

Psychology, Philosophy, Linguistics 1850-1950

Visual Phenomena

Illusions, Mach Bands

Gestalt Era

Saussure

Behaviorism

H. Jackson,
Modularity

Grouping

Arbitrary
symbols in
language

Lorenz ethology

Cassirer
origins of
symbolic form,
Peirce
semiotics

Stroop,
emotion &
reaction
time

Merleau-
Ponty,
embodiment

Wundt lab

1850

1900

1920

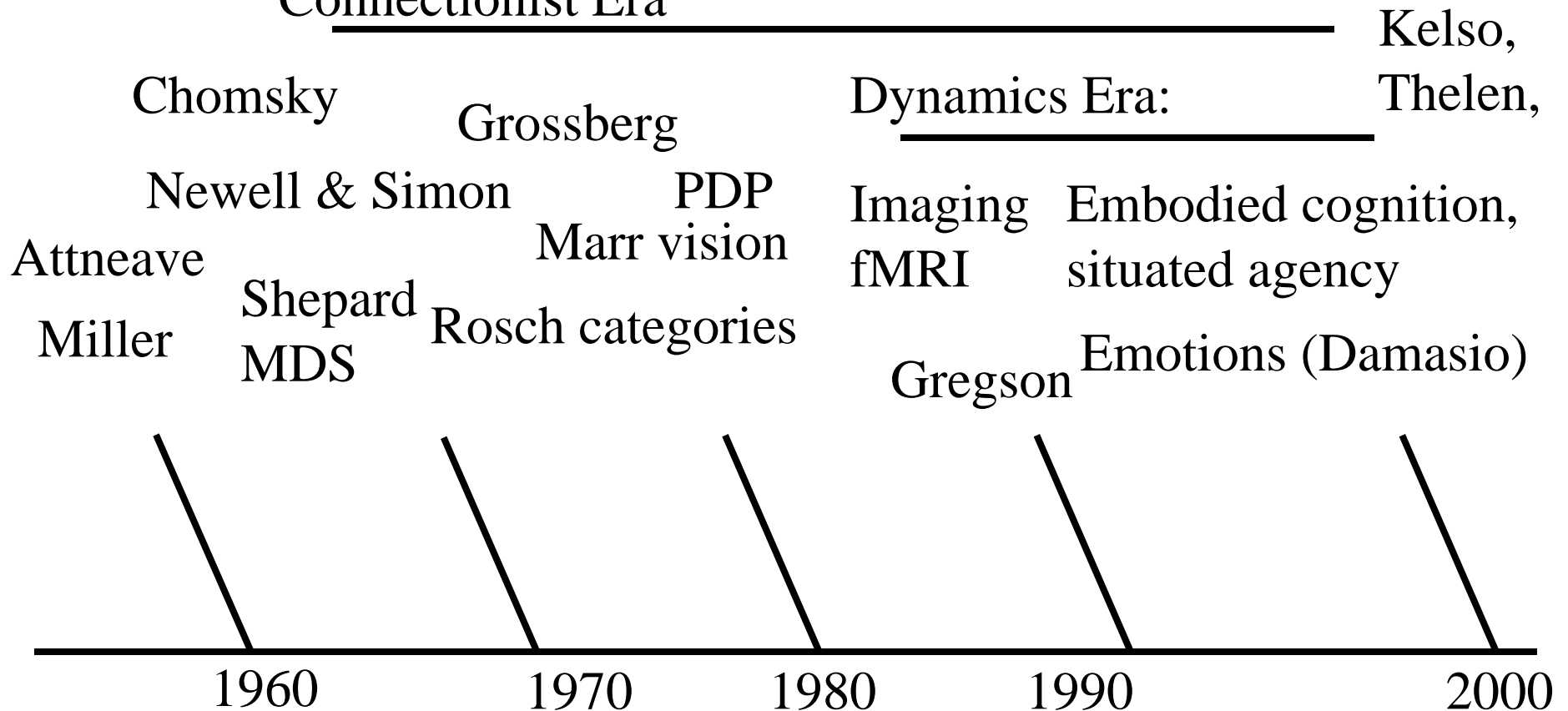
1940

1950

Psychology, Philosophy, Linguistics 1950-2000

Symbolic Era

Connectionist Era



Observation

- Looking at timelines, we see periods when experiment and theory coincided
- Today, multi-channel neuron and EEG data has not well integrated - most theory is still based on rate coding and neuron doctrine (even though it may be considered activation of tuned population)

