is the psychological underpinning of what goes on in science, in which we follow it in a more rigid and rigorous way the method of **conjectures and refutations**.

Hume right for logical problem but psychological one is formulated in the wrong way.

The idea of induction by repetition, which is wrongly formulated, must be itself due to an error and possibly a logical error: but Hume’s logic does not make us see what the error is. Here is the reason why we need to reformulate the psychological problem of Hume’s analysis. If we do so, we may find the solution to both.

Assessing truthiness is asserting if something is true or false. How can L1 [Can the claim ‘X is true’ or “it is true that Y’ be justified by empirical reasons? (Hume 🡪 no)] be reformulated?

→ Can the claim ‘X is true or false’, or ‘it is true or false that Y’ be justified by empirical reasons?

Falsity is introduced

**Popper** 🡪 sometimes YES: we can conclude with certainty about the falsity of a thing but not about the truthiness.

And how can we conclude it through logic? Because the way in which we reach this conclusion is not based on induction, but on deduction.

Logical error behind repetition: can we try to reformulate the psychological problem and find a solution for both problems (2nd problem: common sense of knowledge) at the same time?

* **L1**. Can the claim ‘X is true’ or “it is true that Y’ be justified by empirical reasons? -> we cannot inductively conclude that x is true

**Hume 🡪 NO**

* **L2.** Can the claim ‘X is true or false’, or ‘it is true or false that Y’ be justified by empirical reasons?

**Popper 🡪 sometimes YES**

* We introduce falsity in L2: we cannot conclude about truth but we can conclude about falsity
* Sometimes we can conclude that Y is not the case
* The way in which we reach this conclusion is based by DEDUCTION and avoiding induction

In order to find the solution to the problem of inductive inference, he needs to find and argument that makes use of experience, like induction, but avoids all the problems that induction exposes us to.

🡪 applying deduction to experience.

Can we make a deductive use of experience? Yes. To understand why he claims it we have to go back to the material implication.

Back to material implication

**p 🡪 q - or, ‘If p, then q’**

p: antecedent; q: consequent

classic syllogism: modus ponens (short for modus ponendo pones = the mode of affirming by affirmation; the method of affirming the antecedent)

All A are B If A then B  
x is A x is A  
Therefore, x is B Therefore x is B

We should not confuse the modus ponens with

If x, then y if A then B   
y x is B

--------------------- ------------------  
Therefore, x x is A

This is a fallacy: affirming the consequent = the conclusion does not necessary conclude from the premises

e.g.

if I have a boyfriend, then I’m happy.

I am happy

Therefore, I have a boyfriend 🡪 but I can be happy also for other reasons!!!!!

P (antecedent) 🡪 Q (consequent) that is read “If P then Q” (conditional form of the argument)

this can be represented in syllogistic logic, like in the modus ponens (All A are B, x is A, therefore x is B // If A then B, x is A, therefore x is B), meaning ‘**affirming the antecedent’**.

‘**affirming the consequent**’ is instead a fallacy: if x then y, y, therefore x // if A then B, x is B, therefore x is A.

Examples → If I am with the one I love, then I am happy. I am happy. Therefore, I am with the one I love.

If there is fire then there is smoke There is smoke. Therefore, there is fire

Therefore, modus ponens does not suits Popper’s logic because this is the type of sentence that logically puts us into troubles, it does not give us certainty.

But luckily for Popper there is another sound argument, called modus tollens, the method of ‘**denying the consequent’** and which seems more useful.

→ If x then y. Not y, ttherefore not x

Also in this case you can fall into a fallacy: ‘**denying the antecedent**’: If x, then y. Not x, therefore, not y.

Example 🡪 All dogs have four legs.   
 This Mule is not a dog   
 Therefore, this Mule does not have four legs

Why does Popper likes modus tollens? Because it gives us the solution for the problem of using experience in a deductive manner.

In logic we deal with two types of statements:

1. **singular existential statements** 🡪 assertions about the existence of some particular thing.

