The human perception of sequences:
The local global paradigm

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A world full of sequences
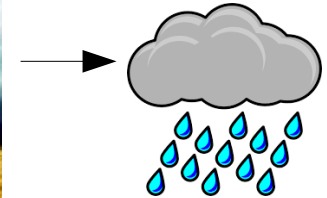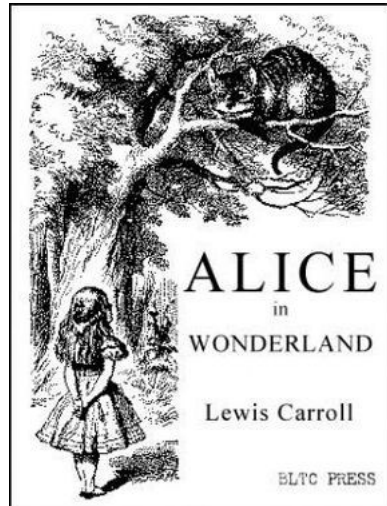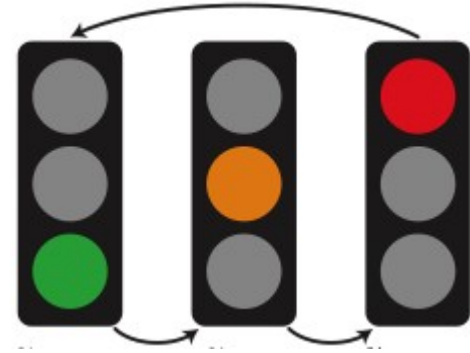
A taxonomy of sequence knowledge