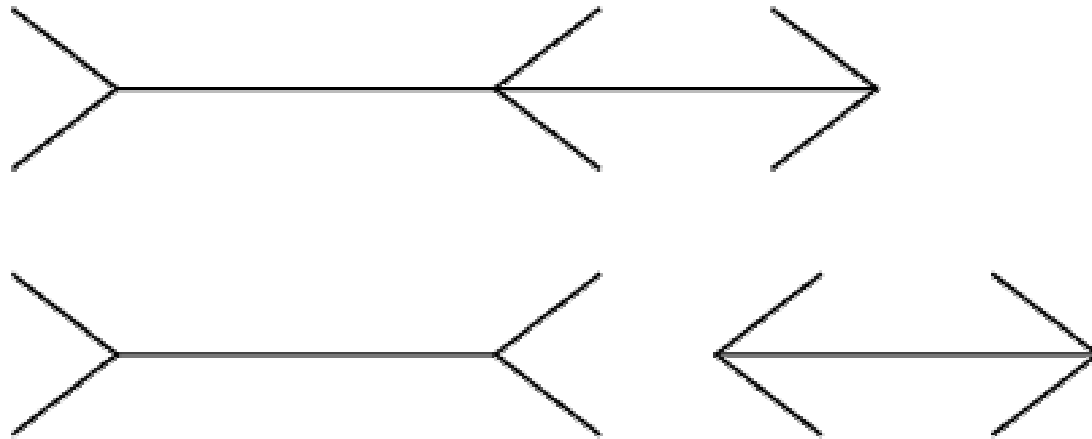
Neuroscience and Psychology

		Digital Computer	Dynamics
Phenemena	Behaviorism	Symbolic	?
Field theories	Networks	General Problem	
Gestalt	Activation, Inhibition	Solvers, Search	



