



An Animated and Narrated Glossary of
Terms used in Linguistics
presents

Entailment



Definition

A **entails** B if

1. whenever A is true, then B must be true,
and
2. if B is false then A is false.

In a 2-value logic system where a proposition must either be true or false, (1) and (2) are equivalent.

However, in other logic systems, and also in linguistic expressions, it is possible for something to be neither true nor false. Then (1) and (2) are not the same.



Example 1

A1: *Carmen stole the Mona Lisa this morning.*

Entailment?

B1: Carmen stole something.

If A1 is true, B1 must be true. **YES!**

If B1 is false, A1 must be false.

B2: Something was stolen this morning. **YES!**

B3: Carmen believes the Mona Lisa is valuable. **NO!!!**

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Example 2

A2: *Who stole the Mona Lisa this morning?*

Entailment?

B1: Carmen stole something. **NO!!**

B2: Something was stolen this morning.

To say A2, B2 must be true.

If B2 is false, A2 is unutterable. **NO!!**

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Test for Entailment

Falsifying the entailment

If A entails B, then falsifying B would falsify A.

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Upward Entailing

- If one can infer by way of entailment from the property of set S to the **superset** of S, then the entailment is **upward entailing**.

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Upward Entailment

- *Some cows are brown.*
Entailment:
- *Some animals are brown.*
- Animals are a **superset** of cows.
- This is a case of **upward entailment**.

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Downward Entailment

- If one can infer by way of entailment from the property of set S to the **subset** of S, then the entailment is **downward entailing**.

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Downward Entailing

- *Elephants are neither stupid nor ugly.*
Entailments:
 - *Elephants are not stupid.*
 - *Elephants are not ugly.*
- Being stupid is a **subset** of being stupid or ugly. Likewise, being ugly is a **subset** of being stupid or ugly.
- This is a case of **downward entailment**.

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Other Definitions of Entailment

- There are various definitions for **entailment**.
- E.g. If one assumes that something **must either be true or false**, and defines entailments as:
 - A entails B if when B is false, A is false.
- By this definition, B2 would be entailed by A2.
A2: *Who stole the Mona Lisa this morning?*
B2: Something was stolen this morning.

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Further reading

- Lappin, Shalom (2001) An Introduction to Formal Semantics. In Mark Aronoff and Janie Rees-Miller (eds.) *The Handbook of Linguistics* (pp. 369-393). Blackwell Publishers.
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Further reading

- Mercer, Robert E. (1992) Default Logic: Towards a Common Logical Semantics for Presuppositions and Entailments. *Journal of Semantics*, 9, 223-250.
- Mohanan, Tara and Lionel Wee (eds.) (1999) *Grammatical Semantics: Evidence for Structure in Meaning*. Stanford: CSLI Publications.
- Palmer, F.R. (1976) *Semantics*, 2nd edition, Chapter 8. Cambridge University Press.
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The End

Wee, Lian-Hee and Winnie H.Y. Cheung (2009)
An animated and narrated glossary of terms used in Linguistics.
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