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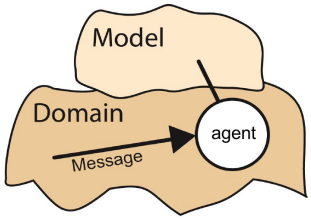
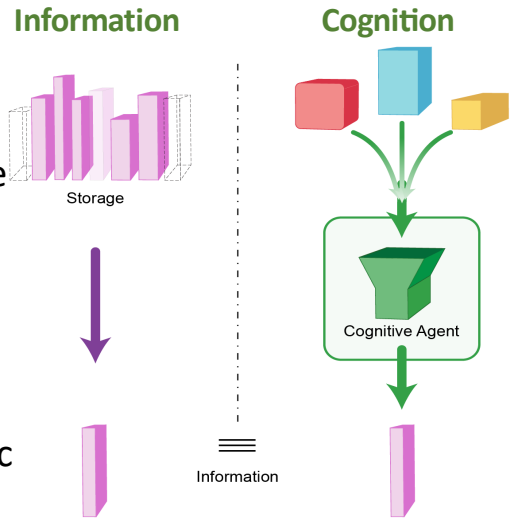
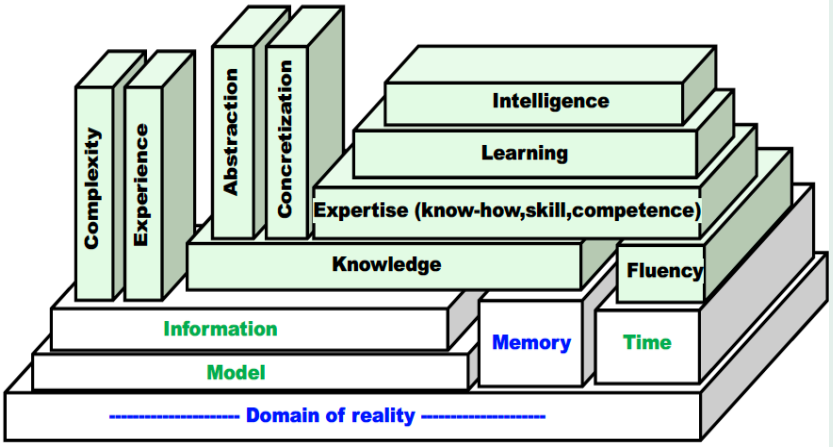
Cognition – Basic Modelling of Imaginary

- It is an understatement to say that imaginary has no limits or laws. In itself, **the imaginary is not** - the real is necessary to make this imaginary exist, or to underpin it, by spontaneous analogies (sensory traces, poetry, etc.) or systematic analogies (conventions, codes, etc.).
- **The cognitive world belongs to the imaginary**. In the cognitive world, a **model** is the (immaterial) description of a domain, imaginary or real.
- The model is created or updated on the basis of messages (frequent synonym: data); by definition, these messages convey **information**, and the information is characterised quantitatively by the probability of occurrence of these messages (p_i).
- **Cognition** allows a natural or machine-based cognitive agent to generate the relevant information.
- Beyond the terms relating to cognition in a more specific sense (knowledge, expertise, intelligence, etc.), it must be clearly understood that **all** other **concepts**, all words, also relate to **cognition**.
- The world of **cognition** is also that of **logic, reasoning, processes**, and, when a law is satisfied (that it is **right**, that the goal has been reached), **beauty**.







Information (average, per message):	$n=\sum p_i \log_2(1/p_i)$ [bit]
Complexity (for example):	$M=n_{out}\, 2^{n_{in}}$ [bit]
Knowledge:	$K=\log_2(n_{out}\, 2^{n_{in}}+1)$ [lin]
Fluency (speed):	$F=1/\Delta t$ [s^{-1}]
Expertise (cognitive speed):	$E=K \cdot F$ [lin/s]
Learning:	$\Delta E=E(t_1)-E(t_0)$; >0 [lin/s]
Experience$_i$ (observed information) :	$R_i=r(n_{in}+n_{out})$ [bit]
Intelligence$_i$:	$I_i=\Delta E/\Delta R_i$ [lin/s/bit]
Experience$_t$ (observation time):	$R_t=T$ [s]
Intelligence$_t$ (cognitive acceleration):	$I_t=\Delta E/\Delta R_t$ [lin/s^2]
Agility (speed) :	$A=1/T$ [s^{-1}]
Relative agility :	$A_r=\tau/T$

T: Reaction time of a control system, incl. possible transmission delays (agility^{-1}, speed $^{-1}$)

τ: Reaction time of the target system, to be controlled

References.:

1. J.-D. Dessimoz, HESSO.HEIG-VD, 2nd Int. Conf. on Natural Cognition, 10-11 Dec. 2015, Macao
2. Cours AIC-Automatisation avancée, intelligence artificielle et cognitique, JDZ, HESSO.HEIG-VD, Yverdon-les-Bains, Suisse, 20 février 2017.
3. SGAICO Annual Assembly and Workshop Deep Learning and Beyond, Nov. 16, 2016 - Hochschule Luzern Informatik - Campus Zug-Rotkreuz, Switzerland
4. Robotics and Automated Systems-Elsevier, nov. 2016, http://dx.doi.org/10.1016/j.robot.2016.08.008
5. J.-D. Dessimoz, "Principes de vie - cognition et sagesse", Conférences et discussions philo / éco / mythe, Evénement "Un Lieu", Claire Dessimoz organisatrice, Espace d'Art Tunnel Tunnel, progr. Sophie Ballmer, Olivia Fahmy, Anne Sylvie Henchoz et Guillaume Pilet, Lausanne, 13.10.2018
6. Jean-Daniel Dessimoz, « Cognition and Cognitics – Definitions and Metrics for Cognitive Sciences, in Humans, and for Thinking Machines, 2nd edition, augmented, with considerations of life, through the prism "real – imaginary – values – collective", and some bubbles of wisdom for our time », Roboptics Editions llc, Cheseaux-Noreaz, Switzerland, 345 pp, March 2020.

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