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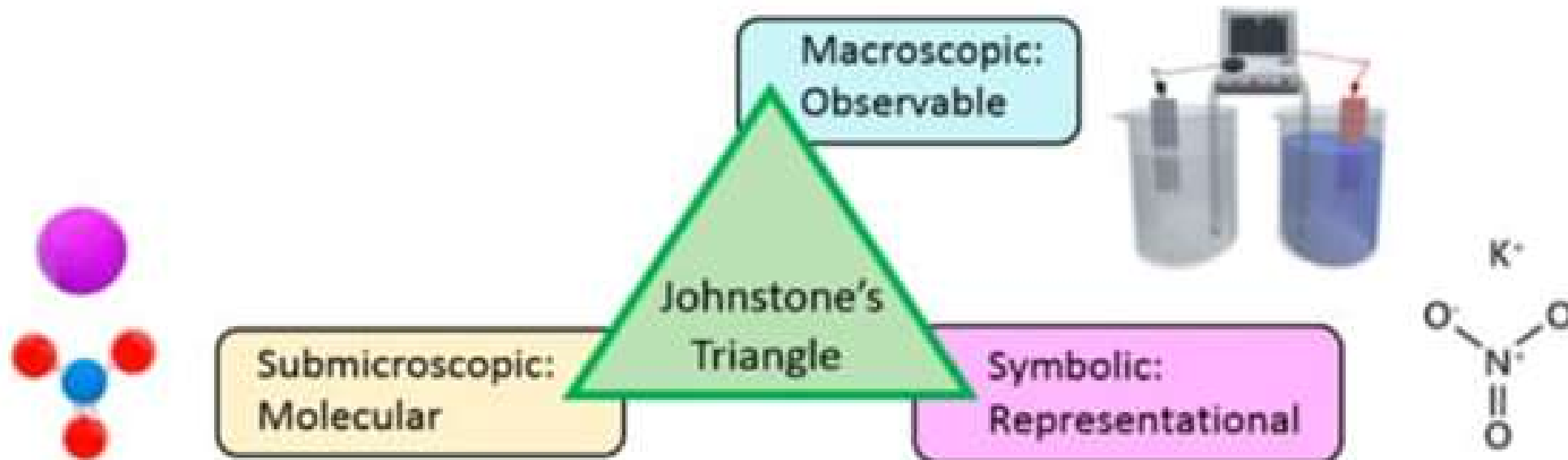
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