

Knowledge and the scientific method: basic intellectual self-defence and hands-on scepticism

Edward Andò for Cortecs

EEATS PhD Day – 14th of June 2017

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 1. Top-level introduction of **science**
 2. Introduce tools for **intellectual self-defence**
 3. **Critical thinking** in general and specifically in Grenoble

We inhabit a complex informational world

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- ▶ information can be wrong
- ▶ information can be manipulated
- ▶ information and conflicts of interest
- ▶ information and crazy ideas

What is in people's heads

- ▶ Opinion
- ▶ Fact
- ▶ Statement
- ▶ Belief
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An important distinction:

1. acts of **Faith**
A matter of choice, bears no proof
2. **Convinced adherence** by **evidence** and **logical reasoning**

Different types of statements about the world

Non-science

- ▶ Art
- ▶ Introspection
- ▶ Faith and Spirituality
- ▶ Literature
- ▶ *etc.*

(Subjective)

Science...

(As objective as possible)

Science?

Science has many different meanings:

1. Scientists



<http://rickandmorty.wikia.com/wiki/>

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4. and...

4. Binding intellectual endeavour

to strive to make assertions that are:

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This definition¹ keeps all types of **science** together with a common method

¹Methodological Monism – “without a split”

Science: Trying to describe reality as accurately as possible

Basic **premisses** to be able to do this:

1. Reality exists (some sort of reality)

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Materialism – not assumed² but adopted as a matter of course in our work as scientists:

No super-natural entities.

²ontological

The scientist's lay contract

Any unproven super-natural entity introduces a weakness into the whole system.

Backwards pandora's box!

Of course things can and do exist without us detecting them directly → **testability**



<http://flickr.com>

Testability

A scientific assertion must be testable

Are these testable assertions?

Discover the Mystery
of the Psychic

The Moon & Stars
Can Be Yours

KEANO

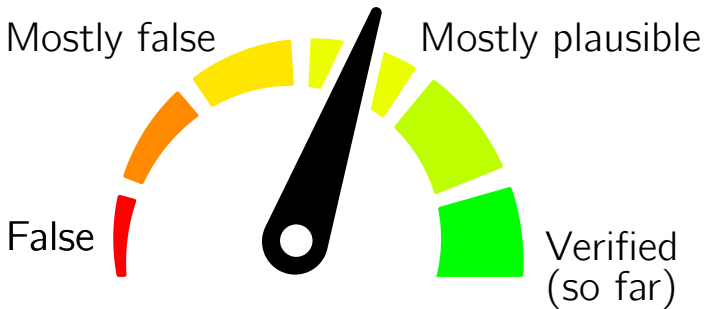
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Removes Jealousy - Evil Eye
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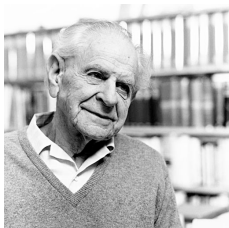
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Icons adapted from Freepik

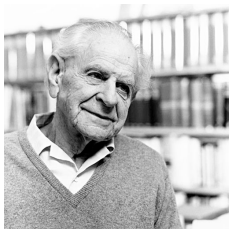
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<http://piel-l.org>

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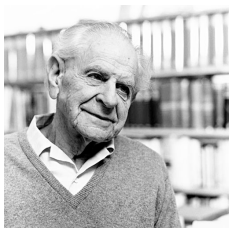
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The criterion of **falsifiability** or **refutability**

A scientific theory must come with a way in which it can be falsified

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Does science operate like this day-to-day when **generating theories**?

Not sure but must be true for an existing theory

Occam's Razor – Theory building



<https://inourwordsblog.files.wordpress.com/>

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- ▶ Principle of sparsity or “parsimony” of hypotheses
- ▶ Notion of complexity and weight of the explicative entities
- ▶ Can be used to select between competing theories with the same predictive power.
- ▶ More often to guide the *development* of theories

(Let's try these tools!)

Theory

- ▶ No act of faith necessary

Scenario

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- ▶ Isolated from evidence

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Hume's Maxim



David Hume

<https://withalliamgod.wordpress.com>

“That no testimony is sufficient to establish a miracle, unless the testimony be of such a kind, that its falsehood would be more miraculous[...].”

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Discovering sources of bias

⇒ Other's potential sources of bias

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Last tool: Remember the Aliens, what would they think?

The context in Grenoble

**“COLlectif de Recherche Transdisciplinaire
Esprit Critique & Sciences”**

Cortecs <https://cortecs.org/>

Soon: 3rd October. SFR (Research structure) on “Pensée Critique”:
Critical Thinking research, a first in France!

Thanks for your attention

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- ▶ Cortecs in Grenoble