

Classes #13-14 - Logical Empiricism and the Verification Theory

I. Wittgenstein and the Logical Empiricists

We started our exploration into the philosophy of language with Frege's "On Sense and Reference."

We noted several questions about the nature of senses, but pursued reference, first.

Now, we turn to senses, or meanings.

In the next few weeks, we will look more closely at some attempts to define, refine, or eliminate meanings in semantic theory.

As we will start with the logical empiricist's verifiability theory of meaning, some background to logical empiricism might be useful.

Frege's work was partly a response to the metaphysical speculations widespread in nineteenth-century idealism.

The logical empiricists are also responding to idealism, and speculative metaphysics generally.

They were intent on ridding philosophy of what they deemed to be pseudo-problems, pseudo-questions, and meaningless language.

Focused on science, they derided such concerns as:

- A. The meaning of life
- B. The existence (or non-existence) of God
- C. Whether the world was created, with all its historical remnants and memories, say, five minutes ago
- D. Why there is something rather than nothing
- E. Emergent evolutionary theory, and the *elan vital*
- F. Freudian psychology
- G. Marxist theories of history

We can see the logical empiricist's metaphysical quarry clearly, in Ayer's derision (pp 11-12) of sentences like AL.

AL                      The absolute is lazy.

Logical empiricism is more-often called logical positivism, or just positivism.

Those are misleading terms.

Logical empiricism is often characterized as British empiricism (e.g. Hume) plus logic.

The concerns of the 19<sup>th</sup>-century positivists, especially Comte, are less-closely aligned with those of the logical empiricists.

Logical empiricism was developed in and around Vienna between WWI and WWII, by philosophers inspired by Wittgenstein's 1919 *Tractatus Logico-Philosophicus*.

Wittgenstein sent the *Tractatus* to Bertrand Russell in Cambridge on scraps of paper from the trenches in WWI, where Wittgenstein was in the Austrian army.

Wittgenstein's *Tractatus* was intended, and was hailed by Russell, as the culmination of the enterprise of logical analysis begun by Frege.

According to the *Tractatus*, the world is a collection of independent atomic facts combined according to logical principles.

If we could get clear about the correct logic, Wittgenstein argued, then we could have a complete, accurate picture of the world in our best, most austere language.

According to the picture theory in the *Tractatus*, both the world and our language consist of independent atomic elements, which are combined according to strictly logical principles. The logical empiricists were especially concerned to establish firm foundations for empirical science. They saw the picture theory as accommodating a scientific view of the world. Scientific laws, for example, were mere generalizations over, and reducible to, the separable atomic facts.

The *Tractatus* was highly influential in Europe between the two wars as the foundation of logical empiricism.

A group of logical empiricist philosophers influenced by the *Tractatus*, including Rudolph Carnap, Otto Neurath, Moritz Schlick, Carl Gustav (Peter) Hempel, and Herbert Feigl, came to be known as the Vienna Circle.

A less-influential group called the Berlin Circle was centered around physicist Hans Reichenbach. The young A.J. Ayer visited Vienna from England and wrote about the movement he found there. Ayer's *Language, Truth, and Logic* became the primary source for logical empiricism for English-speaking philosophers, though most of the logical empiricist's central works eventually were translated into English.

## II. The *Tractatus* and the Picture Theory

We could easily spend an entire term studying the *Tractatus*, let alone logical empiricism. *The Tractatus* is obscure, when read directly, consisting of a series of numbered aphorisms. There are seven main propositions, and all but the seventh have sets of explanatory sub-propositions. Wittgenstein seeks the limits of language in distinguishing between what can and what can not be said.

§7. Whereof one cannot speak, thereof one must be silent (Wittgenstein, *Tractatus*).

The project of distinguishing between what can and can not be said, or between what can and can not be thought, naturally meets a fundamental difficulty.

If we want to distinguish between the backyards of two people, we can draw a boundary line.

We perceive both sides of the line, and see the landscape divided.

But, what is outside of the boundary of thought is inaccessible to us.

Still, we can at least try to get clear about how our language functions, and what its limits are.

