Sciences cognitives pour l'IA

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Socle de connaissances

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Comportements « instinctifs »

Blumberg, M.S.: Development evolving: The origins and meanings of instinct. Cognitive science 8(1), 10.1002/wcs.1371 (2017).

Konrad Lorenz, un des fondateurs de l'éthologie, suivi par des canetons comme s'il était leur mère

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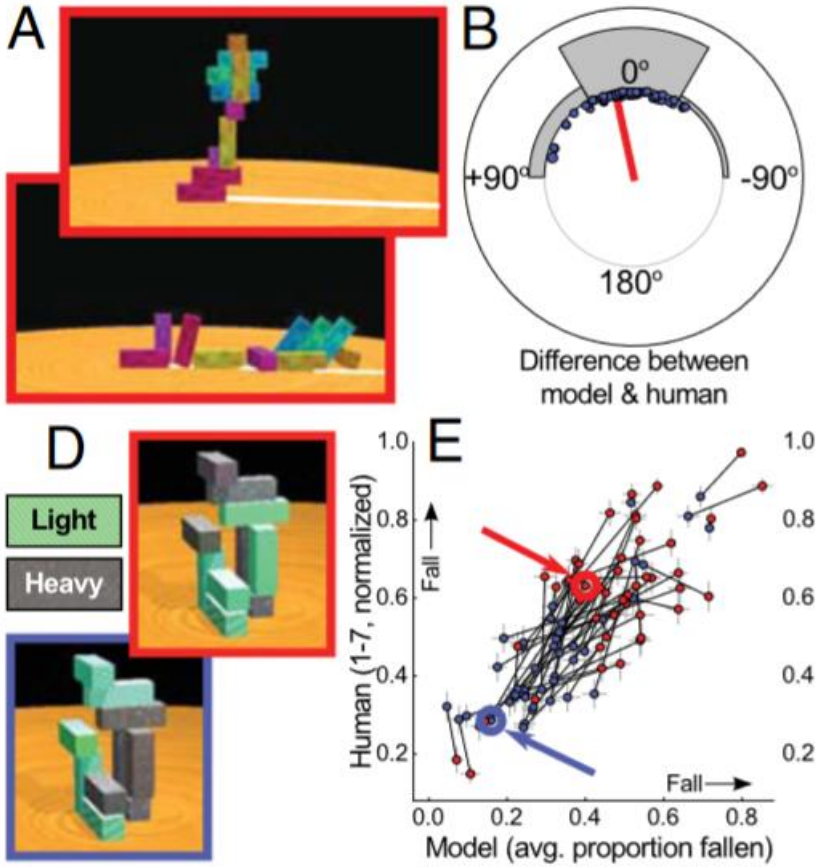
Game Engine In The Head (GEITH)



(Simulation as an engine of physical scene understanding, Tenenbaum 2013)

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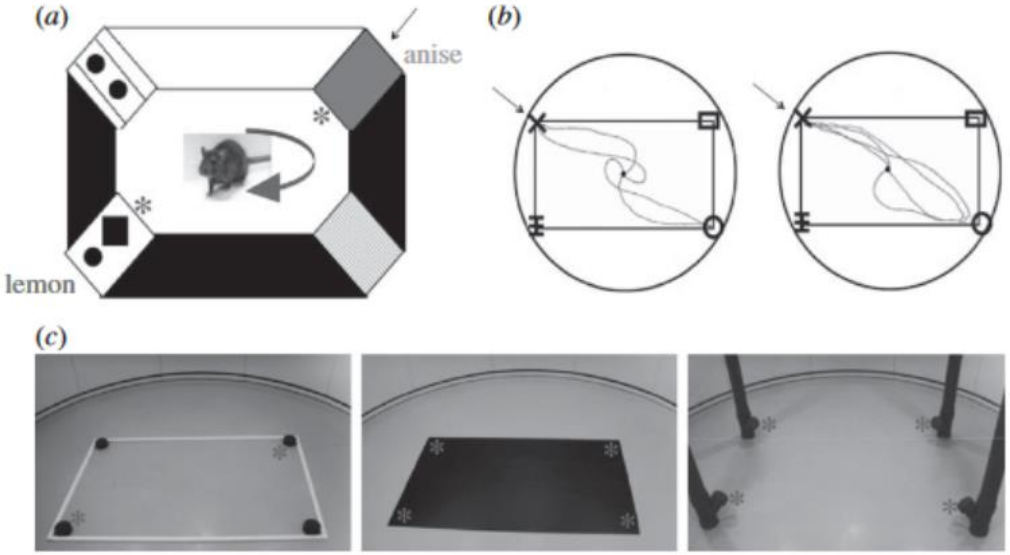
Core knowledge in the brain