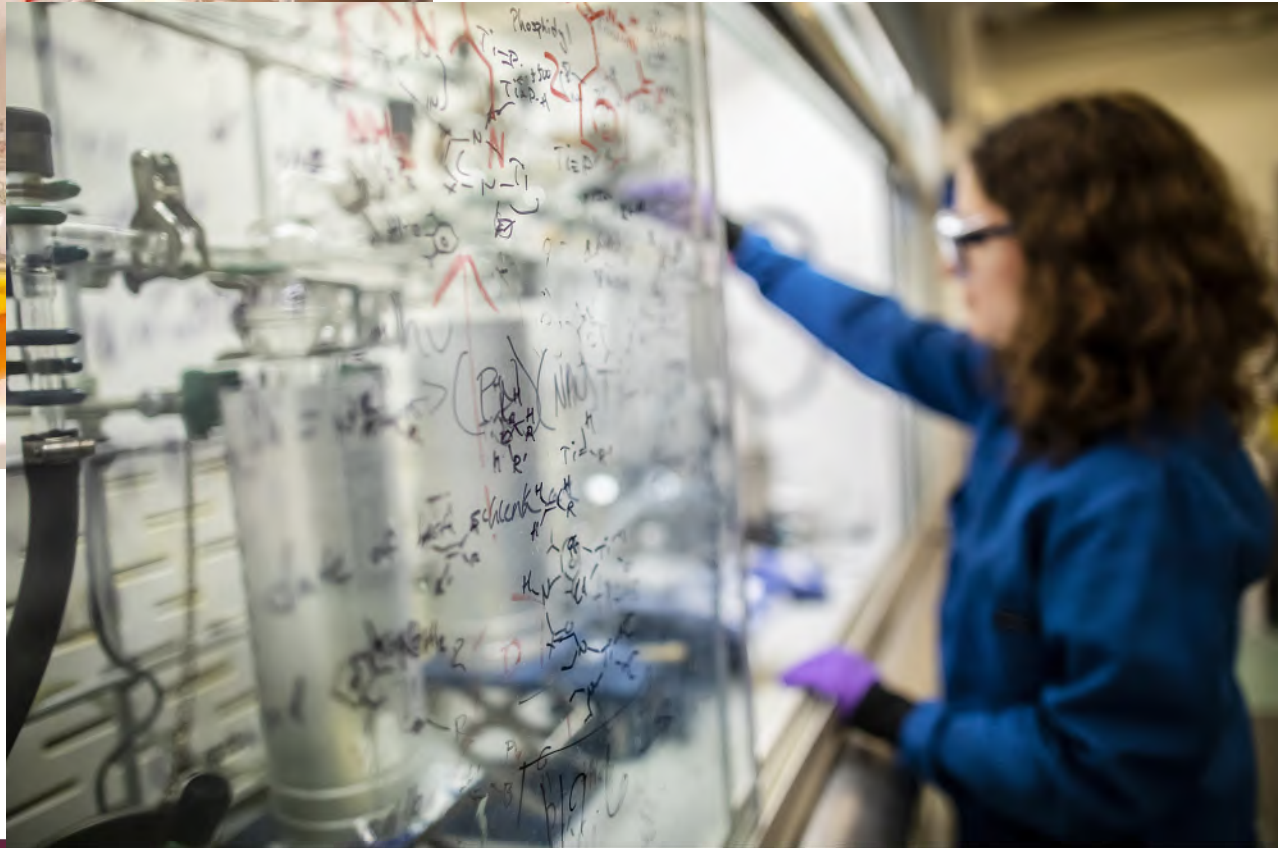
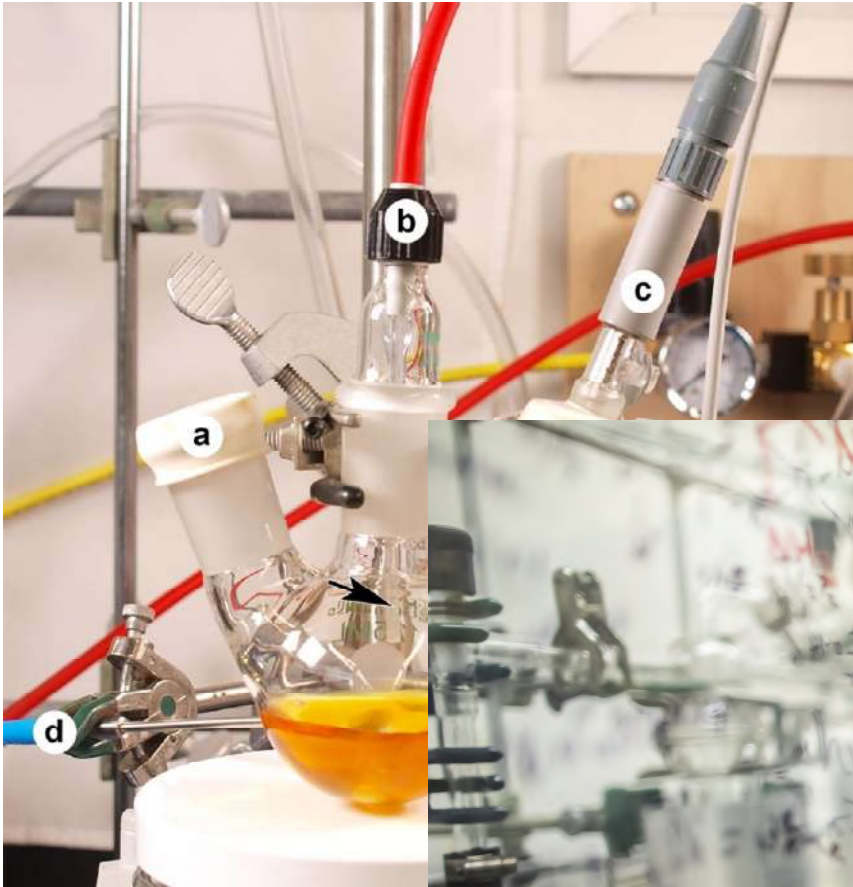
The importance of the human person at the heart of scientific investigation