The *Tractatus* presents an atomistic picture theory of meaning on which language mirrors the world. The structure both of language and of the world is governed by logical rules, like those depicted in truth tables.

Indeed, Wittgenstein was the first to develop truth tables, in the *Tractatus*.

The world, he alleges, is a collection of independent states of affairs.

If I am standing to the right of you, we have, let's say, two atomic facts (my standing and your standing) and a logical relation (to the right of) between those facts.

I could stand to the right of you, or to the left of you, or on the other side of the planet, all of which are independent of you.

§1.2. The world divides into facts.

§2.06. From the existence or non-existence of one state of affairs, it is impossible to infer the existence or non-existence of another (Wittgenstein, *Tractatus*).

Language consists of atomic statements of those facts, connected into more complex statements by logical principles.

Language mirrors the world by providing a logical structure which is isomorphic to the structure of the world.

§2.16. If a fact is to be a picture, it must have something in common with what it depicts.

§2.17. What a picture must have in common with reality, in order to be able to depict it - correctly or incorrectly - in the way it does, is its pictorial form (Wittgenstein, *Tractatus*).

Since language and logic have the same form as the world, we can know about the fundamental structure of reality by examining the fundamental structures of language and logic.

Wittgenstein, following Russell, claims that we can not rely on the surface grammar of natural language to reflect the structure of the world.

Natural language is sloppy full of misleading metaphors and pragmatic shorthand.

If we want a true representation of the world, we must seek a finer language, like Frege's mathematical logic.

Recall Frege's claim that his *Begriffsschrift* is like a microscope on our language.

Frege's logic, therefore, is the precision tool that Wittgenstein's picture theory requires to represent the atomic facts of the world, and to show how they are related and combined.

To see how the demands for precision are manifested, notice that my example of an atomic fact, my standing to the right of you, is misleading.

My standing in a place is not an atomic fact, it is a complex fact.

I am a complex, standing is a complex, you are a complex.

The true analysis of the world involves analyzing these complexes into their simple, atomic components.

Atomic facts are the foundational elements for the *Tractatus*, akin to the postulates of Euclidean geometry, say, or to Descartes's *cogito*.

A theory of the world that analyzed all of the myriad complexes into their atomic elements would present a veridical and secure picture of the world.

Because of its method of analyzing complex propositions into elementary ones, the philosophy developed by the early Wittgenstein, under the influence of Frege and Russell, was called analytic philosophy.

The name 'analytic philosophy' remains as a characterization of Anglo-American philosophy, despite the lack of contemporary interest in the project of analysis, in this sense.

But Wittgenstein's original plan was to use the new logic, because of its utility for analysis, to represent the atomic facts of the world in elementary propositions and their logical combinations.

One of the most important advances in Frege's logic was its ability to characterize the most general logical properties, including logical truth.

All logical truths are tautologies, complex statements which are true no matter the truth values of their component variables.

We might characterize these statements as necessary truths.

For Descartes, the certainty of logic and mathematics had provided essential support to his claim that our minds have substantial content built into their structures.

From the claim that logic and mathematics are innate, it is reasonable to ask whether there are other innate ideas, including the idea of God.

Wittgenstein and the logical empiricists believe that characterizing logical truths as necessary imbues them with too much importance.

In contrast, he calls them nonsense.

The only statements that can picture the world are those that have sense, that can be either true or false, that can picture accurately or not.

Tautologies are empty of content.

§4.46. The proposition shows what it says, the tautology and the contradiction that they say nothing. The tautology has no truth conditions, for it is unconditionally true; and the contradiction is on no condition true. Tautology and contradiction are without sense.

§6.1251. Hence, there can *never* be surprises in logic.

Logical truths are unknowable because they are too thin to be objects of knowledge.

They don't picture any fact.

Wittgenstein wanted carefully to circumscribe what we can know.

There is a direct line between Frege and logical empiricism.

Carnap had studied with Frege.

Wittgenstein's *Tractatus* was intended, and was hailed by Russell, as the culmination of the enterprise of logical analysis begun by Frege.