(Core systems of geometry in animal minds, Spelke and Lee, 2015)

- **The core navigation system** captures absolute distance and sense (distinguishing between corners whose nearer wall is on the left versus right) but not relative length or angle;
- **The core form analysis** system does the reverse (captures relative length or angle but not absolute distance and direction)

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Continuum Phylogénétique

- « Reason is evolutionary, in that abstract reason builds on and makes use of forms of perceptual and motor inference present in "lower", animals. The result is a Darwinism of reason, a rational Darwinism: **Reason, even in its most abstract form, makes use of, rather than transcends, our animal nature**. […]
  Reason is thus not an essence that separates us from other animals; rather, it places us on a continuum with them. »
  (Philosophy In The Flesh: The Embodied Mind And Its Challenge To Western Thought, Lakoff 1999, p. 4).

- "We hypothesize that uniquely human cognitive achievements build on systems that humans share with other animals: core systems that evolved before the emergence of our species" (Spelke and Lee 2015)

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Neurosciences

https://www.humanconnectome.org/

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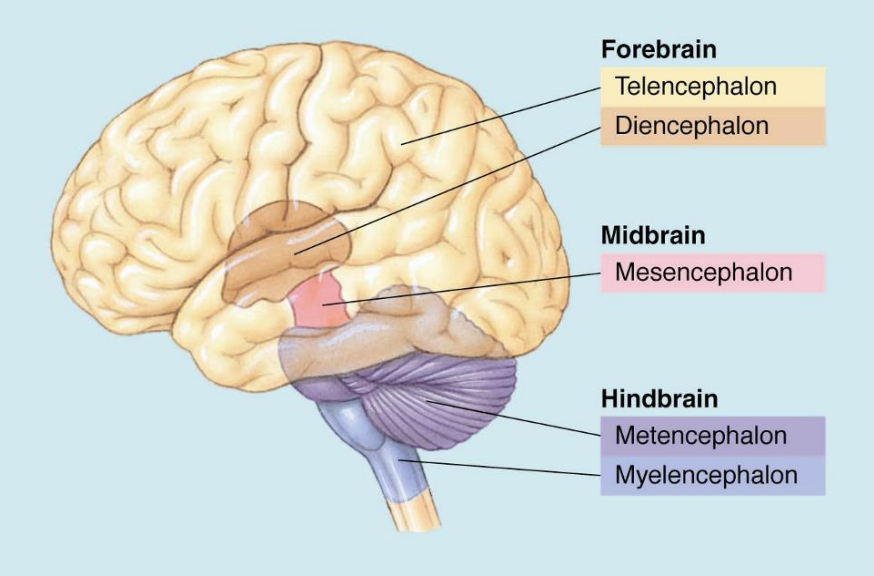
Neuroanatomie



- Cerveau antérieur (prosencéphale)
  - Cortex cérébral (télencéphale)
  - Hypothalamus. Contrôle des émotions, faim, soif, motivation
- Cerveau moyen (mésencéphale)
  - Intégration et traitement des informations sensorielles
  - Mouvements
  - Conscience et reflexes sensorimoteurs
- Cerveau postérieur (rhombencéphale)
  - Respiration, rythme cardiaque, digestion
  - Coordination des mouvements, équilibre

