

SOCIOLOGY

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Figure 2.2

1. THINKING TOOLS: Types of Reasoning

a. Ampliative (or inductive) reasoning starts with the conclusions drawn by a **scientific theory based on general argumentative premises**.
 Example: *In the past, ducks have always come to our pond. Therefore, the ducks will come to our pond this summer.*
Ampliative arguments deal with events that have a degree of PROBABILITY (you can assess the percent chance).

b. Deductive reasoning begins with premises, drawing them from **specific instances**, as with math exercises.
 Example: $\text{If } x = 4, \text{ and } \text{If } y = 2, \text{ then } 2x + y = 9.$
Deductive arguments deal with events that have a certainty of PREDICTION (something either will or will not happen).

c. Inferential (or abductive) reasoning takes incomplete data and draws conclusions based on **the most likely explanation**.
 Example: *The pile of papers I left on my desk next to the open window are now on the floor. Conclusion: the wind blew them off the desk.*
Inferential arguments base conclusions on hypotheses--the best educated guess, applying "Occam's Razor".

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3. What is "reason"?
 It is the capacity of **consciously applying logic** by drawing conclusions from new or existing information, with the aim of seeking the truth.

a. Reasoning: The **production of arguments** used in thinking or debate, especially to form conclusions, inferences, or judgments typically based upon evidence.

b. Argument: An argument is made up of **premises and conclusions**. They can be related in order to produce predictable results (**deductive reasoning**) or probabilistic results (**ampliative reasoning**, as with *inductive* or *abductive* reasoning).

c. Critical Thinking: Critical thinking is **the use of reason** and argument when choosing one's beliefs.

d. Evaluating Evidence: Evidence can be evaluated based on its strength of contribution to the premises and conclusions of an argument. **Not all evidence is equal**, based its the logical consistency between the premises and conclusions.

e. Logical Fallacies: Fallacies are errors in logic that are often difficult to detect. [Click for 15 classic logical fallacies.](#)

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4. What are the NORMS of science?

We can use the acronym **NOTTUS** to identify them:

- N = Natural (vs. Supernatural)** – science seeks to explain natural phenomena
- O = Observable (vs. Invisible)** – uses senses and tools to enhance the senses
- T = Testable (vs. Untestable)** – can make predictions; results must be consistent
- T = Tentative (vs. Omniscient)** – science is not all-knowing; hypotheses and theories must always be open to disconfirmation
- U = Uncertain (vs. Certain)** – science has a degree of improbability; there is no such thing as “perfect knowledge”
- S = Social (vs. Isolated)** – science is social; it requires replication of testing by different people and an openness to sharing results (peer review)



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5. What is NOT science?

a. Non-science: events or phenomena that simply do not meet the NOTTUS criteria and therefore fall outside of the realm of science. This includes any belief system (ideology or religion), philosophy, personal opinions and attitudes, and ethics. *But isn't science just another faith? NO!*

b. Protoscience: science that is emerging or nearing fulfillment of the categories of NOTTUS; with more time, and better tools, new discoveries emerge. For example, research on patterns of electricity in our earth's climate system, [mental telepathy](#) or the [search for aliens \(SETI\)](#).

c. Pseudoscience: "Pseudo-" means false in Latin and so these are claims that appear to be scientific, but the claims do not meet the strict standards of NOTTUS; for example, [astrology](#) or [scientology](#).



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6. On Testing and Evidence: In science, what is crucial in establishing a truth claim are the **types of evidence** one has to back up that claim. **But not all types of evidence are equally strong.**

a. Anecdotal and even an expert's evidence – stories from lay people or individual experts – sometimes the *weakest* evidence.

b. Experimental evidence – not widely used in sociology, because it puts people in “unnatural” situations, but provides *greater strength*.

Evaluates **Independent versus Dependent variables** (cause) (effect) *(do laptops lead to higher grades?)*

c. Surveys and Questionnaires – very widely used in sociology; can collect vast amounts of information; typically reliable but not always valid); **QUANTitative**

d. Case Studies/Observation over time – very widely used in sociology; can be **participant** or **non-participant**; typically valid but not always reliable); **QUALitative**



Did you hear?



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7. What makes a method valuable?

a. Reliability means *generalizability of research* or the degree to which the research gives the same results when repeated in different settings.

It is achieved through *large quantity* of results.
(Ex: *surveys and questionnaires* – lots of people can fill them out, but the questions are limited. *Quantitative research* methods often achieve good reliability of results.)

b. Validity means *accuracy of research*

or the degree to which the study measures *exactly* the reality it claims to be measuring.

It is a measure of the *quality* of results.
(Ex: *case studies and ethnographies* really get into the details. *Qualitative research* methods achieve good validity of results.)
