

# **PHILOSOPHY OF SCIENCE**

**LECTURE FOUR  
PHILOSOPHY IN A WEEKEND**

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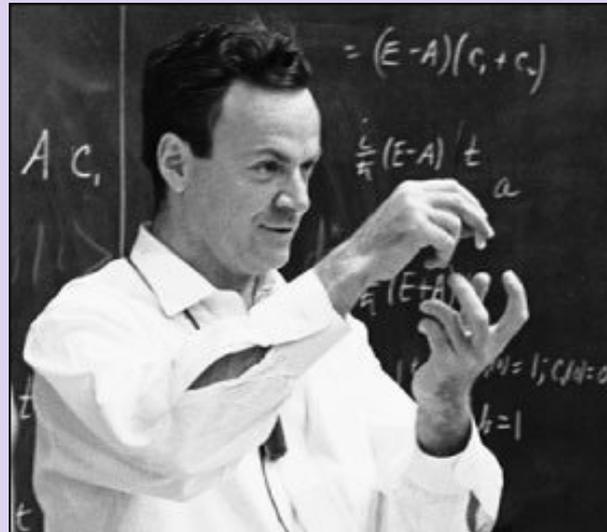
**In philosophy of science our aim is to stand back from science...**

**...to look at what scientists aim to do and...**

**....what their strategies are for doing it**

**Not everyone is a fan of philosophy of science.**

**Richard Feynman once said that “Philosophy of science is as much use to scientists as ornithology is to birds”**



**Is it true, do you think, that ornithology is no use to birds?**



**It is not true that ornithology is of no use to birds**

**But it *is* true that a *knowledge* of ornithology has never helped a single bird do a single thing**



**In the same way scientists can do their thing quite independently of knowing any philosophy of science**

**Science wouldn't be as successful as it is, furthermore, if scientists weren't good at doing their thing**



**But whereas birds are incapable of reflecting on themselves and their actions...**

**...human beings can and do reflect on themselves and their actions...**

**...and arguably their ability to do this contributes hugely to their success**

**So though no-one would want scientists to stop doing science and start doing philosophy of science...**

**...it is surely a good thing that *some* people do philosophy of science?**

**Science is held in high regard because of its phenomenal success in doing things people want done**

**Why do you think science is so hugely successful?**

**Possible answer:**

**Science is successful because it involves *reasoning logically from objective facts***



**We have already looked at what it is to  
*reason logically***

**Now let's examine *objective* facts**

## Here are some putative facts about facts:

- facts are a firm, reliable ground from which we deduce scientific theories
- facts are things of which we are *certain* (or at least as certain as possible)
- facts are accessible to the (extended) senses of careful, unprejudiced observers
- facts are prior to and independent of theory

Would you accept them?

**There are facts of different sorts:**

- *states of affairs* (there being craters on the moon)
- *perceptual experiences* (of craters on the moon)
- *thoughts* [there are craters on the moon]
- *statements* ‘there are craters on the moon’

**From which type of fact do you think we derive scientific theories?**

**Let's have a look at each type of fact...**

**... and see whether facts of this type...**

**... can be the sort of fact...**

**... that will ground a scientific theory**

**The *state of affairs* of there being  
craters on the moon...**

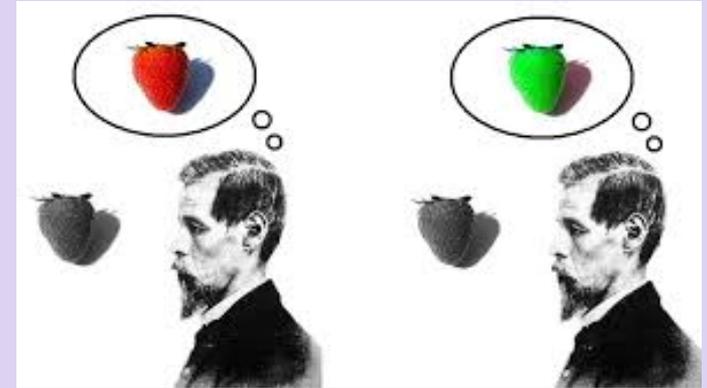
**...cannot ground anything  
unless it is *perceived*...**



**...nor can it enter into logical relations...**

**...so it *cannot* be the sort of fact from  
which scientific theories are *deduced*...**

***Perceptual experiences* of craters on the moon are essentially subjective...**



**... no *two* observers can ever enjoy the *same* perceptual experience...**

**... so perceptual experiences are not *objective* facts...**

**...and not, therefore, the sort of facts on which we ground science**

***Thoughts* about craters on the moon are *not* essentially subjective...**

**...and they *do* enter into rational relations**

**... but they are only accessible to others...**



**... when they are expressed as meaningful statements...**

***Statements are not accessible to the senses of observers...***

**... no matter how careful and unprejudiced the observer,  
or how 'extended' the senses...**

**...they can only be *understood* ...**

**... when others exercise their understanding...**

**...of the *language* in which the statement is  
couched.**

**But statements *can* enter into rational relations...**

**... in such a way that we can *deduce* things from them...**

**...they are accessible to everyone who understands the language in which they are expressed...**

**...and we can be certain of their existence**

**If facts are to be the foundation of science...**

**... in virtue of the fact that we can be certain  
they exist...**

**...they are accessible to all...**

**...and we can logically deduce theories  
from them...**

**... then facts can only be *statements***

**People are often surprised about this...**

**...because they think of facts like *there being craters on the moon...***

**...as being the facts on which science is based**

**But facts like this cannot ground science...**

**... they can, however, *make true* the facts  
that ground science**

**So the facts that ground science are**  
***statements about* (e.g.) craters on the moon...**

**...which are *made true by* craters on the**  
**moon**

**Lots of people are surprised to discover that the facts grounding scientific theories are statements *about* the world rather than states of affairs *in* the world**

