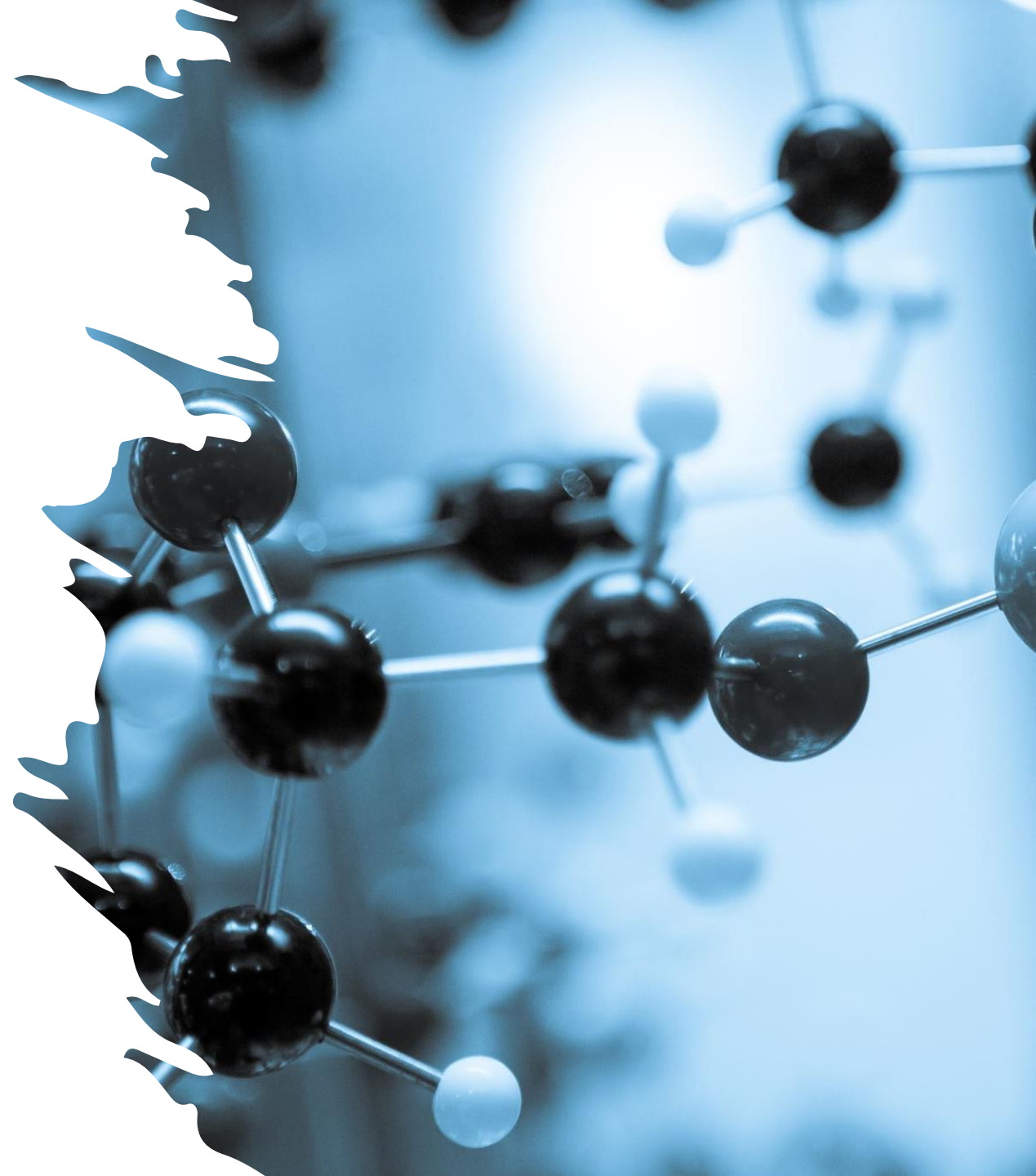


The Scientific Method...Cont'd

The Essential Qualities of a Systematic Method

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Intended Learning Objectives

By the end of this session, you will be able to:

- Describe the principles of the scientific method.
- Draw connections between these qualities.

The essential qualities of a systematic method

Empirically
testable

Replicable

Objective

Transparent

Falsifiable

Logically
consistent

Testability: empirically testable

- Drinking milk causes stress
- the enzymes in milk chemically react in our body to disrupt the production of certain hormones, causing an imbalance and altering our mood.
- Daily cow milk consumption by people over 20 will correlate significantly with cortisol.
- Daily cow milk consumption by people over 20 will result in an imbalance of cortisol.

Replicability: replicable

We do not take even our own observations quite seriously, or accept them as scientific observations, until we have repeated and tested them. Only by such repetitions can we convince ourselves that we are not dealing with a mere isolated 'coincidence,' but with events which, on account of their regularity and reproducibility, are in principle inter-subjectively testable (Popper, 2005)

Non-replicability = Refute the results?

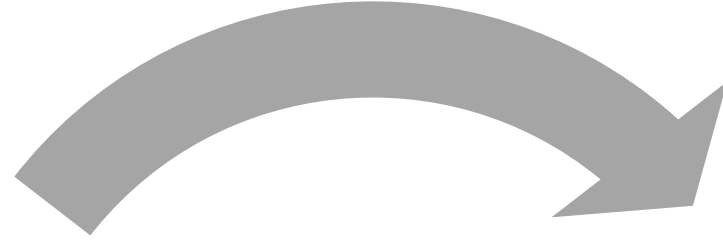
- The discovery of an unknown effect.
- Inability to control complex variables.
- The nature of the problem under study.
- Coincidence or chance.
- The novelty of the area of study.
- Research design selected.



Objective

Free from
biases.

Assumptions,
concepts and
procedures.



Different kinds of biases

Observer bias

Confirmation bias

Selection bias



Transparency

- “researchers have an ethical obligation to facilitate the evaluation of their evidence-based knowledge claims” by making their evidence, analysis, and research design public (Lupia & Elman, 2014).

Transparency

- pre-registering studies and other types of **qualitative or quantitative** research through specification of "the study's motivation, hypothesis, method, materials, sample, and analysis plan... basically specifying everything except the results and the discussion of the results before the study is completed" (Gernsbacher, 2018a).
- can also refer to providing open access to supporting research materials.



Falsifiable: Falsifiability

- Finding contradictory evidence is a possibility.
- there must be a possible negative answer.
- Example: all green apples are sour.
- What is an example of a hypothesis that is not falsifiable?



Logical Consistency

- The researchers need to be consistent on what they count as confirmatory or contradictory evidence.
- Provide a coherent chain of reasoning.



Example

- Colour of apples predict their taste.
- If green, then it is sour.
- Imagine finding a sweet apple.
- It was sour before it was sweet.
- All green apples are sour

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