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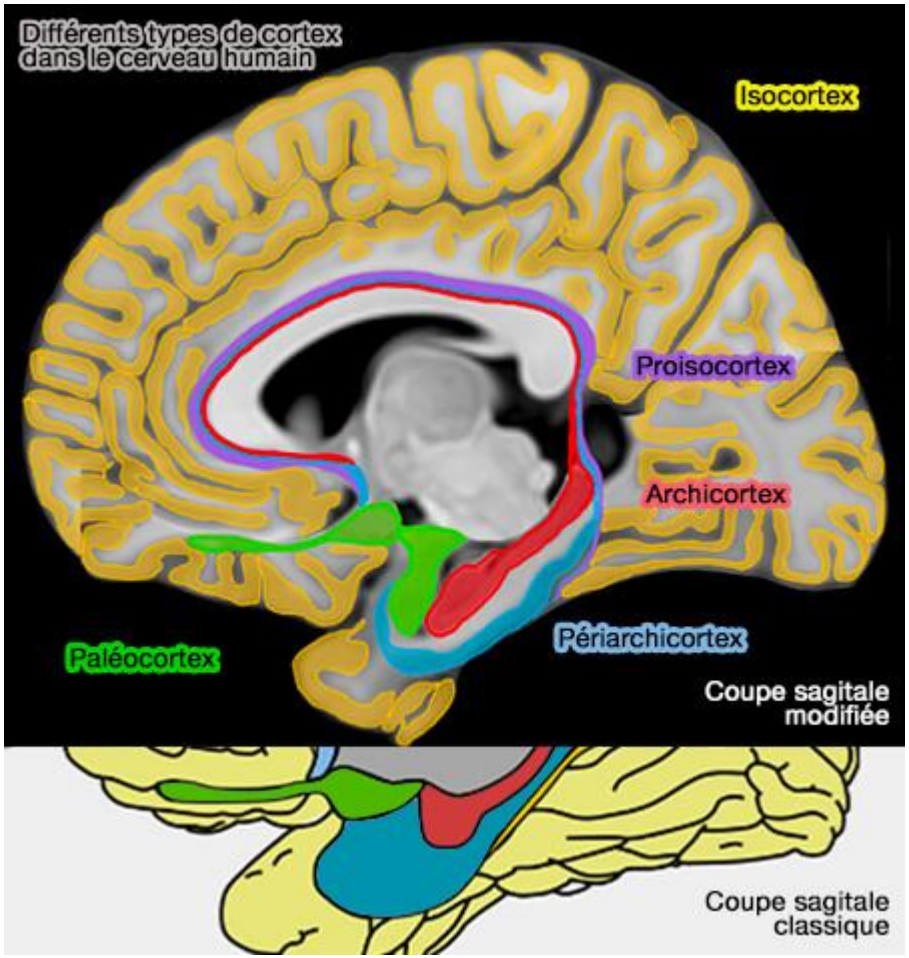
Diencéphale



- Archiostriatum (premiers vertébrés, poissons,…)
  - Amygdale. Gestion des émotions et des réactions instinctives
  - Fonctions affectives, mémoire émotionnelle, comportements de survie
- Paleostriatum (reptiles, mammifères primitifs, …)
  - Fonctions motrices essentielles. Tonus musculaire et coordination des mouvements
- Néostriatum (mammifères)
  - Porte d'entrée des informations corticales
  - Contrôle moteur volontaire , motivation, douleur,