Carnap's masterwork, *Der Logische Aufbau der Welt*, which attempted to reduce all of science to phenomenal experience, was itself patterned on Whitehead and Russell's *Principia Mathematica*, which had, like Frege's *Grundgesetze*, attempted to reduce all of mathematics to logic.

Carnap *Aufbau* extended the Frege-Russell project to empirical science.

It would be a mistake, though, to take the logical empiricists as completely aligned with Frege.

Fregean senses, in their third realm, may well be the kinds of metaphysical objects that the logical empiricists were deriding.

The logical empiricists were much closer to Russell, who denied the existence of senses, than to Frege.

### III. The Verification Theory of Meaning

The logical empiricists presented a verificationist theory of meaning, inspired directly by Hume and Locke.

Hume believed that for a term to be meaningful, it had to stand for an idea in one's mind that could be traced back (in some sense) to an initial sense impression.

Remember that Hume wanted to commit to the flames, as meaningless, any speculative metaphysics.

The logical empiricists replaced Hume's theory of language (which we saw originally in Locke) with a verifiability theory of meaning.

Influenced by Frege's demand for objectivity, and his rejection of idealism, the logical empiricists demanded that expressions stand for publically observable objects.

More importantly, the logical empiricists took from Frege the context principle, the claim that the primary unit of meaningfulness is the sentence, rather than sub-sentential expressions.

The transition from terms to sentences can be traced to Jeremy Bentham, in the late eighteenth and early nineteenth centuries; see Quine's "Five Milestones of Empiricism," in his *Theories and Things*.

One could describe the logical empiricists as combining Frege's logical tools with Hume's empiricist principles.

The verification theory says that for a sentence to be meaningful, it must be verifiable, in some sense. Any sentence which is unverifiable, including especially claims related to the examples A-G above, is meaningless.

The logical empiricists welcomed scientifically legitimate (i.e. verifiable) reformulations of some traditional philosophical problems, even some of which seemed like metaphysical nonsense. For example, Newton and Leibniz had debated the question whether space is relational or absolute; see the Leibniz-Clarke correspondence.

The absolute/relational debate persisted through Kant's defense of the absoluteness of space, and it appeared essentially metaphysical.

An early influence on logical empiricism, the scientist and philosopher Ernst Mach, had argued against absolute space on logical empiricist principles.

No one is competent to predicate things about absolute space and absolute motion; they are pure things of thought, pure mental constructs, that cannot be produced in experience. All our principles of mechanics are...experimental knowledge concerning the relative positions and motions of bodies... No one is warranted in extending these principles beyond the boundaries of experience. In fact, such an extension is meaningless, as no one possesses the requisite knowledge to make use of it. (Mach, *Science of Mechanics*, 280; cited in William Craig, *Time and the Metaphysics of Reality*, p 124)

But the logical empiricists were later able to interpret the question so that it had empirical, scientific meaning.

Einstein's theory of relativity provided evidence for the relativity of space to an inertial frame of reference.

The theory of relativity made testable and verifiable claims which allowed the logical empiricists to transform the old, metaphysical debate into a legitimate, scientific one, decided, for the time, in favor of relational space.

While some metaphysical questions could be re-cast as scientific ones, the logical empiricists believed that many philosophical problems, like the problem of free will, could be dissolved, rather than solved.

The challenge for the logical empiricists was to clarify what it meant to verify a sentence.

This challenge turned out to be more difficult than it seemed, and led, along the way, to the development of the philosophy of science as a significant research area in philosophy.

The core idea of the principle of verification is that all our justifiable claims are traceable to a core set of claims which refer only to things or events that we can experience.

The logical empiricists claimed that all of science (and philosophy) can be founded on the basis of observation statements in conjunction with the logical and mathematical principles used to regiment and derive those observations.

Claims that are not observable may be derived from the axiomatic observations, or introduced by definition.

But, all and only meaningful statements will be analytic, observable, or derivable (using logic) from observable axioms.

#### IV. Verificationism and Circularity

I mentioned that the logical empiricists held that for a sentence to be meaningful, it had to be verifiable, in some sense.

Explaining the “in some sense” clause turned out to be trickier than the young Ayer imagined.