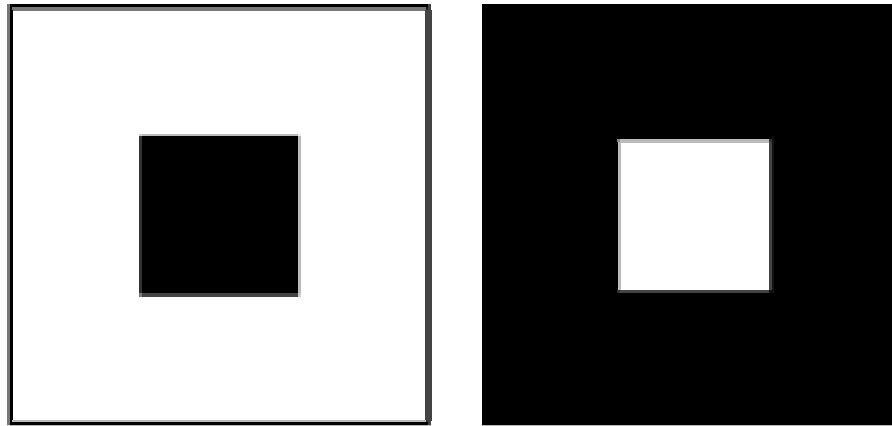
19th century: visual phenomena

Muller Lyer

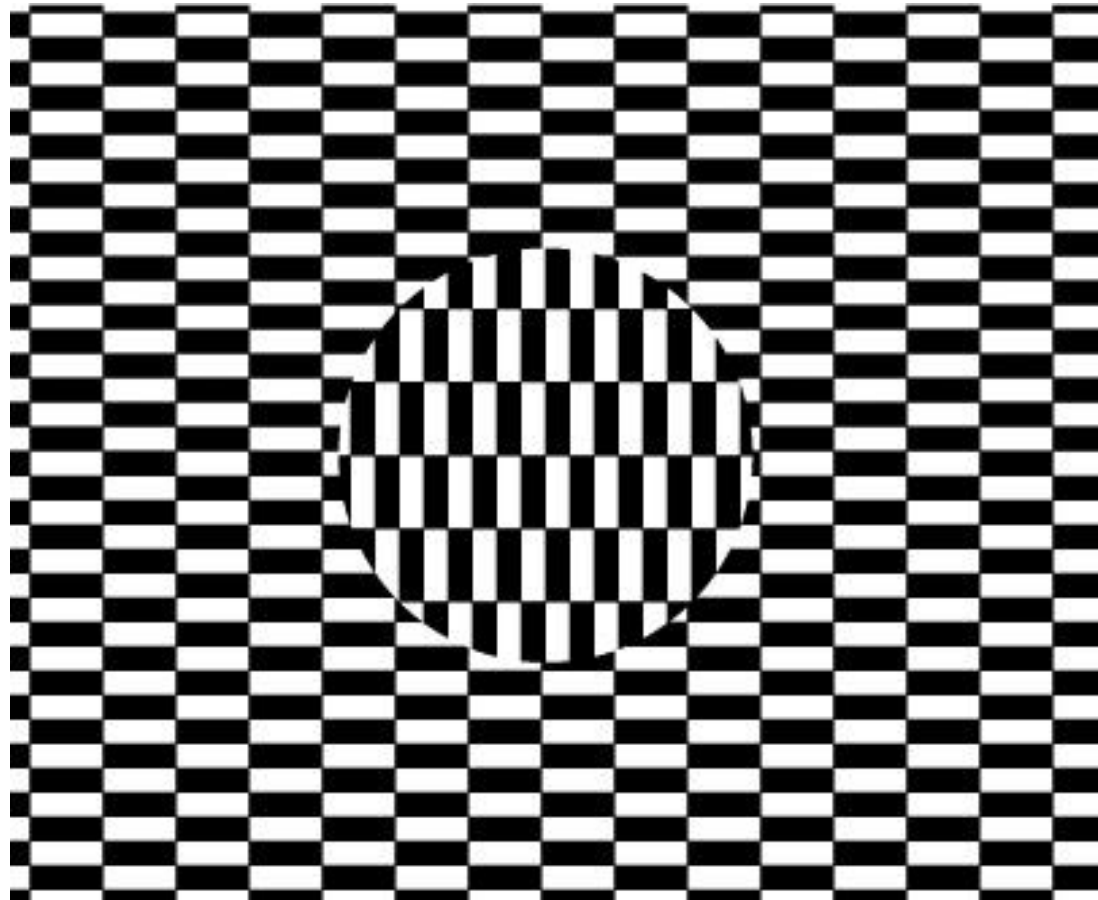


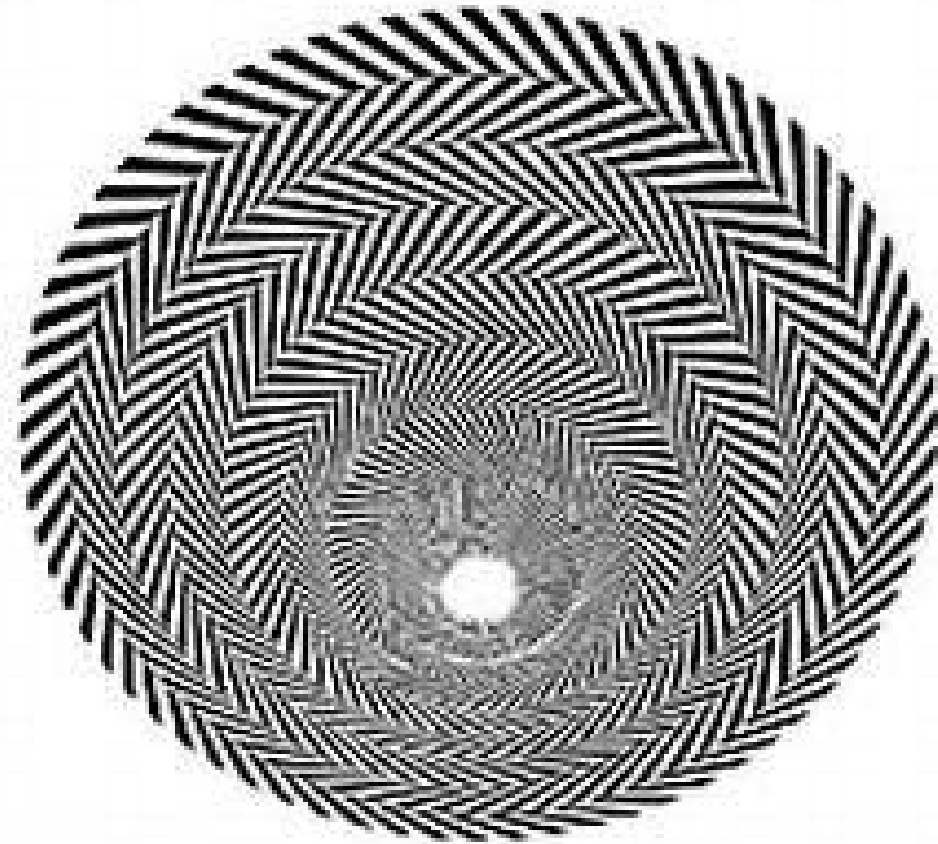
Fixations on intersection of arrowheads not possible; displaced to inside of fins. Gregson and I have modeled with coupled map lattice.

