# The Concept of Semantic Space, Affinity Space and Execution Space

## The Concept of Semantic Space

Every V-particle is adorned with a semantic signature which can be represented by a DAG where each node contents can be represented as an integer number and each arc is assigned a weight which is a positive real number. Equivalently, the semantic signature can be represented as a matrix (refer to the document [ThoughtSynthesis](https://github.com/dimitarpg13/aiconcepts/blob/master/docs/ThoughtSynthesis.docx) for details). Every semantic structure is represented by its semantic signature. The weights of the arcs in its semantic signature represent confidence values which are not normalized. The Semantic space is a metric space where the metric (norm) is the semantic distance dentoed by . The semantic distance is defined recursively as:

Let us denote the semantic distance between two particles and with .

Let us evaluate the semantic distance between and .

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Here is connected to with an arc having a weight . Let us assume that the where is a small positive number. Let us denote the new compound particle with . We want the following asymptotic behavior to hold true when we make the weight arbitrary small:

when

We want also when is small enough. Here represents the null semantic particle which has no meaning i.e. it is arbitrarily close in terms of semantic distance to any other semantic structure or particle. The last asymptotic relation is equivalent to disregarding V-particles which do not enrich the semantic structure of the resulting compound particle.

Example:

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