The readings from Ayer and Hempel mainly consist of attempts to explicate the notion of verifiability in order to capture the logical empiricists’ intent.

By the end of the Hempel article, it is clear that the logical empiricist’s project faces serious difficulties. The death blow for logical empiricism was Quine’s article, “Two Dogmas of Empiricism,” which we will read next.

But, you can see the seeds of Quine’s argument at the end of Hempel’s paper.

One serious problem with the verifiability theory of meaning is its apparent circularity.

The theory claims that a proposition is meaningless unless it is verifiable.

But, to know whether the statement is verifiable, we need to know what it means.

For example, few of us know whether 1 is verifiable.

KK                    Kichwa chake kikubwa.

If we know that KK means that the meaning of life is 42, we can claim that it is not verifiable.

If we know that KK is Swahili for HB, then we can claim that it is verifiable.

HB                    His head is big.

Recall Alice’s confusion on first hearing “Jabberwocky.”

After Humpty Dumpty explained that ‘slithy’ referred to things that were lithe and slimy, Alice could verify whether any toves are in fact slithy.

But, until she knew the meaning of the terms, she could not know whether the sentences in which they occurred were verifiable or not.

If we know what a proposition (or sentence or statement) means before we verify it, then verificationism is not doing any semantic work.

There seems to be a difference between real nonsense (gibberish) and metaphysical claims.

Metaphysical claims can be grammatical, and composed of terms which otherwise might refer.

They can combine with other claims in consistent ways.

Some terms which are supposed by the positivists to be meaningless do appear to have content.

Ayer accepts that there are grammatical sentences that can be used to make metaphysical statements.

But, he claims that only some statements express meaningful propositions.

Then, the logical empiricist’s semantic theory will apply to propositions.

Of course, Ayer’s conception of a proposition was different from Frege’s third-realm conception, but it is not exactly clear what he means by ‘proposition’.

Ayer is attempting to avoid the circularity criticism by distinguishing sentences, statements, and propositions.

Sentences have grammatical criteria.

The class of sentences includes questions and commands, analysis of which depends on the more-fundamental indicative sentences.

So, Ayer focuses on statements, sentences which can be used to make assertions.

But some grammatical statements, like RN, are nonsense.

RN                      Quadruplicity drinks procrastination.

To express a proposition, a statement has to be meaningful.

The verification theory is thus supposed to tell us which statements are propositions.

Still, the same problem arises here: we can not know whether we can verify a statement if we do not know antecedently its meaning.

Ayer recognizes the problem.

If a sentence expresses nothing there seems to be a contradiction in saying that what it expresses is empirically unverifiable; for even if the sentence is adjudged on this ground to be meaningless, the reference to “what it expresses” appears still to imply that something is expressed (Ayer 6).

But he doesn't seem to grasp the depth of the problem.

This is, however, no more than a terminological difficulty... (ibid).

The solution Ayer proposes is just the distinction among sentences, statements, and propositions.

Thus, the class of propositions becomes, in this usage, a sub-class of the class of statements, and one way of describing the use of the principle of verification would be to say that it provided a means of determining when an indicative sentence expressed a proposition, or, in other words, of distinguishing the statements that belonged to the class of propositions from those that did not (Ayer 8).

Ayer's so-called solution seems like no solution at all.

Still, even if the verification theory is circular, not all circles are vicious.

It is worth some time to explore the notion of verification and how it is supposed to work as a theory of meaning.

## V. Logical Empiricism and the Analytic/Synthetic Distinction

Ayer started with the following formulation of the verification theory of meaning:

VT            A statement has meaning if and only if the proposition it expresses is either analytic or empirically verifiable.

Ayer uses the phrase ‘literal meaning’, which I will ignore.

Note that VT provides two ways for a statement to be meaningful.

Meaningful statements are either analytic or empirically verifiable.

While empirical verifiability is, strictly speaking, an epistemic concept, the core distinction Ayer is making is between analytic statements, which are verifiable strictly by logical analysis, and synthetic statements, which are verifiable empirically.

Just as Hume had allowed that relations of ideas (logic and mathematics) were legitimate despite not being justified directly by sense experience, the logical empiricists ascribed meaning to analytic statements.