Dr Margaret Blackie

Department of Chemistry and Polymer Science

The challenge of learning chemistry

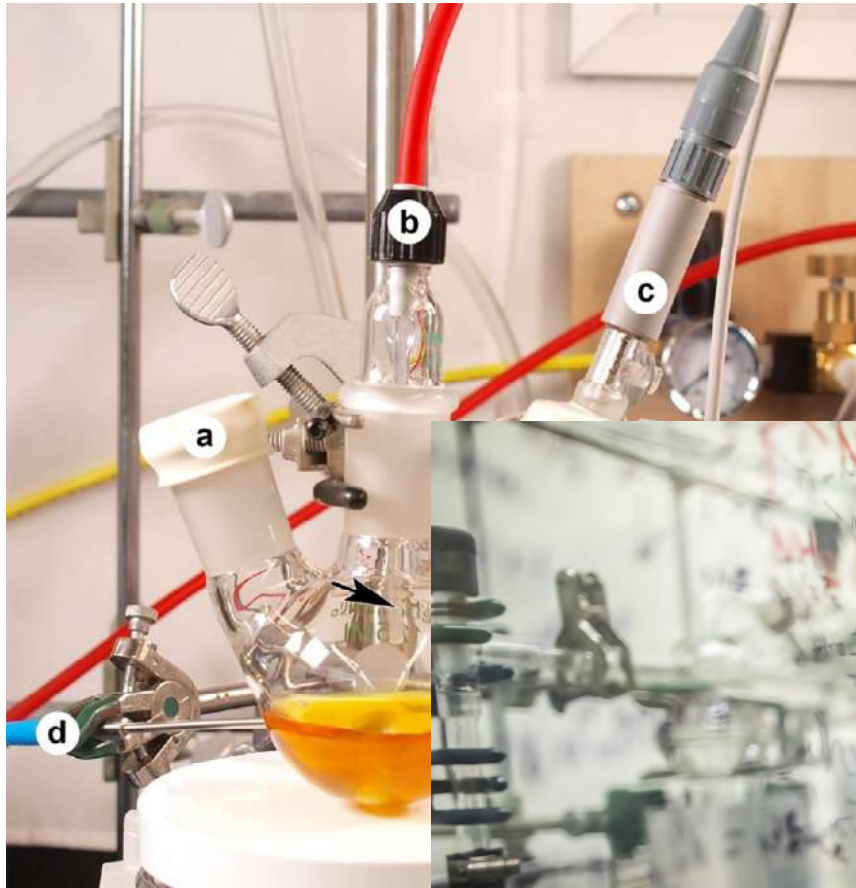




Self awareness

Epistemic assessment framework.

Category	Example	Kind of knowledge
Vocabulary	information which must be learned	knowing the fact
Simple procedure	give reagent/product /starting material	knowing how
Complex procedure	known mechanism	
Principle	fill in the gaps on a new mechanism	knowing why
New Problem	application of knowledge to a new scenario	powerful knowledge



Knower awareness

Where is the human person in chemistry education?

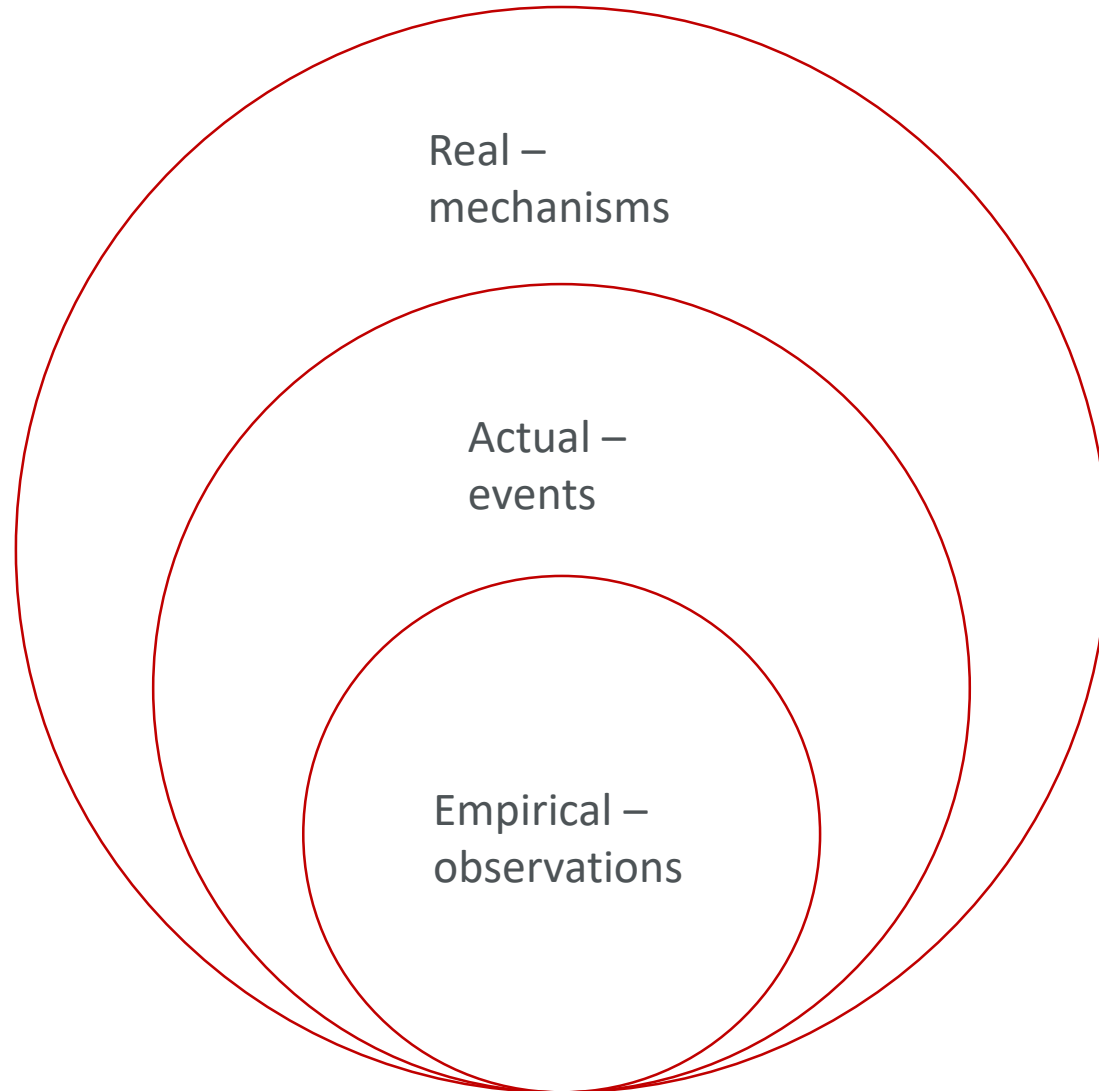
Decolonisation in STEM
'science is objective'