19th century: visual phenomena



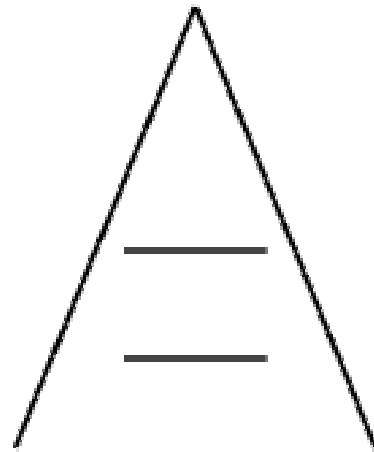
19th century: visual phenomena



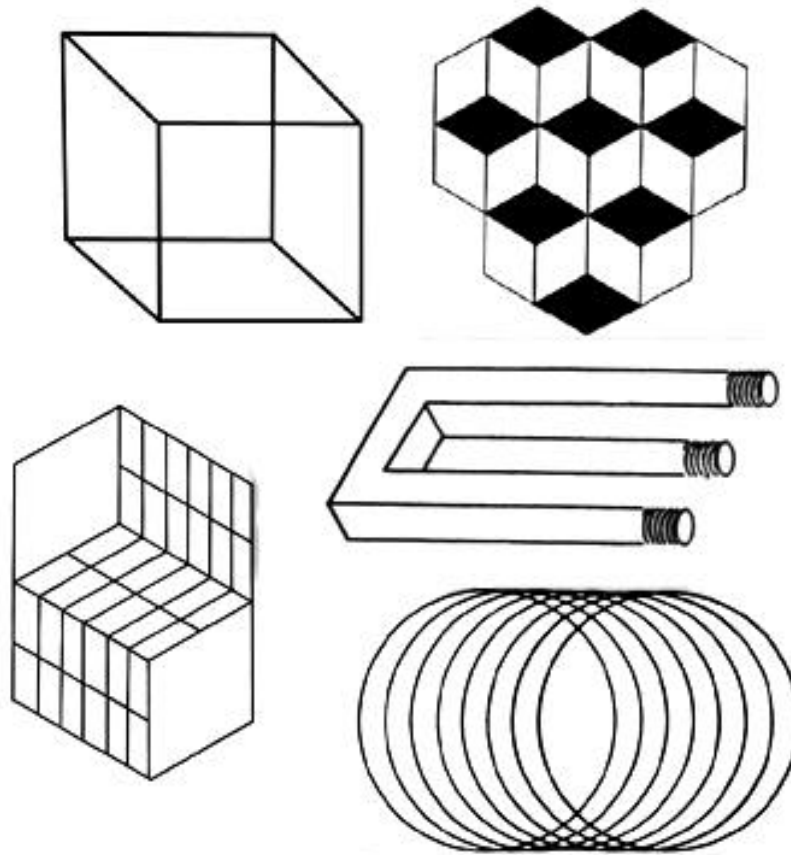


BRIDGET RILEY - BLAZE # - 1964 - HAYWARD GALLERY DONATION - SEPTEMBER 1992

Visual phenomena: Ponzo



Visual phenomena: Necker Cube



Kelso study: reversal rate dependence on configuration

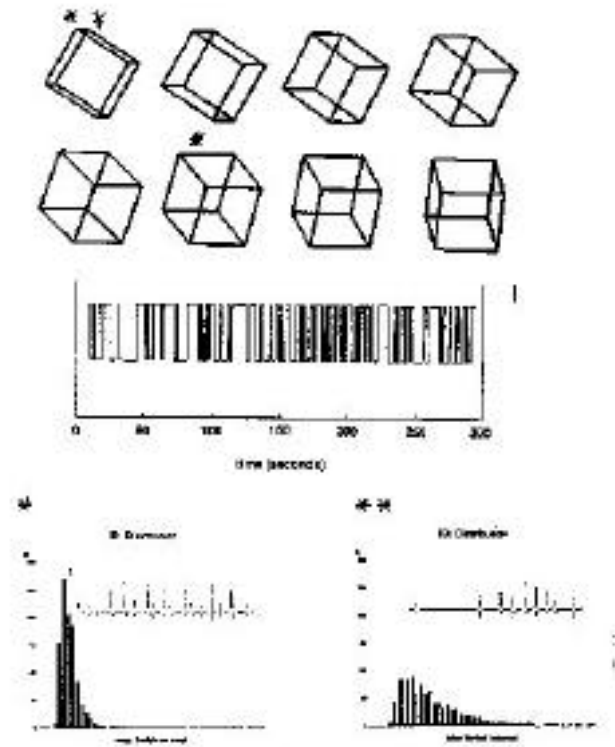
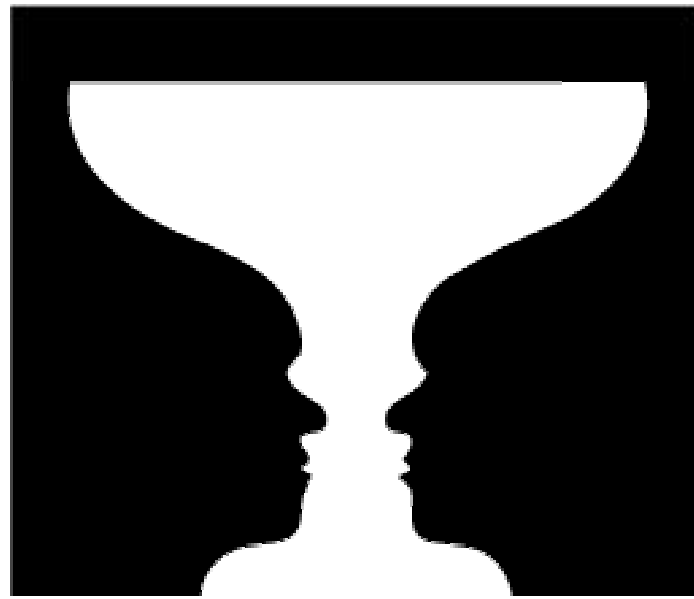


Fig. 3

Necker Cube Psychophysics

- Luminance does not effect reversal rate
- Fixation near “inducing” vertex affects residency time, first perception
