Semantic Templates

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Semantic Functions

Semantic Functions will be denoted with small cap Greek letters capturing the semantics of the specific function such as the *Action function* δ from Greek δράση for *Action*.
Real Semantic function $\varphi: \mathbf{\Sigma} \to \mathbb{R}$ is function defined on semantic space $\mathbf{\Sigma}$ and having a value on the real axis $\mathbb{R}$.

What is a Semantic Template?

Every Semantic Template is represented by an incomplete semantic structure which contains missing substructures (i.e. *compound semantic particles*) and/or missing *primitive semantic particles* and/or missing *semantic property particles*. The place of each missing particle is occupied by a relevant *replacement particle* which contains properties generating the necessary binding force and has an appropriate semantic mass which match the position of the particle in the semantic template. The Semantic Templates and the regions within them will be denoted with capital fraktur letters ($\mathfrak{T}$, $\mathfrak{P}$, $\mathfrak{I}$, …) subscripted with an index appropriately.
Every Semantic Template $\mathfrak{T}$ is partitioned into two regions – *pattern matching region* $\mathfrak{P}(\mathfrak{T})$ and *inference region* $\mathfrak{I}(\mathfrak{T})$.

Definition: *Centroid of Semantic Template*: represents the mass center of the template structure using the semantic masses of the replacement particles.

Definition: *Regular Semantic Space (or just Semantic Space)*: Semantic space which is populated with the semantic structures created by parsing external constructs or by inference. Denoted with $\mathbf{\Sigma}$.

Definition: *Semantic Template Space (or just Template Space)*: Semantic templates exist in a semantic space parallel to the *regular semantic space*. Denoted with $\mathbf{T}$ (tau). Unlike semantic space the *template space* is populated with incomplete semantic constructs in which the missing particles (properties, primitive semantic particles, compound semantic particles) are replaced by special particles. Each semantic template $\mathfrak{T}$ is associated with a region $\mathfrak{A}(\mathfrak{T})$ (region of *applicability*) of semantic template space in which the template is valid. To be precise, $\mathfrak{A}(\mathfrak{T})$ is region in which its centroid is allowed to be positioned without violating the applicability condition of $\mathfrak{T}$.

Definition: *Semantic Template*: It is a function with input which is a semantic structure from semantic space $\mathbf{\Sigma}$ and output which is a new *non-empty* semantic structure from $\mathbf{\Sigma}$ if $\mathfrak{P}(\mathfrak{T})$ has been matched to some semantic structure S from $\mathbf{\Sigma}$ and it is the empty semantic structure $[]$ if no match is found.

Definition: *Matching of Semantic Template*: the centroid of the semantic template $\mathfrak{T}$ moves within $\mathfrak{A}(\mathfrak{T})$ in Semantic Template Space. When the semantic latch μ associated with $\mathfrak{T}$ is triggered the centroid of $\mathfrak{T}$ is affixed to the point which has triggered the latch.

Pattern Matching Region of Semantic Template

The pattern matching region $\mathfrak{P}(\mathfrak{T})$ of any template $\mathfrak{T}$ is represented by a semantic tree T in which every node is one of the three:

a) semantic structure S
b) primitive semantic particle V
c) dummy particle X

Without a loss of generality we can assume that every non-dummy particle

Example of Semantic Template: Calculation of attractive force between semantic structures

Let us consider a newly formed semantic structure S_1. The closest semantic structure will be denoted with S_0. On aggregation level l the nearby semantic structure S_0 can be represented as a graph of n_l substructures.