If we lose sight of the human person then we tend to conflate 'science is objective' with 'scientists are objective'

Adendorff and Blackie, Building Knowledge in Higher Education, Routledge 2020;
Blackie and Adendorff, Decolonising Knowledge and Knowers, Routledge, in press



Critical Realism

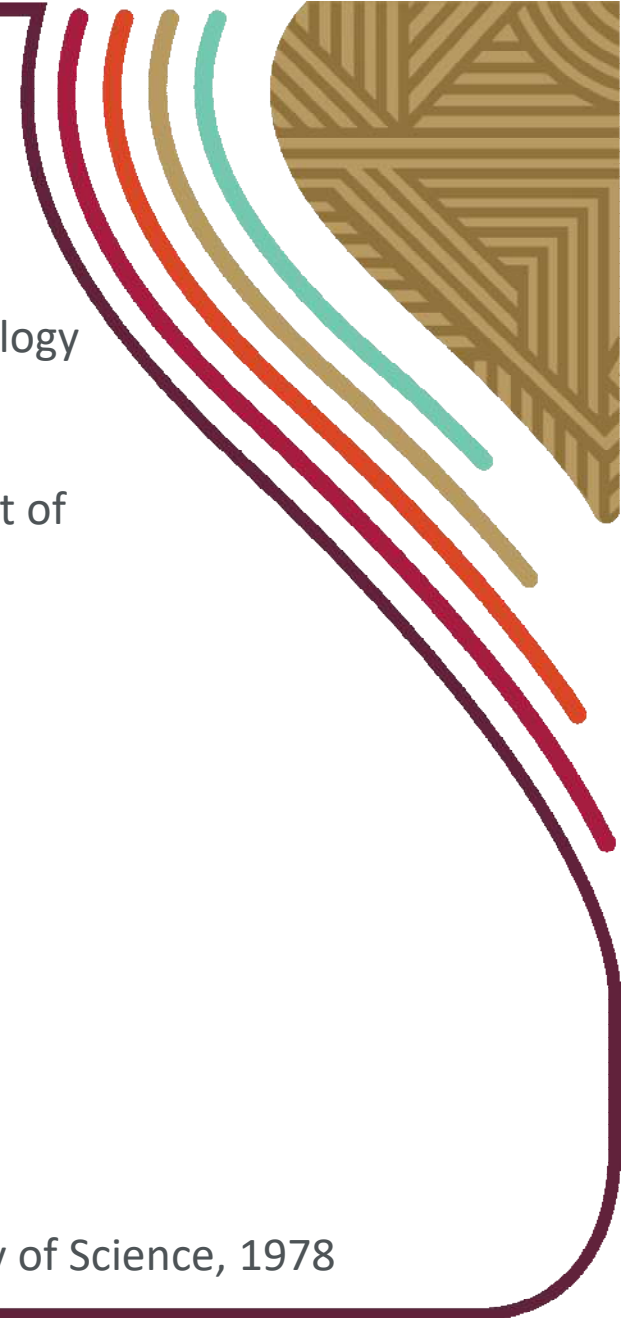


Distinction between ontology
and epistemology

The observable is a subset of
the Real

Scientist as agent not as
passive observer

Bhaskar, A Realist Theory of Science, 1978



Development of a scientific concept

Mechanism
seems to hold

Experiment

Publish data

Experiment

Experiment:
Intentional
closure of a
system

Rinse and