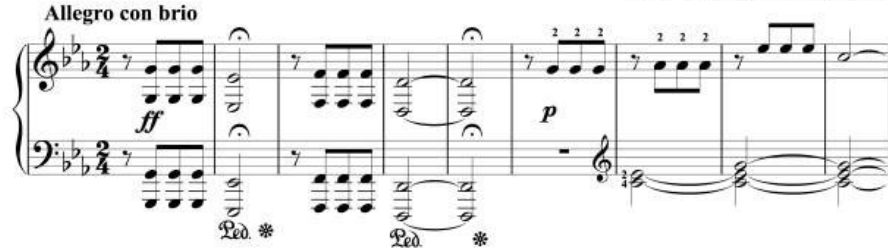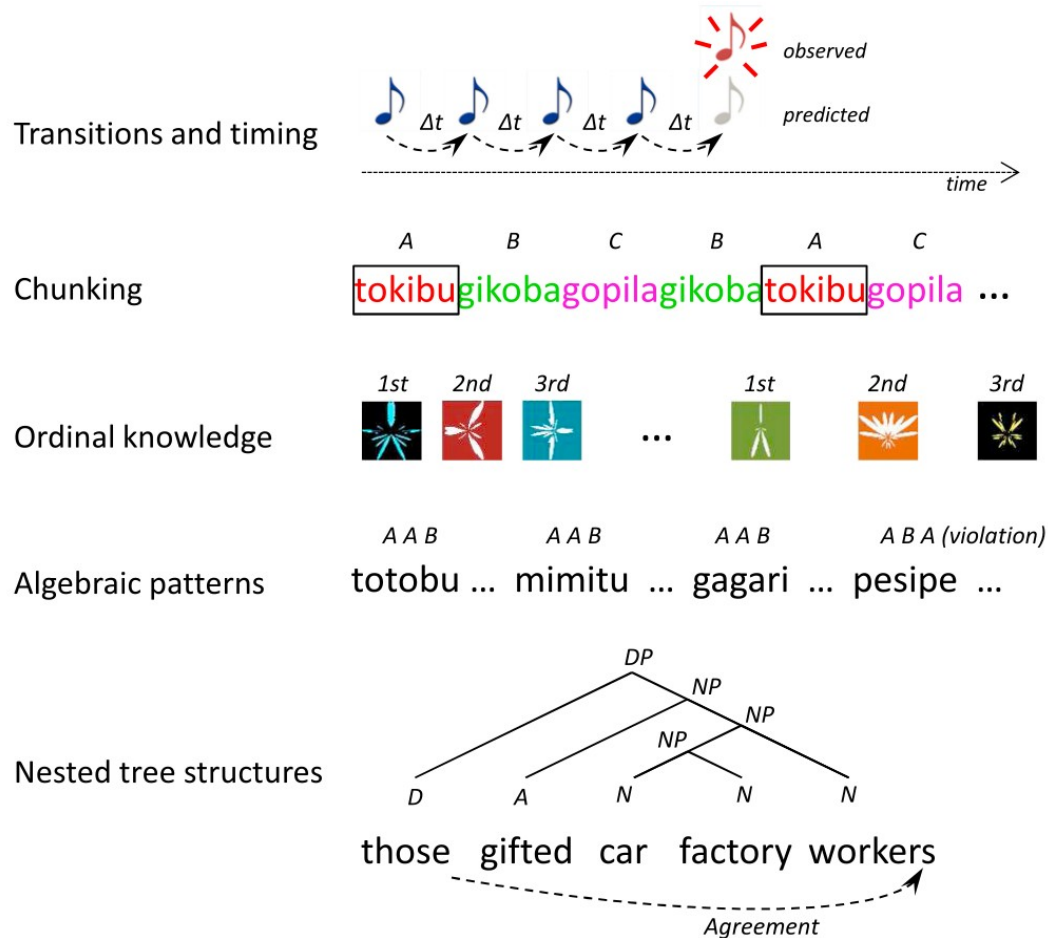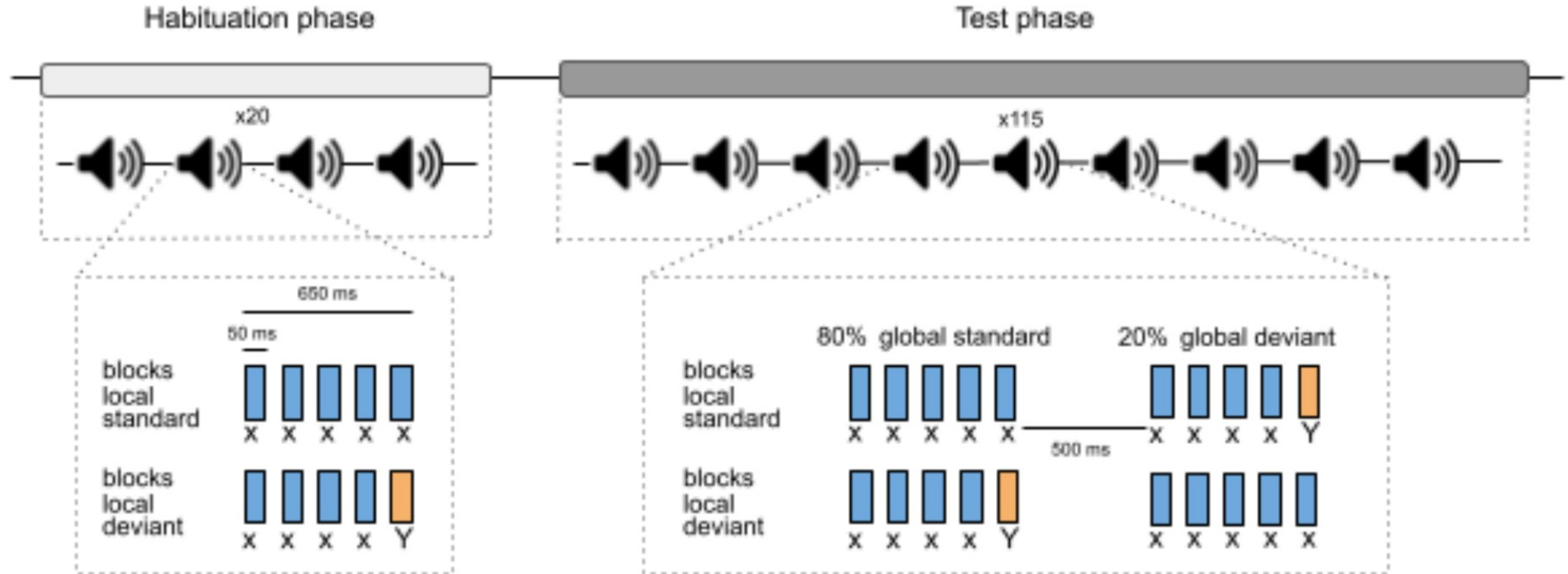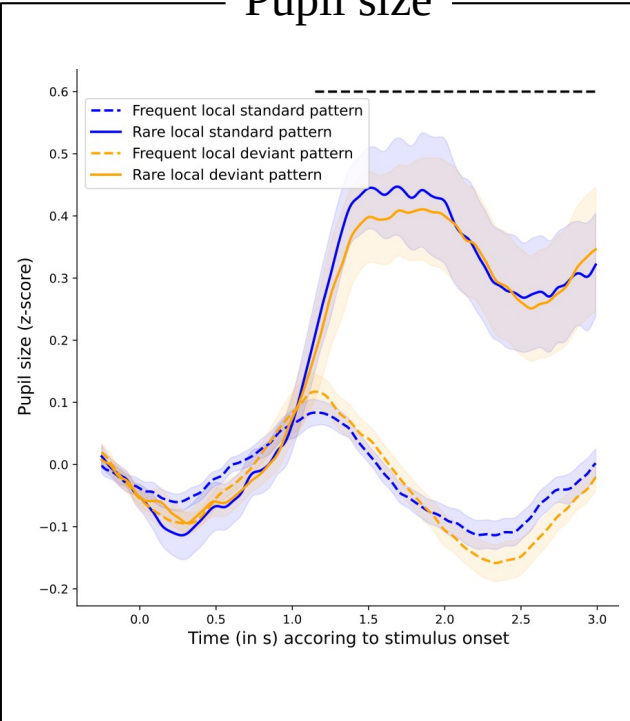# The local global paradigm