“*There is an x that is a swan, and x is white*”

1. **universal statements** 🡪 assertions that categorize all instances of something.

“*For all x, if x is a swan, then x is white*”

In science the first are called **observational statements,** statements about things that we can observe. If we follow the logic of induction, these are used in order to create universal statements, by generalization.

From a deductive point of view, we know that the inductive manner of inferring it is invalid, because it lead us to an enormous possibility of error. How do we infer, then, a universal statement from any number of particular statements?

Observational statements cannot be used to show universal statements are true.

Observational statements can be used to show that the universal statements are false.

Can we validly infer a universal statement from singular existential statements? Yes, by modus tollens, but *by denying and not affirming*. (If U then O, not O therefore not U 🡪 not all swans are white, deductive certainty)

**One evidence is enough to make a universal statement false.**

Flow of the argument:

* start with a hypothesis or universal statement (U)
* make a prediction about a certain singular happening (U – O)
* make an observational statement that contradicts the expected prediction (-O)
* falsify the universal statement (-U).

This is called **logic of falsification**, through the **modus tollens** (= ‘the mode that denies’: deduction from the truth of a singular statement the falsity of a universal statement): If T then P, not p therefore not T. here ‘not p’ is called **potential falsifier** because there is the potentiality of being false.

Ex. if all swans are white then this swan must also be white; *this swan is black**(not white)* therefore not all swans are white (we have falsified the antecedent)

So, the **argument from experience** has become in Popper a deductive argument which uses **experience** (a singular observational statement) **as a test** to show that a universal statement is false. The experience we are dealing with is the **potential falsifier of the theory**.

So, if, like Hume claimed,no matter how many empirical instances in favor of a regularity, the regularity cannot be proven to hold true (inductive circularity). Then lets change of tactics: let us use one empirical instance against a regularity to show that the regularity does not hold true (deductive certainty).

*🡪 The original problem of induction is the problem of justifying induction, (…) If you answer this problem by saying that what is called an ‘inductive inference’ is always invalid and therefore clearly not justifiable, the following new problem must arise: how do you justify your method of trial and error? Reply: the method of trial and error is a method of eliminating false theories by observation statements; and the justification for this is the purely logical relationships of deducibility which allow us to assert the falsity of universal statements if we accept the truth of singular ones.*

Now we can finally rely on experience as a proper guide, on deduction.

From truth of particular to falsity of universal statements.

How he arrived to his conclusion?

He was not a logician, he was a philosopher of science.

He started reasoning upon induction because he wanted to reason about what made science different from other practices (what **demarcates** science): the method of science, that is the empirical one. The empirical method is based on inductive procedures. Therefore, to demarcate genuine science from pseudo-sciences, we have the empirical method. Pseudo-sciences are demarked by an attitude that is about always trying to find positive evidence, to confirm its theories through inductive procedures.

Examples of pseudo-sciences: Astrology, Marx’s theory of History, Freud’s psychoanalysis, Adler’s individual psychology. These last two were really targeted by Popper: he feels like anything can be explained with Freud and Adler’s theories, they seem to have an unlimited explanatory power that, for Popper, is a weak.

Dreams in Freud theories are another example: Freud uses counter-examples in a positive way, using counter-example as verification of the theory, he does not look for further verifications, support.

A good science is the one that tries ruthlessly to doubts their theories.

Einstein is no Freud: bold predictions and taking risks. How? Predicting in advance of observations, assuming himself the serious risk of being refuted.

*→ If observation shows that the predicted effect is definitely absent, then the theory is simply refuted. The theory is incompatible with certain possible results of observation – in fact with results which everybody before Einstein would have expected. This is quite different from the situation I previously described, when it turned out that the theories in question were compatible with the most divergent human behavior, so that it was practically impossible to describe any human behavior that might not be claimed to be a verification of these theories*

We should never be dogmatic, but prepared to the test of falsification.

