

A P P E N D I X G

Seeing Reason Tool Resources

Causal Fallacies

It is common for arguments to conclude that one thing causes another. But the relationship between cause and effect is a complex one. It is easy to make a mistake.

In general, we say that a cause C is the cause of an effect E if:

- Generally, if C occurs, then E will occur, and
- Generally, if C does not occur, then E will not occur either.

We say “generally” because there are always exceptions. For example, we say that striking the match causes the match to light, because:

- Generally, when the match is struck, it lights (except when the match is dunked in water), and
- Generally, when the match is not struck, it does not light (except when it is lit with a blowtorch).

The following are causal fallacies:

- **Coincidental Correlation** - Because one thing follows another, it is held to have caused the other. Also known as *post hoc ergo propter hoc* (“after this therefore because of this”).
- **Joint Effect** - One thing is held to cause another when in fact both are the effect of a single underlying cause.
- **Insignificant** - The purported cause is insignificant compared to the other cause(s).
- **Wrong Direction** - The direction between cause and effect is reversed.
- **Complex Cause** - The cause identified is only part of the entire cause.

Students will benefit from an introductory discussion of cause-and-effect relationships before beginning investigations. For further information about causal fallacies, visit:

www.intrepidsoftware.com/fallacy/causal.htm

Relationships that Are Not Cause and Effect

There are many other relationships that occur that are not cause and effect, such as those that are categorical, sequential, correlational, or spatial-temporal.

- **Categorical Relationship** – Factors fall into some user-defined categories.
Examples:
 - The characteristics of a typical paperclip: metal, silver, rounded edges, etc.; however, these characteristics do not cause any of the other characteristics.
 - A character concept map is an example of a categorical relationship. This map might show the characteristics “brave” and “impulsive” associated with the main character’s personality. Neither of those two characteristics cause the character’s personality.
- **Sequential Relationships** – How things link together for a result; factors that occur in a specific sequence.
Examples:
 - The travel of a paperclip may move from factory, to office supply store, to office, but one location does not cause the others to occur.
 - “Egg” may link to “fetus” which may link to “baby”, but one does not cause the other.
- **Correlational Relationships** – Factors that are often both caused by the same third factor.
Examples:
 - Jane purchases paper and paperclips. The purchase of paper does not cause the purchase of paperclips.
 - As a soufflé rises, its browning increases. Both of these are caused by the heat of the oven.
- **Spatial-Temporal Relationship** – Factors that relate to each other by proximity of time or space.
Examples:
 - I put a paperclip on some papers, then I got a paper cut.
 - I wore my lucky hat, then my team won.