A statement is analytic if the concept of the attribute is contained in the concept of the subject. Thus, BU is analytic because the concept of the bachelor contains the concept of being unmarried.

BU                      Bachelors are unmarried.

Among the analytic statements, according to the logical empiricists, were truths of logic and mathematics which were essential to the construction of scientific theory.

Here, the logical empiricists followed Frege and Russell in their claim that mathematical truths were analytic, against Kant, who claimed that mathematics was synthetic *a priori*.

Kant was an early target of the logical empiricists, who especially derided his claims about mathematics. (In fact, Frege agreed with Kant that geometry was synthetic, but we will ignore geometry.)

Mathematics and logic, according to the logical empiricists, were justifiable strictly by the same methods of analysis which yield the analyticity of BU.

There are ways to define 'analyticity' which do not refer to conceptual containment; we will look at them when we get to Quine.

Even using containment, there are different interpretations of the term.

Kant's version of containment is called (by Frege) beams-in-the-house containment.

Frege contrasts Kant's version with his own 'plant-in-the-seed' version.

The more fruitful type of definition is a matter of drawing boundary lines that were not previously given at all. What we shall be able to infer from it, cannot be inspected in advance; here, we are not simply taking out of the box again what we have just put into it. The conclusions we draw from it extend our knowledge, and ought therefore, on Kant's view, to be regarded as synthetic; and yet they can be proved by purely logical means, and are thus analytic. The truth is that they are contained in the definitions, but as plants are contained in their seeds, not as beams are contained in a house (Frege, *Grundlagen* §88).

For Frege, if one statement follows by purely logical principles (a proof) from another, then the entailment is analytic.

Frege and Russell argued that arithmetic was analytic, since the theorems of arithmetic could be derived from pure logic.

That's their logicism.

Frege and Russell were wrong about the reducibility of mathematics to logic.

Arithmetic can be reduced to logic and set theory, but not to logic itself.

Still, the logical empiricists maintained the Fregean doctrine of the analyticity of mathematics.

Empirical scientific claims, according to VT, were justifiable by the completely different methods of observation.

A standard interpretation of BL is that it is synthetic.

BL                      Bachelors are lonely.

The concept of a bachelor does not contain (either in a plant-in-the-seed way or in a beams-in-the-house way) the concept of loneliness.



The logical empiricists added to the standard interpretation the claim that the meaning of BL consists in the way that we would verify, or test, the loneliness of bachelors.

The logical empiricists' sharp distinction between analytic statements and synthetic ones will turn out to be a weakness of their program.

Hempel noticed the problem.

Whether it is possible to make a sharp theoretical distinction between logical and extra-logical terms is a controversial issue related to the problem of discriminating between analytic and synthetic sentences (Hempel, 61, fn 9).

We will return to the analytic/synthetic distinction.

For the purposes of understanding the problems of the verifiability theory of meaning, we need only consider the second disjunct in the right side of VT.

That is, I will put aside for a week questions about the method of analysis.

## VI. Refining VT

We have still to determine how the logical empiricists believed that we verify a claim.

Ayer first proposes observation as the core of verification.

RS                    A statement is verifiable if some possible sense-experience would be relevant to the determination of its truth or falsehood (Ayer, 11).

He rejects RS because it raises, without answering, the question of how a sense-experience is relevant to a determination of truth.

Ayer neglects the difficulties with 'possible' in RS.

Does it, for example, exclude or include the sense experiences of creatures with different sensory apparatuses from ours?

If we include the sense experiences of Martians, or other aliens, or robots, then we may never know whether a statement is verifiable.

If we only include our sense experiences, then meaningfulness becomes chauvinistic.

Chauvinism is unacceptable as the basis for scientific theory.

We want science to cut nature at its joints, not our joints.

Either interpretation of 'possible' in RS is undesirable.

In lieu of RS, Ayer proposes DO.

DO                    A statement is verifiable, and consequently meaningful, if some observation-statement can be deduced from it in conjunction with certain other premises, without being deducible from those other premises alone (ibid).