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Rather than a solution, Popper proposes a change in the game: he does not really answer the main question of induction, but rather answers the question of how to reach certainty about statements. Furthermore, his solution is peculiar because he reaches it by contextualises the problem outside the philosophic/epistemological debate: he uses science as his context. This allows us to see the inductional work, why we are better off without it? (at least in science)

So, he tries answering the question of why not using it.

* Why do we use induction, why we should not use induction, no matter what (is induction)
* Modus tollens: we start with a hypothesis and we derive a prediction (by the hypothesis); if the prediction is false, the hypothesis is false.
* **Logic of falsification** -> how science should proceed

Falsification is not Popper’s invention but he improved it;

Science can follow a particular type of logic, the logic of falsification

Describing and putting into place the method of conjectures and refutations

→be a good scientist = follow the method of conjectures and refutations

Popper found a logical method (falsification: conjectures and refutations) to be used in science: this is in fact the only way to be a good scientist.

According to him, valuable scientific claims have

**a)** low probability; a statement with high probability is not so interesting because when the theories are to probable they explain too much about sth, so they explain nothing

**b)** high falsifiability;

**c)** ‘corroborated’ by evidence at time *t*.

Note that ‘corroborated’ ≠ ‘true’: ‘*the degree of corroboration (…) is just a report about the state of discussion at time t.’*

He was clearly interested about improbable ideas, the probable ones are taken for granted somehow: by explaining to much, it explains nothing. Instead unlikely theories are more valuable because by being so, they will be more open to falsification. If they survive at the falsification test, at least we can be confident that they are not false, it is acceptable to accept them. Not being able to falsify a theory at a particular time is not a guarantee of how these theories will perform in the future or if they will be reliable no matter what, but they tell us which theories are to be preferred because no one has confuted them yet.

If we are capable of putting under test of falsification a theory, this means that this method is empirical:

✯ **Falsifiability** as a sign that a claim is empirical (crucial feature in science) → the hallmark of genuine science, the criterion of the scientific status of a theory, is its **refutability**, **testability**, or **falsifiability**

= real science is different from pseudo-science

BRIEF RECAP:

* induction is a myth
* actual procedure of science 🡪 jumping to conclusions
* repetition 🡪 only at the stage of testing a conjecture; it has no role at the level of discovery induction
* falsification, not induction, is the right criterion of demarcation
* *in finding the right criterion of demarcation we find the correct way to make the argument from experience work 🡪* observations can prove the falsity of the hypothesis

these views were strongly criticised. We’ll mention three main aspects:

1. **historical objections** → falsification does not represent nor explain how science actually progresses (because it progresses more with induction than falsification)
2. **methodological objections** → philosophy of science issues; ‘being dogmatic’ is necessary in science, one falsification is not enough to give up on a particular theory; conclusive falsification of a theory is never achievable
3. **logical objections** → falsification does not exclude induction

We will focus on this last type of objection.

To address the **logical objection**, we need to start from the rule of potential falsifiers in deductive falsification.

Potential falsifiers are a special class of basic statements; a basic statement takes the form of a singular existential statement, i.e. an existential assertion about some definite spatio-temporal region. (e.g. *‘there is a raven in spatio-temporal region k’*). The role of these basic statements, in Popper’s picture, is not that of providing an epistemological bedrock, but: *our ‘basic statements’ are anything but ‘basic’ in the sense of ‘final’; they are ‘basic’ only in the sense that they belong to that class of statements which are used in testing our theories*.

The theory that all swans are white is not compatible with the basic statement ‘there is a black swan’.

But what do they actually do? How do a theory and a potential falsifier interact?

We need to understand two different strategies, the difference between verification and falsification:

* To verify a universal statement 🡪 infinite number of observations not a finite number (induction is inconclusive)
* To falsify a universal statement 🡪 one observation is enough (deduction is logically conclusive)

But when we use the test of falsification to choose among two statements we immediately face a lot of logical problems. Here there are a couple of them:

1. In principle, any theory admits infinite **numbers of potential falsifiers**. How can we choose btw two theories basing ourselves on the quantity of falsifiers? How can we establish the degree of corroboration of a theory over another giver that at one time I am aware only of a finite number of instances and evidence? At time t only a finite set of observable consequencesof a theory are testable and tested.