- Fixations near edge correlated w/ flip, but cause effect unclear
- Reversal event time series irregular (chaotic?)
 - Avg. rate decreases with cube size
 - Distribution of reversal times changes with shape
 - Larger cube->flatter distribution
- At least one study finds correlation between reversal rate and personality traits - scores on creativity tests

Figure ground : face vase

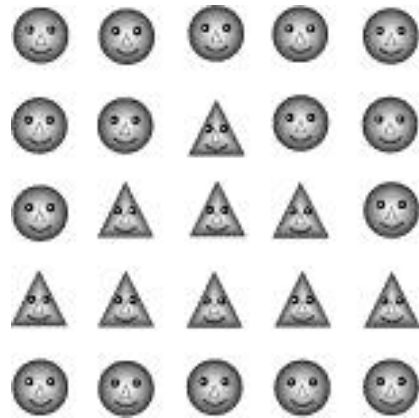


Gestalt Laws: Proximity

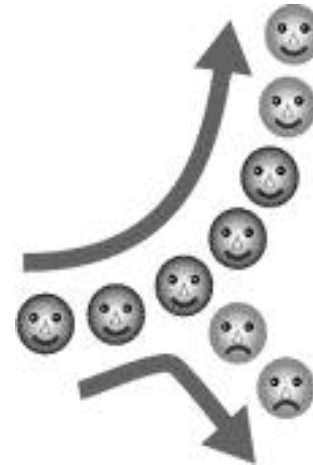


Objects closer together are grouped together.