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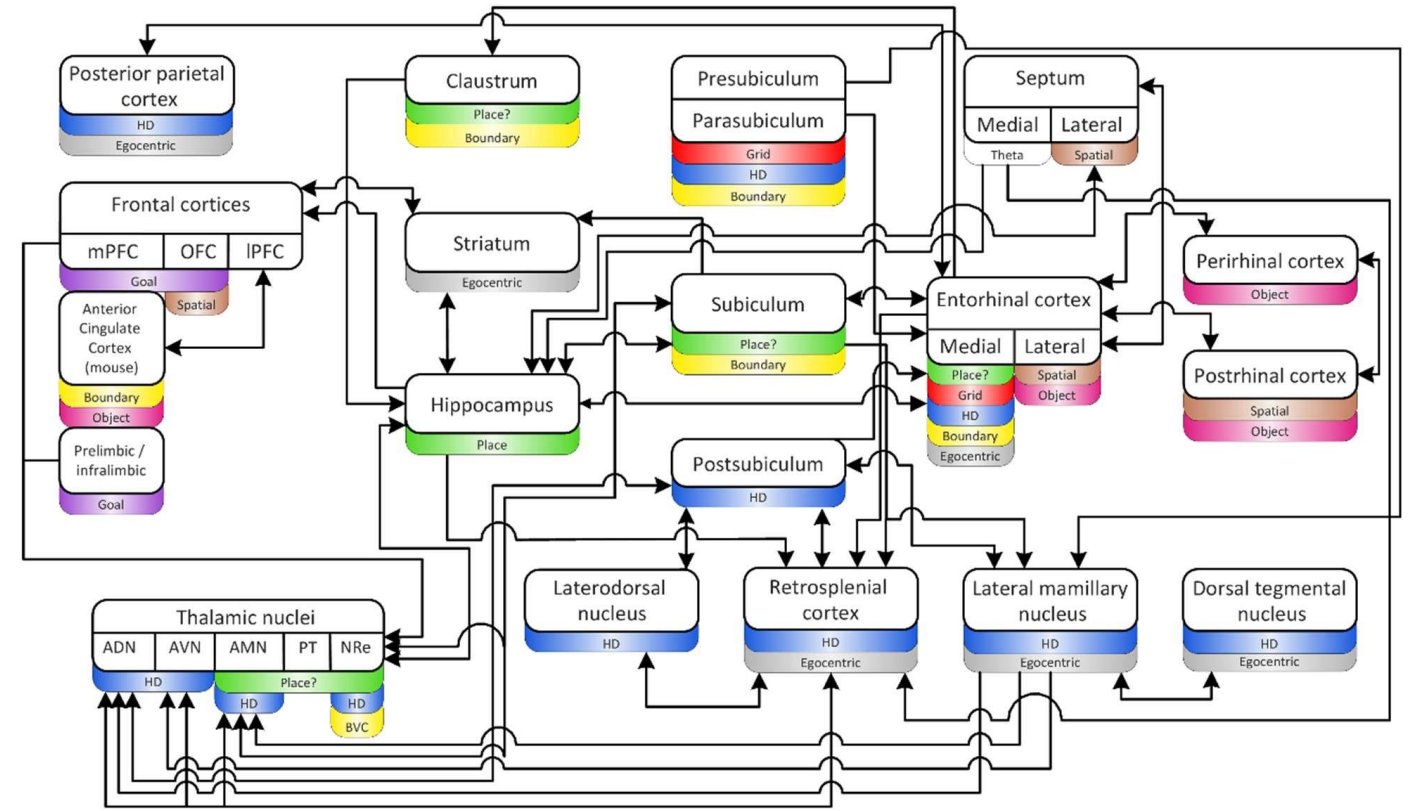
Représentation de l'espace dans le cerveau



Grieves & Jeffery 2017

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Emotions

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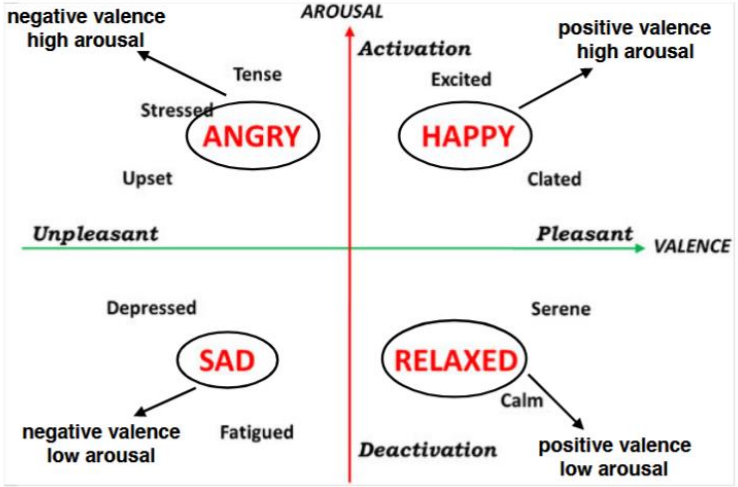
Circumplex model of affect