If all possible tests could be performed, they all end up producing the same result. In a sense, we are smuggling an inductive condition. I use induction to establish the degree of corroboration.

He defends himself: corroboration is never forward-looking: “*the degree of corroboration at the time t (…) says nothing about the future – for example (…) [about] a time later than t*” But if so, it is difficult to see why/how greater corroboration of a theory T1 over a theory T2 should be a reason to prefer T1 to T2. So, corroboration gives us good ground to accept one theory and reject another one because we could be able to at least conjecture that the theory we are choosing has a higher chance to be true/similarly true in the future. 🡪 we are assuming on the basis of negative evidence that the future of a theory can be argued for. On the basis of this, it is difficult to justify why I am going for one other than the other, unless I have some kind of inductivist hope.

1. **The truth of potential falsifiers** → if we follow the logical falsification, we can deduce the falsity of a universal statement for the truth of a singular statement but what allows us to accept that these singular statements are true?

Especially when Popper himself says that basic statements are not finite. In his words *“From a logical point of view, the testing of a theory depends upon basic statements whose acceptance or rejection, in its turn, depends upon our decisions. Thus, it is decisions which settle the fate of theories”* or again he claimed that:

*“The empirical basis of objective science has nothing ‘absolute’ about it. Science does not rest upon solid bedrock. The bold structure of its theories rises, as it were, above a swamp. It is like a building erected on piles. The piles are driven down from above into the swamp, but not down to any natural or ‘given’ base* (therefore no logical foundation or certain one)*; and if we stop driving the piles deeper, it is not because we have reached firm ground. We simply stop when we are satisfied that the piles are firm enough to carry the structure, at least for the time being”*.

Popper seems to be arguing against himself: if I reject that all swans are white because I saw a black swan, I assume that I have enough reasons to believe that I actually have seen a black swan, just on the basis of experience. Therefore, I use experience as a positive evidence, just like in induction (part that he claimed to dislike) 🡪 he responded that the acceptance is not a matter of experience but of decisions.

But a decision is something consensual, it is something that we reach: even if a scientific community agrees on such or such a matter, it is still a decision. The acceptance would be under positive evidence/support. We are not reasoning in the negative, but on the affirmative again.

In the end he admits that basic statements ultimately are ungrounded conjectures themselves: the only grounding that we should follow is the decisions taken by the scientific community, we should basically trust them.

But how can we trust observation? Are contentious issue. For Popper there are no plain observation: *observation is always selective. It needs a chosen object, a definite task, an interest, a point of view, a problem. And its description presupposes a descriptive language, with property words: it presupposes similarity and classification, which in their turn presuppose interests, points of view, and problems. (…) The problem ‘Which comes first, they hypothesis (H) or the observation (O)?’ is soluble; as is the problem ‘Which comes first, the hen (H) or the egg (O)?’. the reply to the latter is ‘An earlier egg’; to the former ‘An earlier hypothesis’. It is quite true that any particular hypothesis we choose will have been preceded by observations (…) But these observations in their turn presupposed the adoption of a frame of reference*. The idea is that there is always something like a theory or a theoretical structure before we can observe anything: we can rely on good tests for our theories, and get rid of the bad ones.

Problems in relating observation to theory:

* how can we trust the observations we use to test a theory – unless we have independent reasons to trust the theories on which these observations rely
* what becomes of the observation of facts when theories are ultimately responsible for what we observe. This can be summarized and formulated in this way: If theories are essentially involved in the observation of facts, we cannot separate what is theoretical from what is factual in an observation. But if this is so, theory is part of what we take to be facts, and it becomes part of what we observe. So, the observation itself is a piece of theory.