The idea behind DO is that a claim with empirical content will have some observable consequences. Claims without empirical content will have no observable consequences.

Hempel provides an alternate version of DO:

DOH. A sentence has empirical meaning iff it is not analytic and follows logically from some finite and logically consistent class of observation sentences (Hempel, 51).

Hempel's allusion to logically consistent sets of sentences is there just because any sentence follows from an inconsistent set.

The fact that any sentence follows from a contradiction in classical logic is what logicians call explosion.

One may reasonably expect scientific theories to be consistent.

If they turn out to be inconsistent, we reject them.

More importantly, Hempel requires that the deduction of a sentence must come from finite sets of observation sentences.

Hempel's concern is that we have only a finite number of experiences from which to derive any further claim.

Hume wanted us to trace all our ideas back to initial sense impressions or commit them to the flames.

Hempel wants to make sure that we don't mistakenly assert that we have more than a finite number of initial sense experiences.

But while any empirical theory is likely to have a finite set of laws as its axioms, scientific theories are generally couched within mathematical theories.

As Galileo wrote, approximately, the book of nature is written in the language of mathematics.

Mathematical theories strong enough for scientific purposes are not finitely axiomatizable.

Still, the core element of both DO and DOH is the explanation of verifiability in terms of observation statements.

Hempel provides a more specific characterization of an observation sentence:

*An observation sentence* might be construed as a sentence - no matter whether true or false - which asserts or denies that a specified object, or group of objects, of macroscopic size has a particular *observable characteristic*, i.e. a characteristic whose presence or absence can, under favorable circumstances, be ascertained by direct observation (Hempel, 51).

Looking at the component parts of observation sentences,

We shall understand by an *observation term* any term which either (a) is an observation predicate, i.e. signifies some observable characteristic (as do the terms 'blue', 'warm', 'soft', 'coincident with', 'of greater apparent brightness than') or (b) names some physical object of macroscopic size (as do the terms 'the needle of this instrument', 'the Moon', 'Krakatoa volcano', 'Greenwich, England', 'Julius Caesar') (Hempel, 53).

According to DO and DOH, the logical empiricists wanted to reduce all synthetic statements to statements whose terms refer to macroscopic objects and properties.

Note that the logical empiricists were working in what were still the early days of atomic theory.

According to logical empiricism, claims about molecules, atoms, and sub-atomic particles (e.g. quarks), if they were to be meaningful, would have to be translated into observational terms.

Such translations would involve, as legitimate terms, references to microscopes, ohmmeters, and other devices for measuring unobservable properties or events.

Translations could also refer to personal sense data.

Notice the affinity to Russell's translations of statements including names or definite descriptions to statements involving logically proper names.

Both DO and DOH seem to do the work that the logical empiricists want from it.

For example, according to DO, the claim that the world was created just now, with all its history and memories as they are, is unverifiable because there are no observable consequences to the claim.

It is part of that claim that all the observable evidence is exactly the same as it would be if the world had existed from long ago.

Still, the observability clause quickly runs into an obvious difficulty.

Some claims are completely legitimate, according to the spirit of logical empiricism, though their truth is unobservable.

For example, Socrates certainly had a blood type.

But, there is no way for us to observe what his blood type was.

We might ascribe to the logical empiricists the claim that meaningful statements must be verifiable, not in fact, but in principle, as a friendly amendment.

We could, in principle, verify Socrates' blood type.

We could not, in principle, verify whether the Absolute is lazy, or whether the world was created five minutes ago with all its historical remnants and memories in place.

It [is] characteristic of the metaphysician, in my somewhat pejorative sense of the term, not only that his statements do not describe anything that is capable, even in principle, of being observed, but also that no dictionary is provided by means of which they can be transformed into statements that are directly or indirectly verifiable (Ayer, 14).

So, we arrive at the claim that a factual (or empirical) statement is meaningful if it is, in some way, under some principle, connected to observation.

Unfortunately, with friendly amendments like this, the logical empiricists need no critics.

The proposed amendment of 'in-principle observation' leads to logical empiricist right back into the chauvinism of possible sense experience I discussed at the beginning of this section.