repeat
Until reliably
reproducible

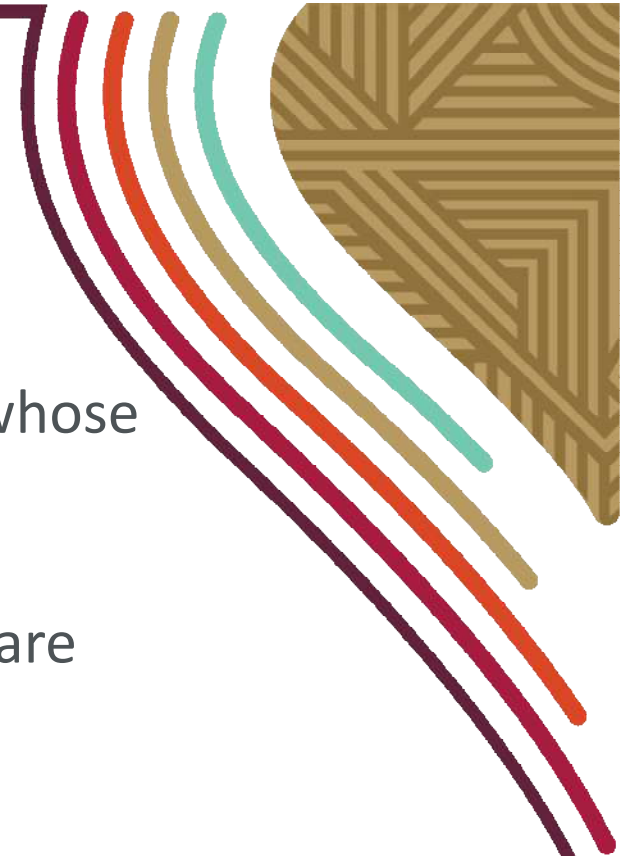
Experiment

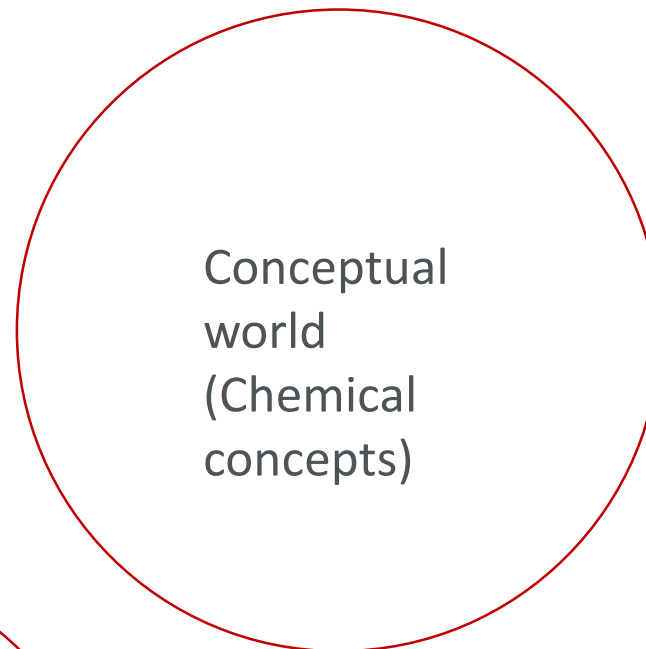
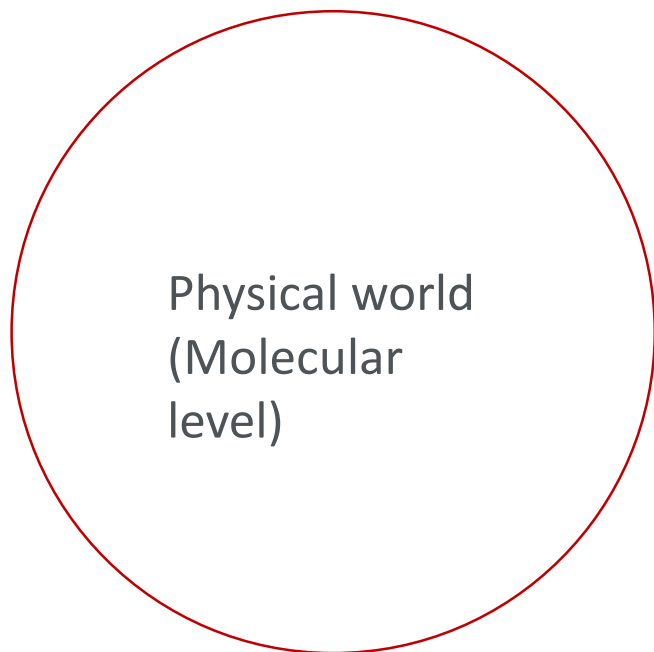
1. Reproducibility is a product of a real mechanism not an inherent quality of the scientist
2. A 'scientific concept' requires reliability of the mechanism AND acceptance by the community
3. A 'scientific concept' will build on existing knowledge

Critical Realism

Scientists are exploring real, intransitive mechanisms whose existence is independent of human action.

Science is the description of those mechanisms which are empirically observable, and that description is socially constructed.





