KR-IST - Lecture 6a
Epistemology

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February 21, 2012

Introduction

AI uses methods (such as search) for producing intelligent forms of behaviour, i.e., behaviour which seems to be based on knowledge.

But what is knowledge exactly?

Analysis of the forms knowledge can take is called *empistemology*.

Greek philosophers (Aristotle, Socrates, Plato etc.) gave particular attention to epistemological issues.

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We are conscious of

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- sensory stimulation

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Thinking (on a good day) can seem to be a process in which we chain inferences together to reach some kind of conclusion.

We call this **reasoning**.

The process seems to involve reference to **facts** and **relations**.

But we also experience knowledge in other ways.

Knowing how vs knowledge by acquaintance

In *The Concept of Mind*, Gilbert Ryle introduced the distinction between **knowing how** and **knowing that**.

Much earlier, Socrates introduced the idea that knowledge is **true belief**, i.e., if you believe that X, and it is true that X, then you have knowledge that X.

But it seems a bit odd that one could gain knowledge just by adopting a true belief at random.

Rationalism v. empiricism

How does knowledge come into existence?

Two main possibilities:

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- We acquire it by reasoning. **Rationalism**
- We learn it from sensory data. **Empiricism**

John Locke introduced the idea that the mind at birth is like a **white page** (blank slate).

All ideas are seen to develop from experience.

Locke distinguishes simple ideas ("red", "sweet", "round") from complex ideas like "number", "cause".

Induction

One way of integrating rationalism with empirism involves seeing knowledge as the outcome of **induction**, i.e., the process of learning rules from experience.

This does seem to be the basis of learning and science.

From seeing that swans are white, we derive the law that all swans are white.

Using this, we predict that an unseen swan is going to be white.

This certainly seems like knowledge.

But can we really treat inductive inferences as knowledge, given they may turn out to be false?

The problem of induction

Let's say every swan ever observed is white.

Is there any reason to expect unseen swans to be white?

Intuitively, yes, because we expect the world to show uniformity. If we see a preponderance of white swans, we expect more of the same.

But is there any reason to expect the world to show uniformity?

The only way we could justify this assumption is by induction!

That would make the whole thing circular.

So it seems there cannot be any firm, foundation for inductively derived laws.

David Hume

The philosopher most associated with this demonstration is David Hume.

As he noted, the validity of inductive generalizations depends on nature's uniformity.

The validation of inductive generalization therefore involves demonstrating that nature exhibits uniformity.

The only basis on which we can know about the uniformity of nature is by induction.

Attempts to validate induction using a uniformity assumption are 'going in a circle, and taking that for granted, which is the very point in question' (Hume, Enquiry, Salle Court, 1748, p. 80).

Can there be scientific knowledge?

The fact that induction cannot be placed on a firm foundation seems to imply all science is ultimately just guesswork.

Bertrand Russell summarised the situation by pointing out this implies 'there is no intellectual difference between sanity and insanity'.

He suggests scientists are on an equal footing with 'the lunatic who believes that he is a poached egg.' (Russell, 1946, p. 673)

Falsificationism

Karl Popper argued scientists should not even try to induce laws, because it just can't be done.

They should use **falsification** instead.

This means always sticking to hypotheses that can be proved wrong.

Progress is achieved simply by falsifying one hypothesis after another.

We can't assume the process is getting closer to the truth unfortunately.

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