Even if we were to solve the in-principle/possible observation problem, both DO and DOH still run into some difficulties.

Ayer points out that given the proper other premises, a meaningless metaphysical statement can logically entail meaningful statements.

In SO, 'S' can stand for any statement, including a meaningless one, and 'O' stands for a fully legitimate observation statement:

SO	If S then O
	S
	Therefore O.

SO is an obvious counter-example to either DO or DOH.

The intent behind DO and DOH was that if you had legitimate premises, you would not be able to derive meaningless conclusions.

SO shows that DO and DOH do not provide both necessary and sufficient conditions for meaningfulness. Still, a system of meaningful statements will only entail other meaningful statement.

So, DO and DOH, combined with the right premises, might be promising explications of the principle of verification.

Unfortunately, as Hempel points out, DOH renders all universal laws meaningless.

Let us assume that the properties of being a stork and of being red-legged are both observable characteristics, and that the former does not logically entail the latter. Then the sentence

(S1) All storks are red-legged

is neither analytic nor contradictory; and clearly, it is not deducible from a finite set of observation sentences. Hence, under the contemplated criterion, S1 is devoid of empirical significance; and so are all other sentences purporting to express universal regularities or general laws. And since sentences of this type constitute an integral part of scientific theories, the verifiability requirement must be regarded as overly restrictive in this respect (Hempel 52).

Universal laws do not follow deductively from any finite set of observation sentences.

And, universal laws are essential to all good science.

If the logical empiricists want anything, it is to vindicate empirical science.

The problem of how to verify a universal statement is related to the difficulty Ayer mentions with strong verifiability.

Ayer claimed that a statement is strongly verifiable if it could be conclusively established; it is weakly verifiable if it is rendered probable by verificationist means (whatever they turn out to be), p 9.

In retrospect, he realized that no empirical claim is ever conclusively established, since, again, no finite set of observations suffices to establish a universal generalization.

Thus, his strong/weak distinction collapses; all verification is weak, in his original sense.

A related, apparently-intractable difficulty is that VT seems to pronounce some sentences meaningful while closely-related ones are not.

It seems reasonable to believe, and the logical empiricists did, that a statement is meaningless if and only if its negation is meaningless.

This claim is a corollary of Hempel's condition (A).

(A) If under a given criterion of cognitive significance, a sentence  $N$  is nonsignificant, then so must be all truth-functional compound sentences in which  $N$  occurs nonvacuously as a component. For if  $N$  cannot be significantly assigned a truth value, then it is impossible to assign truth values to the compound sentences containing  $N$ ; hence, they should be qualified as nonsignificant as well (Hempel 51).

But, the negation of every existential claim is a universal one.

Compare BU and BU<sub>r</sub> with their respective negation, NBU and NBU<sub>r</sub>

BU                    There are balls of uranium greater than a mile in diameter.  
BU<sub>r</sub>                     $(\exists x)(Bx \cdot Ux \cdot Hx)$

NBU                    There are no balls of uranium greater than a mile in diameter.  
NBU<sub>r</sub>                     $(x)[(Bx \cdot Ux) \supset \sim Hx]$

BU and BU<sub>r</sub> are meaningful, even if they are false, since they make finitely verifiable claims about observable objects.

But, NBU and NBU<sub>r</sub> are impossible to derive from a finite set of observations.

As NBU<sub>r</sub> shows, they are essentially universal claims.

And, as we saw, universal laws seem to be meaningless on the VT.

Thus, NBU and NBU<sub>r</sub> should be meaningless.

So, some meaningless universal claims have meaningful negations, violating Hempel's (A).

Just as universal claims are not derivable from any finite set of observation sentences, dispositional terms are not reducible to observational terms.

For example, we can define fragility in terms of what would happen if an object were struck.

Thus, Brad Pitt is fragile if he would break if he were struck.

If Brad Pitt is never struck (they have stunt men for this sort of thing), he would automatically be categorized as fragile.

The conditional 'if he were struck, he would break' would be vacuously true.

We have seen difficulties with both RS and DO/DOH as attempts to explain the verifiability theory of meaning.

