# Relations between Semantic Structures

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Let us consider the semantic structures and in specific context .

Is-a relation:

: *is-a*

Is-not relation

: *is-not*

Has-a relation:

: *has-a*

Has-not relation

: *has-not*

Equivalent relation:

: is true *iff* is true

Not-equivalent relation:

: *if*  *is true* *then it does not follow that* *is true* ***or*** *if* *is true then it does not follow that* *is true*

Implication:

: *if* is true *then* is true

Not-Implication:

: *if* *is true* *then it does not follow that* *is true*

General relationship:

Let is a semantic DAG, is the set of vertices of and is the set of arcs of . We say that is *related to* when and are subgraphs of .

: the structures and have the same semantic meaning. Two semantic structures have the same semantic meaning when the semantic distance between them is small enough. Evaluating semantic distance involves evaluating their respective semantic signatures. We need to consider all possible semantic association chains when we evaluate the structures in the given context. We will discuss an algorithm constructing augmented semantic structures and from and respectively.

## Constructing Augmented Semantic Structure

Let us have a semantic structure in the context . is related to the context by a set of relationships , , …, , …, .

...

...

In the future we will denote this augmented semantic structure in the context by the notation . Shortly:

The approach to construct , , …, is reminiscent to the process discussed in [Semantic Parsing](https://github.com/dimitarpg13/aiconcepts/blob/master/docs/SemanticParsing.pdf).

We are attaching a set of match-seeking particles and match-repelling particles to substructures of . Similarly, we are attaching match-seeking particles and match-repelling particles , =1,2,.. to substructures of . Each matching-seeking particle attaches to a substructure which is a subdigraph of . Each match-seeking particle exposes particular region of the semantic signature of the substructure it attaches to. A similarity link association is established by our match-seeking particle on and another attached on if the exposed regions on both sides are similar enough. More than one match-seeking particle can be attached to a specific substructure where each of the match-seeking particles exposes different region of the semantic signature of the same substructure. More on this topic in [Note on binding of Match-seeking and Match-repelling particles](https://github.com/dimitarpg13/aiconcepts/blob/master/docs/NoteOnBindingOfMatchSeekingAndMatchRepellingParticles.pdf).