Bonus insight into
knowledge:
Chemistry as science
Chemistry as technology

The practice
of chemistry

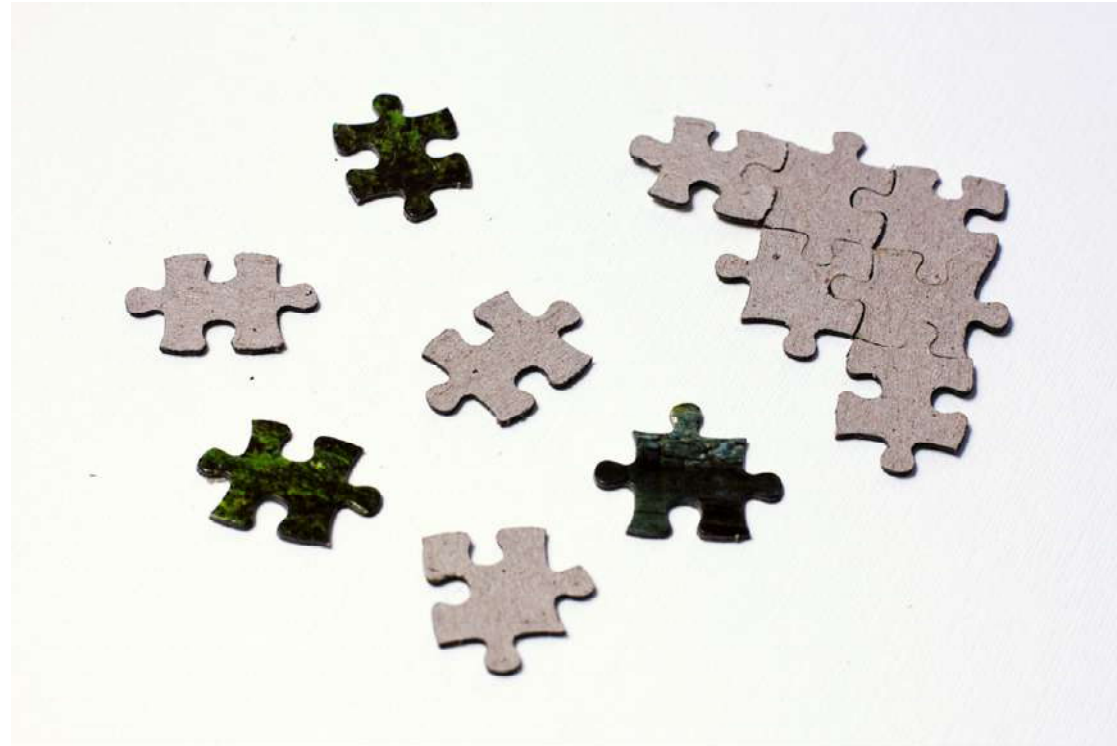
Understanding understanding

Experience

Insight

Judgement

Decision making



Lonergan, *Insight: A study in human understanding*, 1957

Development of a scientific concept

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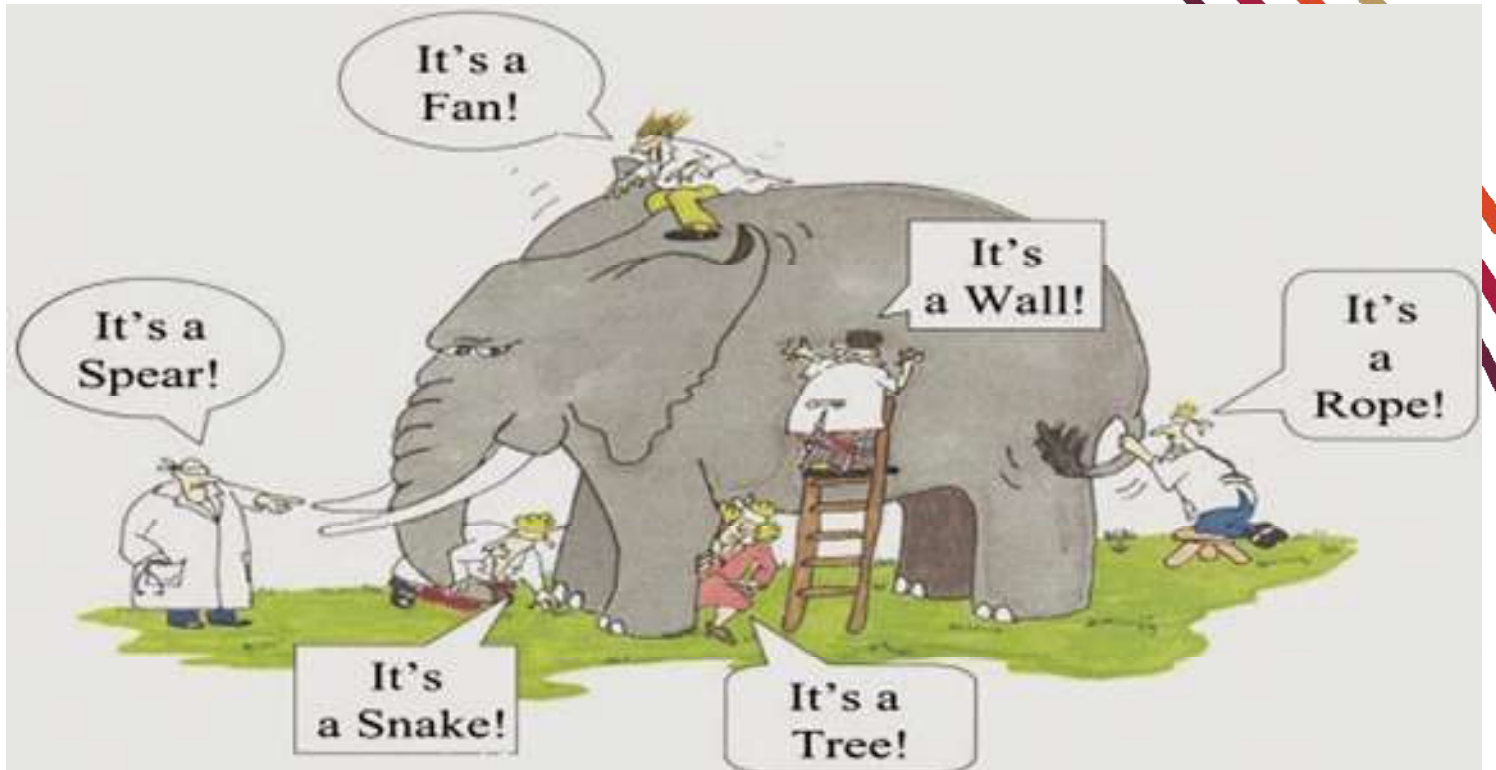
Rinse and
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Experiment

