14.C: the ***Philosophyldeas*** overview of

Induction

What is the rational response to an observation of the same thing happening over and over again? This is a situation which faces any living creature, and it is also a central question for the highest levels of science. This problem (of scientific induction) can be generally described as 'learning from experience', but it is only when our experiences are repeated that there appears to be something like logic involved. Four species of induction have been identified: the most discussed form is 'enumerative' induction, in which we count the build-up of repetitions. The standard idea of induction is that at some point this build-up triggers a universal claim, that they are *all* like that. If instead we just assess a rising probability, this is 'statistical' induction. There is also 'ampliative' induction, which says a whole group has some feature observed among some of the members. 'Eliminative' induction homes in on a truth by observing negative instances (as in eliminating criminal suspects).

Enumerative induction is so normal that even animals practise it, but the presuppositions and aims of induction are of interest. If the world were wildly unpredictable there would be nothing to learn from experience, so induction latches onto presumed regularities in what we observe. A common suggestion is that induction relies on the presumption that the future will be like the past. Presumably historians can reason inductively about a dead culture, so this can't be strictly true, but induction certainly expects continuity. However the world is famous for continually changing, so what is it that must remain 'the same'? Candidates for this are properties, objects (including the inductive thinkers, and their memories!), natural kinds and laws. Even more basic are the concepts of resemblance and identity, so our metaphysical background for induction makes a difference. If determinism were true, and each event followed necessarily from its cause, then the future is so reliable that perfect induction would reveal the whole of it.

The best known **sceptical** commentary on induction comes from empiricists. We expect the future to resemble the past, and resemblances among the properties of objects to persist, but why? If we say 'because it has worked well so far', that uses induction to justify induction. If we ask for a reason why the world will remain the same for inductive purposes, no reason can be given, because it might not stay the same. We assume the sun will rise tomorrow, but cosmic explosions and collisions happen, and tonight could be that night. Empiricists say that induction rests not on reason, but on 'habit'. Constant repetition drills the human brain into expectations, but we can never know if we are seeing the whole picture (in which that expectation will actually be thwarted). Even the biggest fan of induction (which is, after all, the foundation of most of our knowledge) must admit some of this scepticism. Induction latches onto regularities in the world, but we could hardly prove the impossibility of ever disturbing these regularities.

Uncertainty about the world's regularity is not the only problem for induction. If, after a substantial series of observations, we insist on making a universal claim about ***all*** of these cases, how can this be justified if you haven't seen them all? 'All numbers are less than a million' is supported by nearly a million cases, and albino crows are so rare that a huge amount of research is unlikely to falsify 'all crows are black'. If we want to be dutiful empiricists, and only report what we have actually experienced, we not only can't make rational universal claims, but we can't even talk of the statistical possibilities for the next observation. This is impressively modest, but our whole culture and science depends on a multitude of universal claims, especially those which are taken to be laws of nature.

These accepted universal claims rest on the related concept of a '**natural kind**'. This idea rests on the principle 'seen one, seen them all' – that is, if you analyse one tiger or one sample of gold, you can assume that what you learned applies to all of them, because tigers and gold are judged to be natural kinds. This will not, of course, solve the problems of induction, because we only judged tigers and gold to be natural kinds by examining a lot of samples and finding them all pretty much the same – and that relies on induction. Induction is so fundamental to our thinking that it is inconceivable that we could learn anything about the real world without it. We could (reluctantly) treat induction as a 'primitive' in our conceptual scheme, about which nothing useful can be said, but probably it is better to treat induction as a conditional activity. That is, *assuming* the world is going to remain unchanged in its main regularities, it is rational to employ inductive thinking. Rational people, though, should always be ready for the unexpected.

Traditional induction is a fairly superficial activity, in that it extrapolates from what has been observed, and predicts and generalises about what will be observed next time, but it doesn't ask ***why*** this regularity occurs. Critics of this very empirical activity say we should dig deeper, in a search for the sources of the patterns we observe. The aim is explanation, rather that prediction and description. Thus we don't just surmise that 'all swans are white', but we investigate the genetics which produces the whiteness. If we grasp the 'essence' of swans, we might show the necessity of their being white, which would take us far beyond the normal generalisations that emerge from induction.

Two well-know paradoxes of induction have emerged. If all observed emeralds have been 'green', you can reasonably predict that tomorrow's emerald will be green. If a predicate '**grue**' means 'observed and green, or not-observed before tomorrow and blue', then the same observed emeralds can be described as 'grue'. However, when grue emeralds are observed tomorrow, they will look blue, not green. Hence the prediction of an induction seems to depend on the words used to describe what is observed. We may have to concede that induction is entirely relative to language, or else find criteria for the sorts of predicates which must be used if traditional induction is to be trusted.

A second problem is that if we wish to confirm 'all ravens are black', it seems obvious that we examine the colour of lots of **ravens**. However, that sentence is logically identical to 'all non-black things are non-ravens' (e.g. if it's pink, it can't be a raven). This suggests that confirming the second sentence is no different from confirming the first – but that means examining non-black objects, such as pink shoes, which seems wildly different from checking the ravens. It is true that if you examine every non-black thing in the universe (thus eliminating them) you could arrive at the same result, but it seems like a crazy procedure, even if the logic supports it. This paradox certainly undermines simple ideas of how to confirm a general truth, and points to what the sentence is about having as much importance as which objects it singles out.