# Rules of the Mind

We claim that the human mind is organized in terms of a Kantian ( architectonic ) set of rules. Let us first express them in informal language:

**IR1** All minds have partially ordered *bindings*
**IR2** All minds are made up of atomic elements, *elementary ideas*
**IR3** Elementary ideas are related by a *similarity* relation
**IR4** The ideas are connected architectonically into *thoughts*
**IR5** The bindings are controlled by *bonds* whose values are called modalities
**IR6** *Modalities* are formed as clouds of elementary ideas
**IR7** All *in-bonds* of an idea are the same
**IR8** The *out-bonds* of an idea can be different expressing the regularities of the mind processes
**IR9** All minds are non-deterministic, operating in *controlled randomness* varying with time and motivated by individual experiences.
**IR10** *New ideas* are formed as encapsulations of elementary ideas and will be, themselves, elementary ideas
**IR11** Replacing ideas in a thought by respective modalities produces an *abstract* thought
**IR12** *Patterns* of thought consist of abstract thoughts

The above deals only with higher functions of the mind. We do not make any statement concerning the implementation of the rules by a neural substrate.

The informal rules *IR1, IR2,... IR11* are made into formal rules using the pattern theoretic formalism:

**FR1** The connector $\sigma$ belongs to the connection type $\Sigma = POSET$
**FR2** The generators, the elementary ideas of Patterns of Thought, belong to a generator space $G$ in which one or several similarity groups $S_\mu$ are defined
**FR3** Two ideas $idea1, idea2$ are said to be similar iff $\exists s \in S_\mu : idea2 = s\ idea2$
**FR4** Regular configurations are the thoughts of Patterns of Thought

$$thought = \sigma(g_1, g_2, ...g_i, ...g_n) \tag{1}$$

with elementary ideas $g_1, g_2, ...g_i, ...g_n \in G$ and the directed graph $\sigma$ is allowed to connect $g_{i_1}$ with $g_{i_2}$ if $\beta_{out,j_1}(g_{i_1}) \subset \beta_{in}(g_{i_2})$
**FR5** The elementary ideas $g \in G$ have bond vectors

$$\beta(g) = [\beta_{in}(g), \beta_{out,1}(g), \beta_{out,2}(g), ..., \beta_{out,j}(g), ...\beta_{out,m}(g)] \tag{2}$$

**FR6** The values of bonds, the modalities M, are subsets of the generator space: $M \subset G$ with the modalities belonging to a lattice $\mathcal{M}$

**FR7** An idea has an arbitrary number of in-bonds, all with the same value $\beta_{in}$

**FR8** An idea has $m$ our-bonds, $j = 0, 1, 2, ...m$ that may differ from each other

**FR9** The probability of a thought $\sigma(g_1, g_2, ...g_n)$ is proportional to $Q(g_i)$,to $A(g_{i_1}, g_{i_2})$ and to $\pi_n$, leading to a version of the second structure formula of pattern theory:

$$P(thought) \propto \prod_i Q(g_i) \times \prod_{(i_1,i_2)\in\sigma} A(g_{i_1}, g_{i_2}) \times \pi_n \tag{3}$$

**FR10** Given a regular *thought* it can be made into a new elementary idea with no out-bonds

**FR11** A given $\sigma(g_1, g_2, ...g_i, ...g_n)$ can be transformed into an abstract thought by replacing each idea $g_i$ by the modality $M_i$ that contains it:

$$thought \Rightarrow thought_{abstraction} = \sigma(M_1, M_2, ...M_n) \tag{4}$$

**FR12** A pattern $\mathcal{P} = \{thought^1_{abstraction}, thought^2_{abstraction}, ...\}$