Both Hempel and Ayer discuss a completely different tactic.

One might define meaningfulness in terms of falsifiability.

This suggestion derives from Karl Popper, a contemporary of the logical empiricists, but not a member of the group.

Popper thought that the difference between real science and pseudo-science was that real sciences were falsifiable, and pseudo-sciences admitted of no falsification.

His main concerns were to show that Marxism and Freudianism were pseudo-sciences.

Thus, he had concerns which were consistent with the logical empiricists' desire to eliminate claims A-G.

Popper's work is interesting, but too far away from philosophy of language and into philosophy of science for our purposes.

See Popper's excellent *Conjectures and Refutations*, if you are interested in falsifiability.

In the end, Ayer settles for a distinction between indirect and direct verification.

Directly verifiable statements are those which either are observation-statements or, in conjunction with other observation-statements, entail other observation statements which are not deducible from the original ones alone.

What counts as an observation statement is left as an open question.

Ayer eliminates counter-examples like SO by requiring that all statements involved in the deduction are observation-statements.

Indirectly verifiable statements are, similarly, those which entail directly verifiable statements, in conjunction with other kosher statements.

And all meaningful statements are either analytic, or directly or indirectly verifiable.

## VII. The End of Foundationalism

The core idea of the principle of verification is that all our legitimate claims are traceable to a core set of claims which refer only to things or events that we can experience.

There is a class of empirical propositions of which it is permissible to say that they can be verified conclusively. It is characteristic of these propositions, which I have elsewhere called “basic propositions,” that they refer solely to the content of a single experience, and what may be said to verify them conclusively is the occurrence of the experience to which they uniquely refer... Propositions of this kind are “incorrigible,”...[in that] it is impossible to be mistaken about them except in a verbal sense (Ayer, 10).

Notice the foundationalism implicit in Ayer’s statement.

Logical empiricism was the last, foundationalist theory.

The claim made by the logical empiricists is that all of science (and philosophy) can be founded on the basis of observation statements in conjunction with the logical and mathematical principles used to regiment and derive those observations.

Claims that are not observable may be derived from the axiomatic observations, or introduced by definition.

But, all and only meaningful statements will be analytic, observable, or derivable from observable axioms.

A fundamental presupposition of logical empiricism, then, is that one can make a clear distinction between an observation statement and an analytic one.

This distinction was rooted in Wittgenstein’s distinction between sensible statements and logical nonsense.

The logical truths were, for Wittgenstein, logical nonsense.

The logical empiricists called them analytic.

All agreed, though, that they were easily derivable within formal logic.

The analytic truths were sharply in contrast with the synthetic ones.

Synthetic claims had to trace back, in some way, to observation.

Indeed, the whole of the atomist movement, from Locke and Hume through Wittgenstein and the logical empiricists rests on this distinction between analytic and synthetic propositions.

Quine’s holism, which we will examine next, devastated the logical empiricists’ project.

Quine’s argument attacks the fundamental presupposition of logical empiricism that one can make a clear distinction between an observation statement and an analytic one.

The worries about isolating observation statements, though, are already present in Hempel’s article.

In the language of science, and for similar reasons even in prescientific discourse, a single statement usually has no experiential implications. A single sentence in a scientific theory does not, as a rule, entail any observations sentences; consequences asserting the occurrence of certain observable phenomena can be derived from it only by conjoining it with a set of other, subsidiary, hypotheses (Hempel, 56).

Wittgenstein and the positivists presented a system on which individual sentences, pictures of states of affairs, were verified or not, and connected only by logic into a big theory.

The holist’s claim is that the meaning of a single expression is elliptical, incomplete on its own.

It requires, for its meaning, reference to an entire linguistic framework, a theoretical context which forms the background to that expression.

If...cognitive significance can be attributed to anything, then only to entire theoretical systems formulated in a language with a well-determined structure (Hempel 57).

Hempel here alludes to what has come to be known as semantic holism: the unit of empirical significance is not the individual sentence, but the entire theory.

Quine's arguments against logical empiricism and the verifiability theory of meaning, and his arguments for semantic holism are next.