Gestalt Laws



Similarity



Good continuation

Gestalt Laws

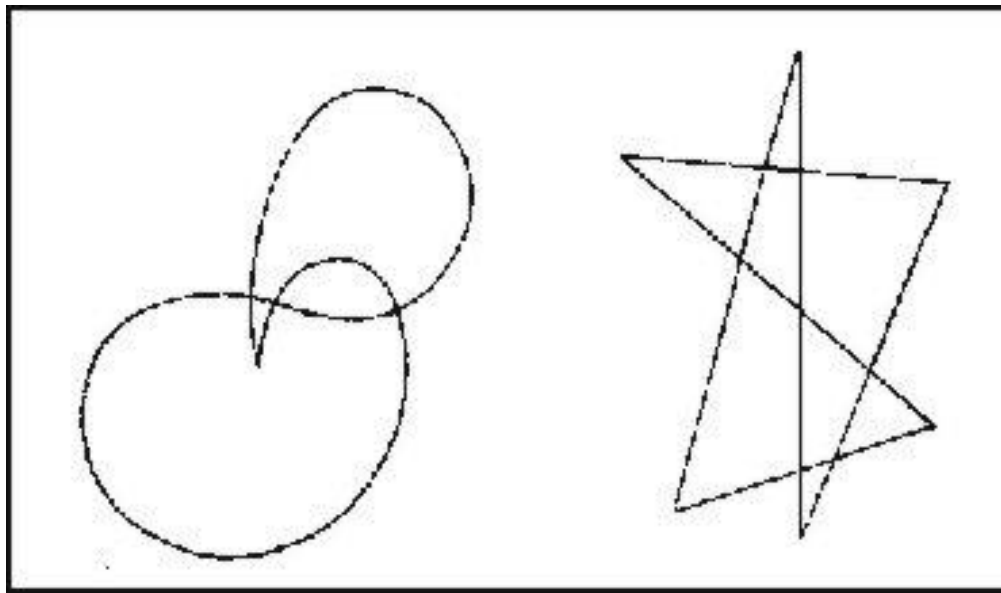


Closure: contour completion, gaps are ignored



Pragnanz: best figure is simple, symmetrical, regular, familiar

Meluma Takete



Stroop interference: What color?

Green

Wrong color increases delay

Violent connotation increases delay for patients with some trauma

Gestalt Theory & Art: Arnheim

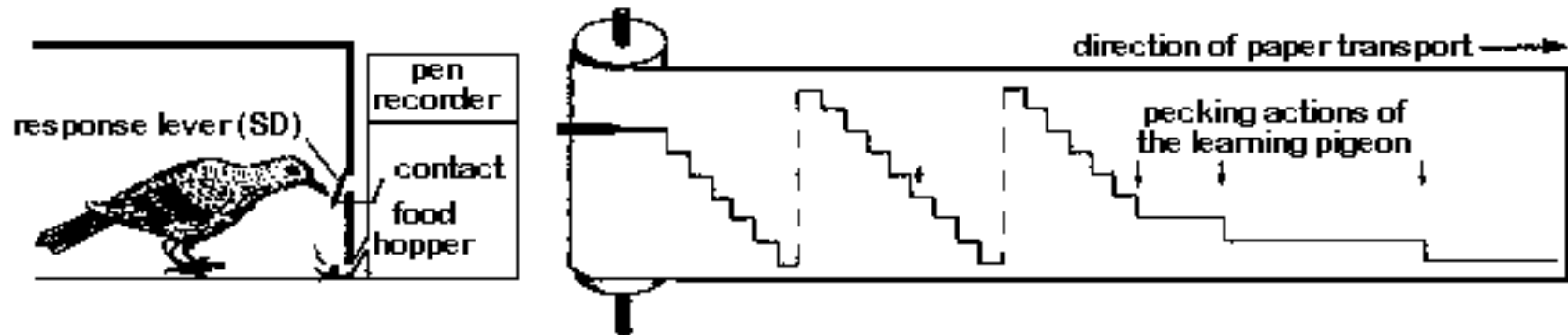


The structural theme must be conceived dynamically, as a pattern of forces, not an arrangement of static shapes. These forces are made visible, for example, by the confluence of the large folds in the Madonna's garment which lead to the hand supporting the child. The system of folds converging towards the asymmetrically placed secondary center is in contrapuntal tension with the implied symmetry axis of the larger figure, established by the Madonna's head but modulated in her body by the secondary theme. The small child is given visual weight by its compactness and relatively simple shape, but is made subordinate by being turned sideways and placed somewhat lower than his enthroned mother.