Emotion	Color(c)		Sound(s)		Vibration(v)	
relaxed	white	c1	flat beep sound	s1	mildly intense vibration	v1
happy	green	c2	flat beep sound (louder than s1)	s2	highly intense vibration (lower than v4)	v2
sad	blue	c3	falling beep sound	s3	low intense vibration	v3
angry	red	c4	rising beep sound	s4	highly intense vibration	v4

Song Yamada (2017) Expressing Emotions through Color, Sound, and Vibration with an Appearance-Constrained Social Robot

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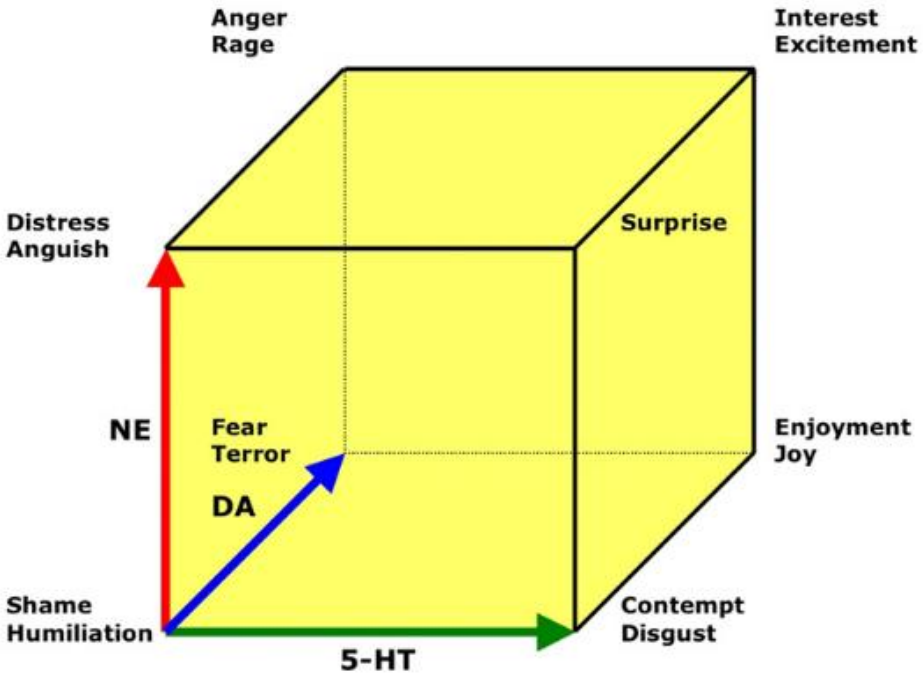
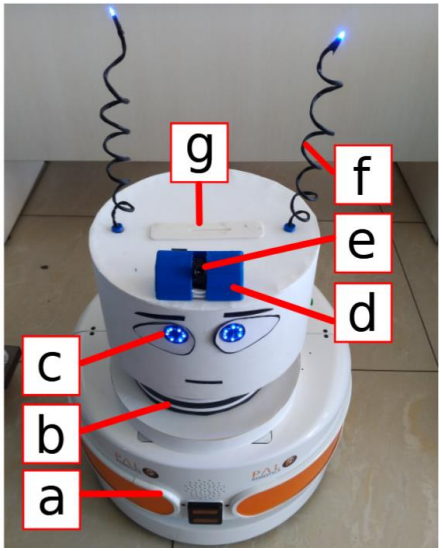
« Cube of emotions » Lovheim (2024)





Lövheim, H. (2024). A new three-dimensional model for emotions and monoamine neurotransmitters.
Chebotareva & al (2019). Emotional social robot "emotico". 12th International Conference on Developments in eSystems Engineering (DeSE).

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