



Arguments

ID1050– Quantitative & Qualitative Reasoning

Statements and Non-Statements

- A statement is a sentence or phrase that can have a 'true' or 'false' value.
 - Examples: 'It rained today' or 'I am in bed'.
- A non-statement has no truth value.
 - Orders aren't statements.
 - 'Go to bed!'
 - Questions aren't statements.
 - 'Are you in bed?'
 - 'Did it rain today?'
- A sentence can consist of more than one phrase, each of which can be an individual statement, and each with its own truth value.

Arguments and Their Structure

- An **argument** is a series of statements designed to persuade the reader/listener of some conclusion.
- A simple argument has a single conclusion statement (**conclusion**) that is supported by **one or more** premise statements (**premises**).
 - Usually, the **conclusion** is the **first** or, more commonly, the **last** statement in the argument.
- The first steps in analyzing an argument are:
 - **Eliminate non-statements**. Occasionally, the conclusion is stated in the form of a rhetorical question (“Why should you go to bed? Here are the reasons...”)
 - **Identify which statement is the conclusion**. All of the statements that remain are premises.

Inference Indicators

- Sometimes there are words in the statements (indicators) that help identify them as a premise or a conclusion. However, whether indicators are present or not, the statement is still what it is (a premise or a conclusion).
- **Premise indicators** – Here is a partial list of some premise indicators. These indicate that the statement is a fact, reason, or example.
 - “the fact that”, “because”, “for example”, “for these reasons”, etc.
- **Conclusion indicators** – Here is a partial list of some conclusion indicators. These words indicate that the statement is the point of the argument.
 - “therefore”, “thus”, “it is clear that”, “so”, etc.

Types of Arguments

Arguments fall into two general types: **inductive** and **deductive**. The type of argument determines how to analyze or attack the argument.

- **Inductive**

- In this type of argument, the premises are supposed to lead to the conclusion with **some degree of certainty** (but not complete certainty). Inductive arguments can be made strong (or weak) if:
 - Many (or few) premises are given
 - The premises themselves are strong (or weak)
 - The premises lead to the conclusion with high (or low) confidence.
- If you can include an additional premise to the argument that doesn't contradict another premise, but strengthens or weakens the conclusion, then the argument is inductive.
- Inductive arguments are attacked by looking for one or more **logical fallacies** (known bad argument types), by providing contradictory premises, or by attacking the premises themselves.

Types of Arguments

- **Deductive**

- In this type of argument, the premises are supposed to lead to the conclusion with **complete certainty**.
- If the inclusion of additional (non-contradictory) premises *cannot* alter the conclusion, then the argument is *deductive*.
- Deductive arguments are either **valid** or **invalid**. If, in every case of the premises being true, the conclusion is also true, then it is valid. Otherwise, it is invalid.
- Deductive arguments are addressed by analyzing the structure of the argument for all permutations of the statements being 'true' or 'false'.
- Often, this is done using symbolic representations of the statements (premises and conclusion) and forming **truth tables** using **symbolic logic**.
- If a deductive argument is valid, it can further be considered either **sound** or **unsound**. A sound argument is one in which the premises are generally agreed to be true.
 - We won't be learning how to determine the soundness of arguments, but we will discuss the idea.

Conclusion

- A **logical statement** can be determined to be **true** or **false**.
 - Questions and orders are not logical statements.
- An argument is formed from one or more **premise** statements and a **conclusion** statement.
 - Sometimes a statement has **indicator words** or phrases that help you decide if it a premise or conclusion.
 - However, a statement is a premise or conclusion based on **its purpose in the argument**, not whether it has indicators or not.
 - Often the conclusion is the **first or last** statement in the argument.
- There are two argument types.
 - **Inductive** – The premises are intended to lead to the conclusion with **some likelihood**.
 - **Deductive** – The premises are intended to **guarantee** the conclusion if they are true.