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## Abductive Reasoning

Martyn Shuttleworth 50.8K reads

Abductive reasoning, or inference, is a useful tool for determining the course of scientific research.

A number of facts, from a multitude of sources, such as literature reviews and general observations, are gathered together. After an assessment of this information, the most likely hypothesis to explain the observations is adopted as the starting point of research.

Effectively, it is a process of choosing the hypothesis, which would best explain the available evidence.

Many ancient philosophers used abduction, believing that all of the answers to how the universe works could be uncovered in this way, without applied experimentation.

Scientists and mathematicians developing Artificial Intelligence use this process extensively, in their quest to design computers capable of thinking like humans.

Abductive reasoning is not the sole preserve of science, with areas such as archaeology, economics and theology using this line of reasoning.

Legal professionals are probably the experts at using abduction, when they read the facts of a case and try to hypothesize the most plausible explanation.



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# Abductive Reasoning in Science

For most scientists, abductive reasoning [1] is a natural and instinctive process, a series of educated guesses, building upon observed phenomena and previous studies. Even young scientists use this process to design simple school experiments [2].

For example, a pupil may have noticed that bread appears to grow mold more quickly in the bread bin than the fridge. Abductive reasoning leads the young researcher to assume that temperature determines the rate of mold growth [3], as the hypothesis [4] that would best fit the evidence, if true.

This process of abductive reasoning holds true whether it is a school experiment or a postgraduate thesis about advanced astrophysics. Abductive thought allows researchers to maximize their time and resources by focusing on a realistic line of experimentation [5].

Abduction is seen very much as the starting point of the research process, giving a rational explanation, allowing deductive reasoning [6] dictate the exact experimental design.

Science tends to follow the rule of thumb known as 'Occam's Razor [7]', where the simplest explanation is likely to be the correct one.

For example, a researcher might observe the phenomenon of increasing levels of violence shown by children over the past few years. Further research may discover that this tends to occur more in societies where violence is prevalent on television.

Abductive reasoning would then lead the researcher to propose the most obvious hypothesis, that 'If children are exposed to more violence on TV, they are more likely to exhibit violent behavior as adults'.

This is probably the simplest hypothesis and is an excellent starting point for research. It is not necessarily correct, as other factors may contribute or cause rising violence, but it is the 'best fit'. Bandura did just that, with his 'Bobo Doll' experiment [8] and uncovered some interesting underlying trends.

Unlike most other deductive [6] methods, abduction is not always correct, but enhancing or exploring different hypotheses will allow a systematic approach to scientific [9] research.

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**Source URL:** <https://explorable.com/abductive-reasoning>

## Links

[1] <http://user.uni-frankfurt.de/~wirth/inferenc.htm>

[2] <https://explorable.com/kids-science-projects>

[3] <https://explorable.com/mold-bread-experiment>

[4] <https://explorable.com/research-hypothesis>

[5] <https://explorable.com/conducting-an-experiment>

[6] <https://explorable.com/deductive-reasoning>

[7] <https://explorable.com/occams-razor>

[8] <https://explorable.com/bobo-doll-experiment>

[9] <https://explorable.com/what-is-the-scientific-method>