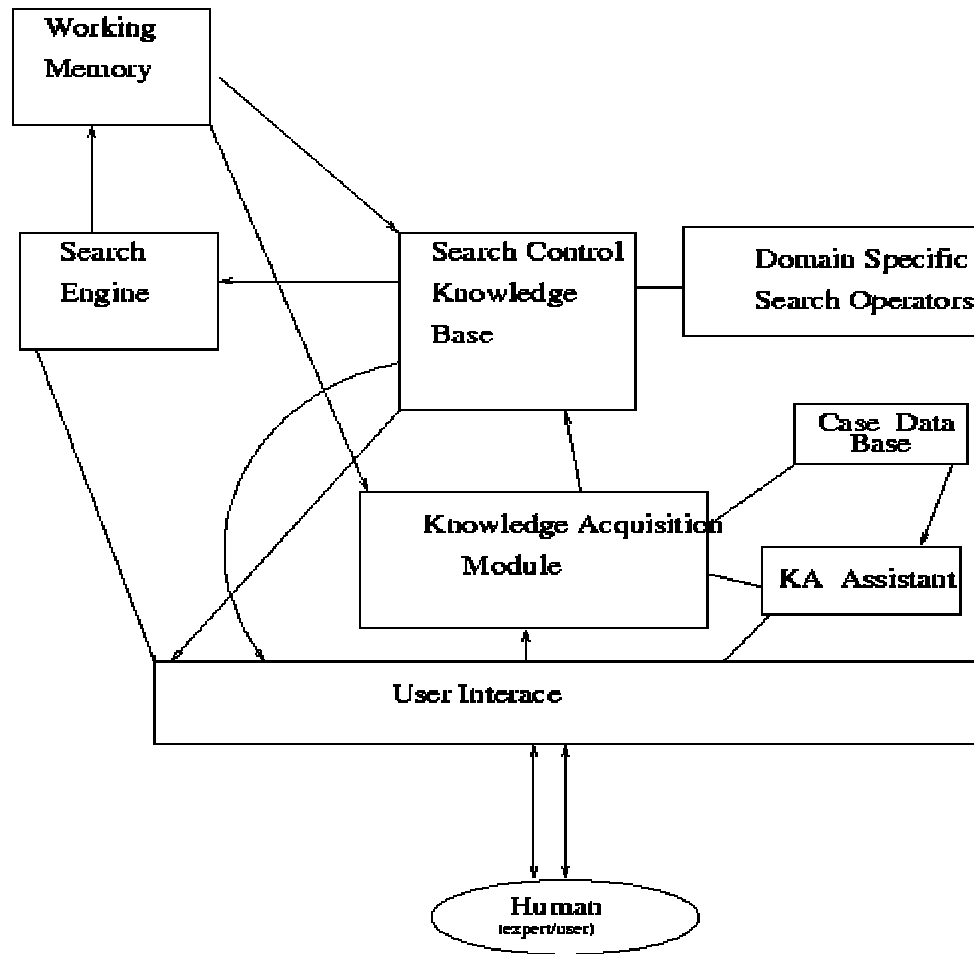
This complex theme of forces is readable by virtue of the delicate visual balancing of sizes, distances, directions, curvatures, volumes. Each element has its appropriate form in relation to all the others, thus establishing a definitive order, in which all component forces hold one another in such a way that none of them can press for any change of the interrelation. The play of forces is at a standstill, the maximum of entropy attainable for the given system of constraints has been reached. Although the tension invested in the work is at a high absolute level, it is reduced to the lowest level the constraints will let it assume.

Tension reduction, directed towards a maximum of entropy, is brought about in closed physical systems by the interaction of the forces that constitute the field. This means that the increase in orderliness is due to self-regulation. But such an effect can also be achieved by intervention from the outside. Even within the body of animal or man the processes directed towards equilibrium by mechanical self-distribution differ from the servomechanisms, located in the hypothalamus and elsewhere, that steer various processes in the body from the outside, as it were, in response to messages received from the critical areas.