**But that's because we use language so easily that we become completely unconscious of it**

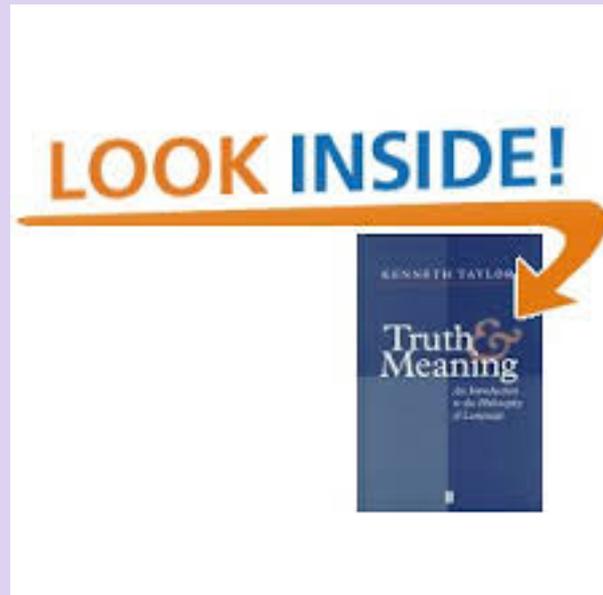


**In the same way we *think* about the world so easily that we are unconscious of it**

**But the language in which we do science**

**And the thoughts we express in that language  
are crucial**

For example it is a necessary condition of discerning *truth* that we discern *meaning*



**Все счастливые семьи похожи друг на друга, каждая несчастливая семья несчастлива по-своему.**

**And if we *think* we understand something  
when we don't things can go badly wrong**

**On September 23<sup>rd</sup> 1999 the \$125 million Mars Climate Orbiter crashed into Mars.**

**The units Lockheed Martin was using were imperial**

**The units NASA was using were metric**

**[http://www.time.com/time/specials/packages/article/0,28804,1982672\\_1982673\\_1982667,00.html](http://www.time.com/time/specials/packages/article/0,28804,1982672_1982673_1982667,00.html)**

**There are two sorts of knowledge involved in determining the truth of *every* statement:**

- 1. knowledge of the meaning of the statement**
- 2. knowledge of the world**

**It is the job of philosophers to acquire knowledge about meaning (and the concepts that are expressed by words)**

**It is the job of scientists to acquire knowledge about the world (and so the *truth* of statements with certain meanings)**

**If philosophers assume empirical claims they can go wrong in their findings**

**If scientists assume meanings that are wrong they can go wrong in their findings**

**The claims about free will based on papers by Benjamin Libet and John-Dylan Haynes...**

**... are examples of what can happen when scientists wrongly assume...**

**... they understand philosophical concepts such as *free will***

**Many people believe  
that Libet and Haynes  
have shown that there is no such thing as free  
will**



**Philosophers generally  
agree that the papers  
show no such thing**



**The problem is that ‘free will’ is such a difficult philosophical concept**

**Determinism is usually thought to be incompatible with free will**

**But ‘soft-determinism’ is not incompatible with free will**

**If compatibilism (or soft determinism) is true  
then the experiments show nothing at all  
about free will**

**Even if hard determinism is true the concepts used in the experiment need to be properly understood**

**How do you think beliefs differ from desires?**

**Scientists and philosophers need each other if we are to discover the truth about the world in which we live**

**Once we recognise that the facts on which science is based are statements...**

**...we have to recognise that they can be false**

# Here are some statements that seemed obviously true when first mooted but that we now know to be false:

*‘The Earth is stationary’*

(we had to discover inertia before we realised that the fact we land on, and not away from, the spot we jumped from does not demonstrate the truth of this claim)

*‘Venus does not change its apparent size during the year’*

(Galileo’s telescope was needed to demonstrate that this was false and not true, as it seemed to be when the naked eye was used)

*‘The Moon gets bigger as it nears the horizon’*

(This was seen to be false when we learned how to use a sighting tube fitted with cross wires so orientation of the moon could be read on a scale)

**There is no certainty...**

**... even at the level of the objective facts...**

**...on which we ground our theories...**

**...because the facts on which science is based are statements...**

**... that can be either true *or* false**

**Reflecting on scientific method tells us all sorts of things that might be of use to scientists**

**But even if they're not the activity is intrinsically rewarding**

**Science is one of the most important things humans do so surely it is good to apply our capacity for reason to it?!**

## References:

**John Dylan-Haynes: short video on his experiment purporting to show that free will doesn't exist:**

<https://www.youtube.com/watch?v=-i3AiOS4nCE>

**Nature article on philosophers' responses to scientific studies on free will**

<http://www.nature.com/news/2011/110831/full/477023a.html>

**An empirical refutation of Libet's experiment:**

<http://www.newscientist.com/article/dn22144-brain-might-not-stand-in-the-way-of-free-will.html#.VDvoqr6yhFI>

**A Philosophical refutation of Mele's interpretation of his experiment:**

<http://www.summer12.isc.uqam.ca/page/docs/readings/Mele-Alfred/Mele.pdf>