Diversity is an asset

Particularity of observation is not an issue if knowledge is a collective process not individual event

Objective knowledge arises from collective, collaborative, authentic subjectivity

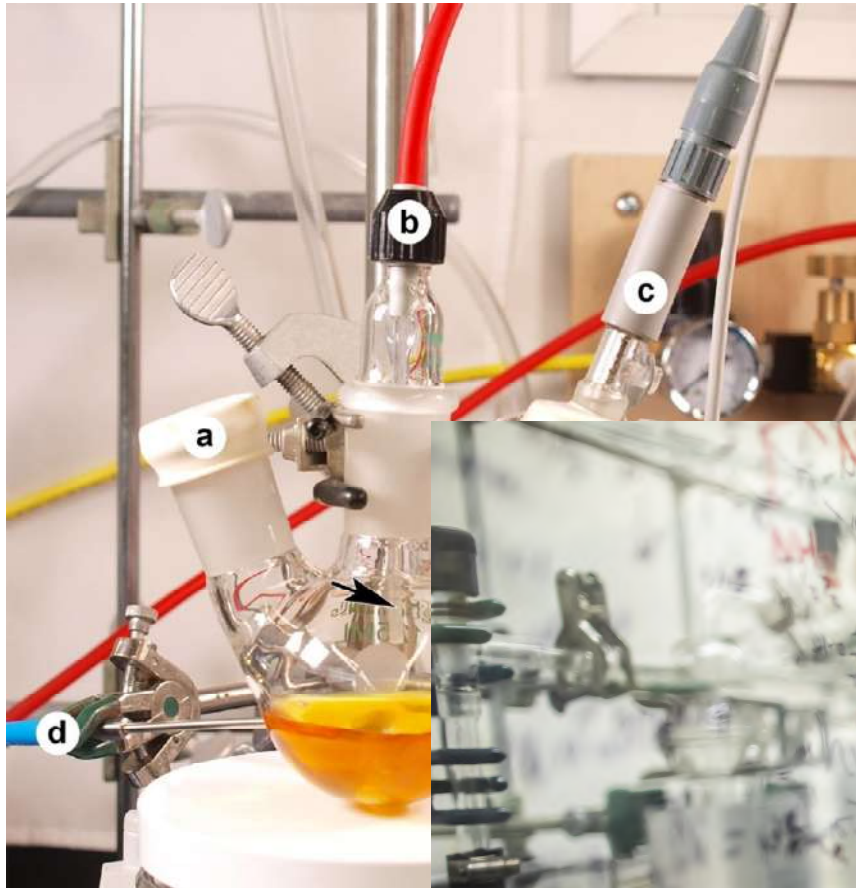


Diversity is an asset

When we think objectivity comes from the attempted erasure of my personal foibles, we will choose those who most closely resemble ourselves in training and in person to perpetuate the field.

When we recognise objective knowledge is situated in the joint effort of the community, it becomes immediately obvious the diversity is valuable