Behaviorism: Skinner box, conditioning



The symbolic descendants of Newell & Simon's GPS: early cognitivism

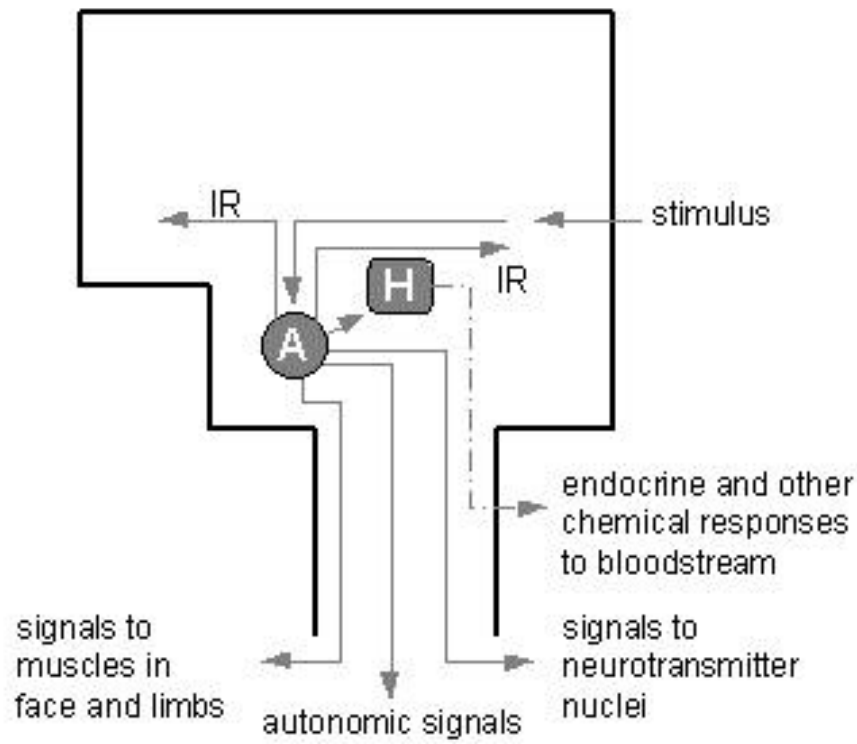


Damasio's Somatic Marker Hypothesis

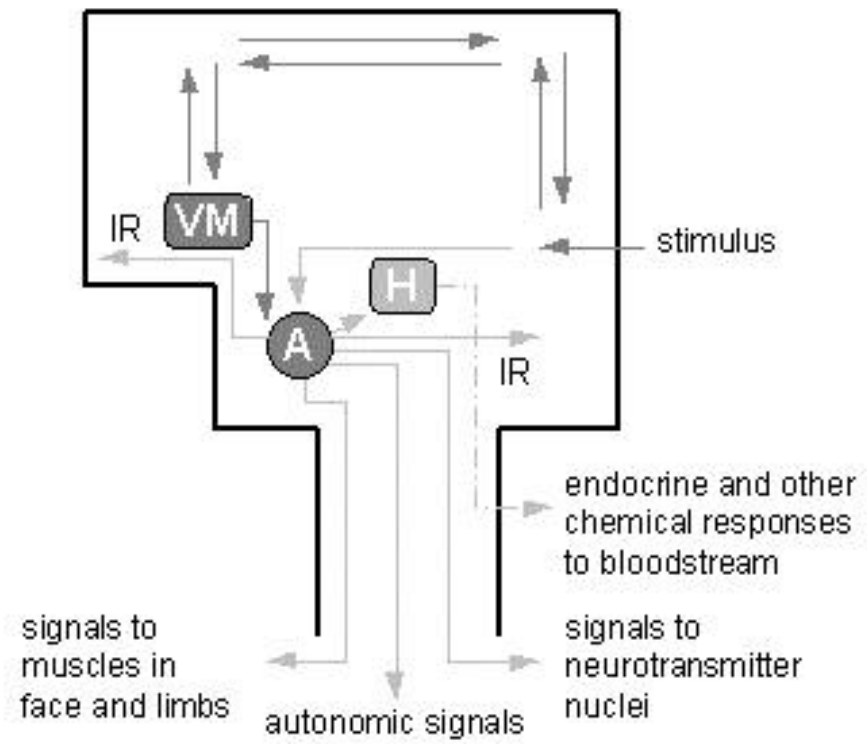
**Primary Emotions: Innate, behavioral
“releasers”**

**Secondary Emotions: Learned
associations of stimulus and emotions;
stimulus could be internal (memory)**

**Memories (representations) tagged with
body based emotional state (somatic
marker)**



Primary Emotions. The black perimeter stands for the brain and brain stem. After an appropriate stimulus activates the amygdala (A), a number of responses ensue: internal responses (marked IR); muscular responses; visceral responses (autonomic signals); and responses to neurotransmitter nuclei and hypothalamus (H). The hypothalamus gives rise to endocrine and other chemical responses which use the blood stream route.



Secondary Emotions. The stimulus may still be processed directly via the amygdala but is now also analysed in the thought process, and may activate frontal cortices (VM). VM acts via the amygdala (A). In other words, secondary emotions utilise the machinery of Primary Emotions.