In this way a lot of problematic consequences will arise: facts can change, so they change whenever you change a theory. But this is a problem is science, especially.

One of the problem is the **thesis of theory-ladeness** by Hanson (1958) → In our theories there is a majority of theory over observations. “*there is more to seeing than meets the eyeball*”: in many cases two or more observers looking at the same objects under the same physical circumstances do not necessarily see the same things: they look at the same things but do not see the same. Or better different things are seeing: the observer is not adding an interpretation, it is the actual experience of seeing that things, either in one way or another, that is different.

The general thesis of the theory ladeness of observation is that **the experience of seeing ‘depends on’ interpretations** (the way we look at things affected and influenced by past experiences, expectations, knowledge, and the like). This thesis applied to science is that what a scientist sees depends on the theory he has.

The claim to be inferred by these theses it that the experience of seeing has a propositional content built into itself: seeing is ‘seeing that’.

He imagined an example, the one of Kepler and Tycho, wondering if they see the same thing. They are both looking toward the sun, but what do they actually see? Kepler sees that the earth moves, while Tycho sees the sunrise.

The consequences of the theory ladeness:

a. facts are theory dependent

b. facts change with change in theory

This is a relativistic conclusion: facts are relative to the theories, facts are not facts at all but just projection of theoretical framework. It is kind of radical conclusion, sceptical one.

a. BUT what type of dependence? It can be totally dependent when the fact changes when the theory changes.

b. BUT what do we mean by ‘theory’? Theories can be conceived both from the more general (→ linguistic formulation, general background information) to the more specific (→ explanation of what we observe in the context of a scientific theory, theory brought about by specific observations). Distinguishing one or the other theory is important. We have different meanings of ‘theory’:

* **categorical** (basic sense of the very conditions and factors that allow us to see everything the moment we open our eyes as human beings, that allow us to organize the environment where we live. These theories are constitutive of our perceptions)
* **interpretative** in the sense of classification: we specify the general classes in which we put specific phenomena. It gives us the classes of things we apply the conditions to. These theories can be part of our background information which somehow changes whether if they are part of the everyday practice or of the scientific one
* **explanatory** 🡪 we are in a far more specific domain, we are in specific answers to particular problems and issues. Here conclusions and theory are taken from experience, from observations.

But how do facts depend on these types of theories? The facts we see are totally dependent on categorical and interpretative sense (to see a table I need to have the word ‘table’, to have the possibility of perceiving it, etc.). it is more difficult to accept total dependence on the third type of theory: it is more difficult to accept that explanatory theories allow us to see something as something.

Can in this context make sense the total dependence? To see this, let’s put Hanson reasoning in an inferential form and see where it leads us, using the example of Kepler and Tycho.

((Remember that the logical grammar of the verb ‘to see’ is like the one of those ‘to believe’, according to Hanson))

* K sees Sk =sun of Kepler
* T sees St **To see something = to see that**

K sees that the sun is fixed

T sees that the sun is orbitating

-----------------------------------------------------------

Sk different from St

To see = to believe that (because they have the same logical grammar)

* K believes Sk
* T believes St

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Sk different from St

Wrong inference!!! we can’t infer a state of affairs from what we believe about it (inferential fallacy) 🡪 what change is the belief of K and T, not the sun

Confusion btw two level that are separate:

Level 1: **seeing** – perception – + object

Level 2: **seeing that** – proposition – + object

You are dealing with proportional experience 🡪 we do not need scientific theory to see things

For Hanson, level 1 and 2 are the same things

Elementary facts (=facts in the level 1) are not totally dependent on scientific reasoning

Theory and observation:

* Fault of naïve inductivism 🡪 to set facts completely apart from theories 🡪 work with very strong concepts
* Fault of radical relativism 🡪 to equate facts to theories 🡪 work with vague that remove the distinction btw theory and facts

Popper: not a naïve inductivist (he does not believe induction) but he avoids being a radical relativist

He accepts that is not strict distinction btw facts and theory but he believes that there is a little difference btw the two.