Implications

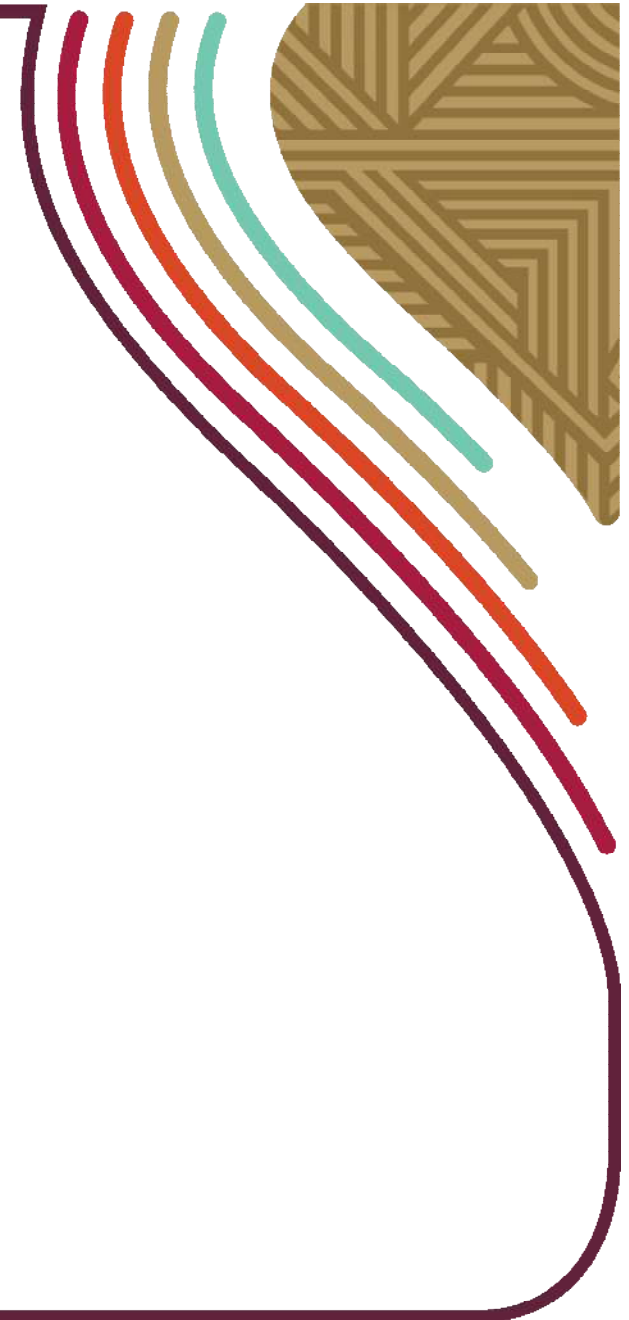
- Appropriate location of reproducibility in the real
- Creativity comes into focus
- Social justice in terms of diversity
- Chemistry is clearly a communal activity



Where to from here?

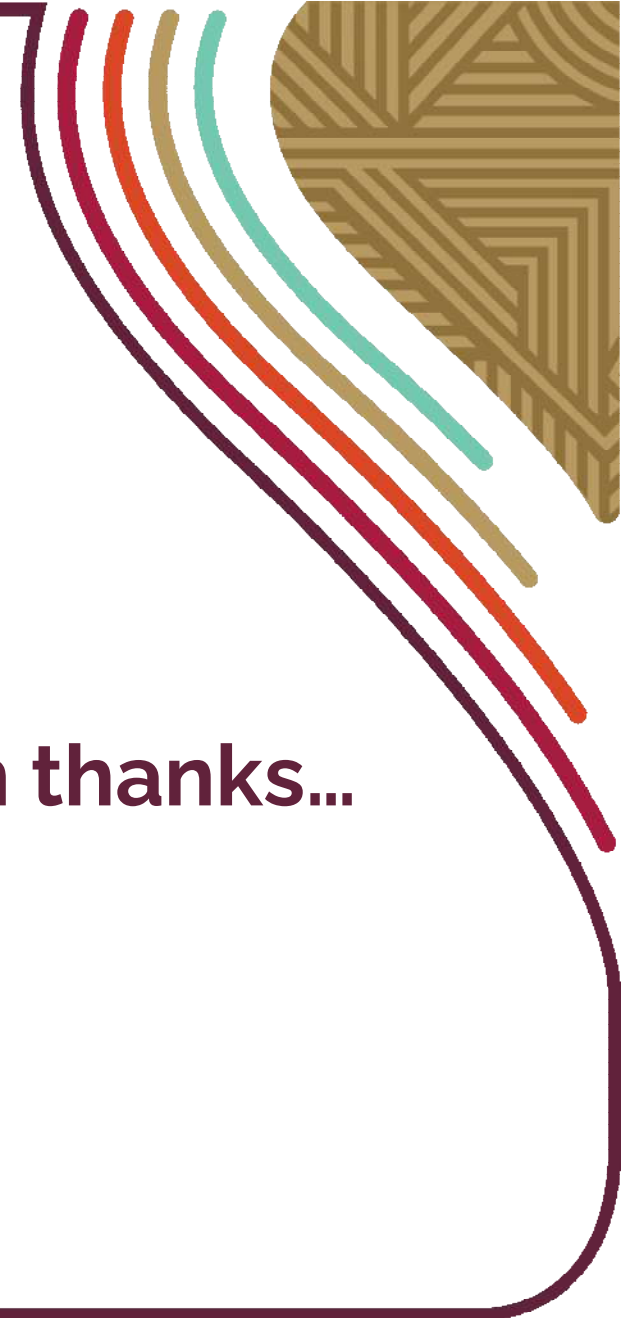
Four planar social being

- material interactions with nature
- social interactions between people,
- social structure
- stratification of the embodied personality





With thanks...





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