Introduction to Semantic Structures

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One of the few things that could still interest Felka was emergence. On Diadem, the first world they had visited after leaving Mars in the very first near-light ship, Clavain, Galiana and she had studied a vast crystalline organism which took years to express anything resembling a single 'thought'. Its synaptic messengers were mindless worms, burrowing through a shifting neural network of capillary ice channels threading an ageless glacier.

From "*Redemption Ark*", Chapter 7, Alastair Reynolds, 2002

Basic concepts

Semantic Aspect

Fundamental concept in the theory of Semantic Structures.

Semantic Property

Primitive Semantic Particle

The property set of the primitive semantic particle V will be denoted with $sprop(V)$ or short $\mathcal{P}(V)$.

Semantic Structure; also Composite Semantic Particle

Semantic Distance between semantic structures

Usually, it will be denoted with $sdist(S_1, S_2)$ or short $\ell(S_1, S_2)$.

Association / Semantic link between Primitive Semantic Particles

It will be denoted with $A_{i,j}$ where i is the subscript corresponding to first primitive particle and j is the subscript corresponding to the second one.

Association / Semantic link between Semantic Structures

Aggregation levels of semantic structure

Let us consider the semantic structure S_1. S_1 contains n_1 primitive semantic particles; we will denote this set of the primitive particles with $\mathcal{S}_1 = \{S_1\}$. Thus, $|\mathcal{S}_1| = |\{S_1\}| = n_1$. Let us denote with $\{\{S_1\} \circ \{S_1\}\}$ the set of distinct pairs of primitive semantic particles from the set $\{S_1\}$. With m_1 we denote the number of elements in $\{\{S_1\} \circ \{S_1\}\}$. Obviously, $m_1 = (n_1 - 1) + (n_1 - 2) + \cdots + 1 = \frac{n_1(n_1-1)}{2}$. Let us sort these m_1 pairs by semantic distance. Let us denote with d_{min} the minimal distance between the particles in a pair and with d_{max} the maximal distance observed in a pair from $\{\{S_1\} \circ \{S_1\}\}$.

Definition: Logical view and Physical view of Semantic Structures

Definition: Instance of a semantic structure