

How Does Abstraction Cause Information to Lose Its Meaning?

Selection, Compression, Context Loss, Reconstruction, and Semantic Fidelity

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The Short Answer

Abstraction causes meaning loss when it preserves general categories or visible claims while removing the relationships, conditions, exceptions, and context that determined what the original information meant.

An abstract representation can remain factually correct. A summary may contain every major claim. A database field may accurately record a category. A model embedding may preserve similarity. Meaning weakens when the reduced form is used as though it still contains the full structure of the source.

Abstraction preserves what the representation can carry. Meaning also depends on relationships the representation may have removed.

Why Abstraction Is Necessary

No representation can preserve everything. Language selects features of experience. A measurement reduces a condition to a scale. A summary compresses a document. A schema converts variation into fields and categories. Abstraction makes information portable, comparable, and usable.

The cost is selective loss. The representation becomes better suited to a task by excluding information outside that task. Problems begin when the purpose changes, the representation is reused, or excluded context becomes necessary for interpretation.

Where Meaning Is Lost

1. Selection. Some features are retained while others become invisible.
2. Compression. Relationships are simplified so the representation occupies less space or attention.
3. Normalization. Irregular cases are translated into standard categories.
4. Recontextualization. The reduced information is moved into a new setting with different assumptions.
5. Reconstruction. A reader or model fills missing structure with typical or probable relationships.
6. Recursive reuse. The reconstruction becomes the source for another transformation.

Accuracy Versus Fidelity

Accuracy concerns whether a statement, label, or value is correct under a specified test. Semantic fidelity concerns whether the transformation preserves the meaning, relationships, constraints, uncertainty, and intended use of the source.

A hospital discharge summary can list the correct diagnoses while losing the uncertainty that shaped the treatment plan. An AI answer can cite the correct document while reversing which condition controls the conclusion. A policy summary can preserve the rule while omitting the exception that matters in the current case.

Why Reconstruction Can Look Convincing

When context is missing, interpreters rarely leave a blank. People and models use familiar patterns to infer what probably connects the remaining fragments. The result often becomes more coherent than the source because ambiguity and contradiction have been removed.

This creates a dangerous signal. Fluency is treated as evidence that meaning survived. The output may instead reflect a successful reconstruction built from general expectations rather than continuity with the original structure.

Semantic Fidelity

Semantic Fidelity names the degree to which meaning survives transformation. It asks whether the output preserves more than isolated factual units. Claims must retain their relationships, boundaries, uncertainty, and reference.

The practical question is not whether abstraction occurred. It is whether the abstracted form remains constrained by what was omitted. A high-fidelity system preserves a route back to the source and allows missing context to correct the representation when the use changes.