- Study the hierarchical representation of sequence
- Use deviance-detection neural signal to characterize this representation
- To detect local deviant: adaptation suffices
- To detect global deviance, notably rare xxxxx, adaption is not enough, a hierarchical prediction mechanism is necessary
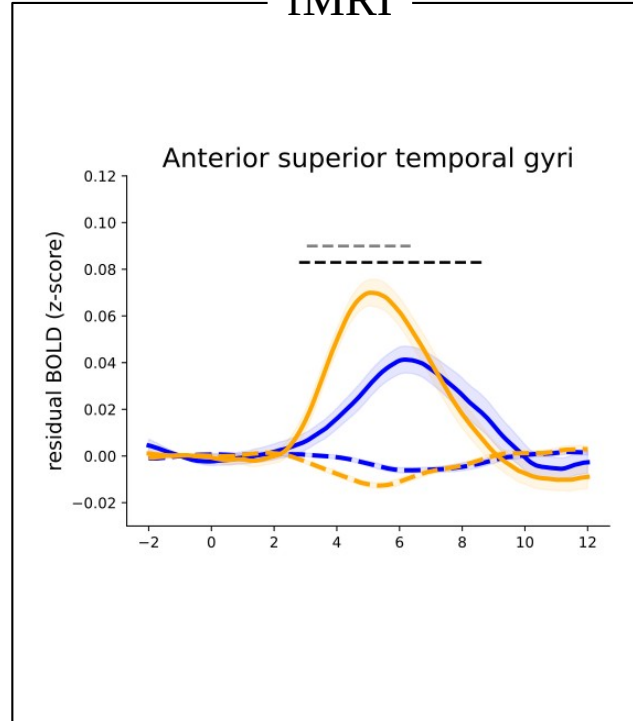
Bekinschtein et al, *PNAS* 2009

The local global paradigm
Neural and peripheral responses

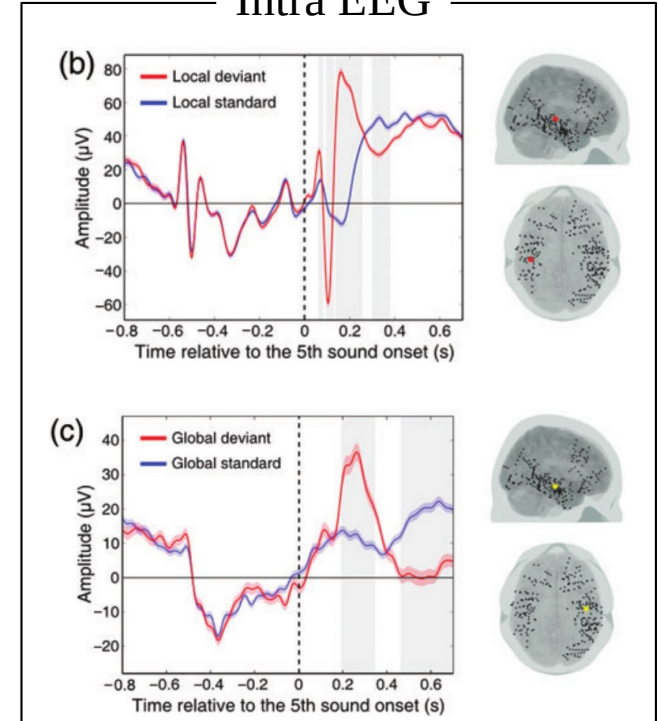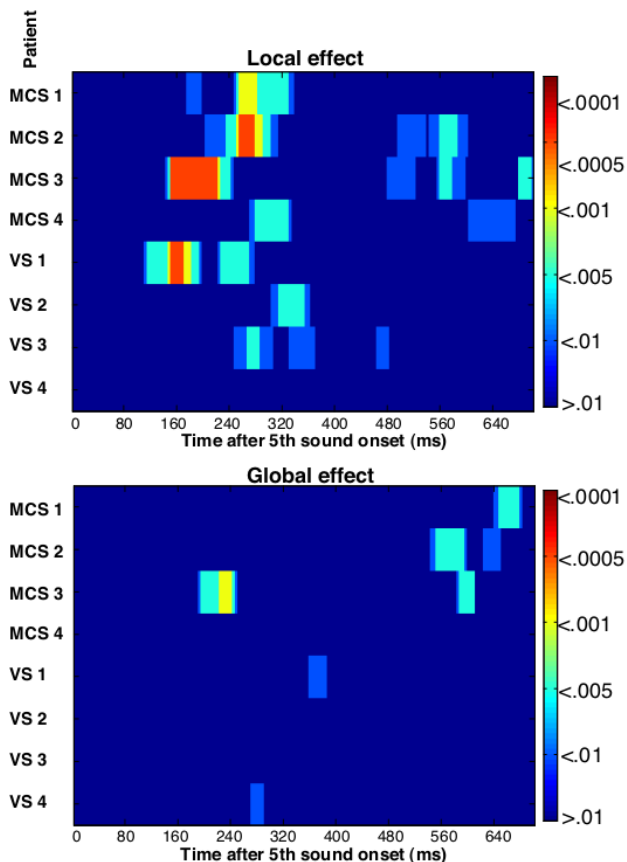Mazancieux et al, *Cell reports*, 2023
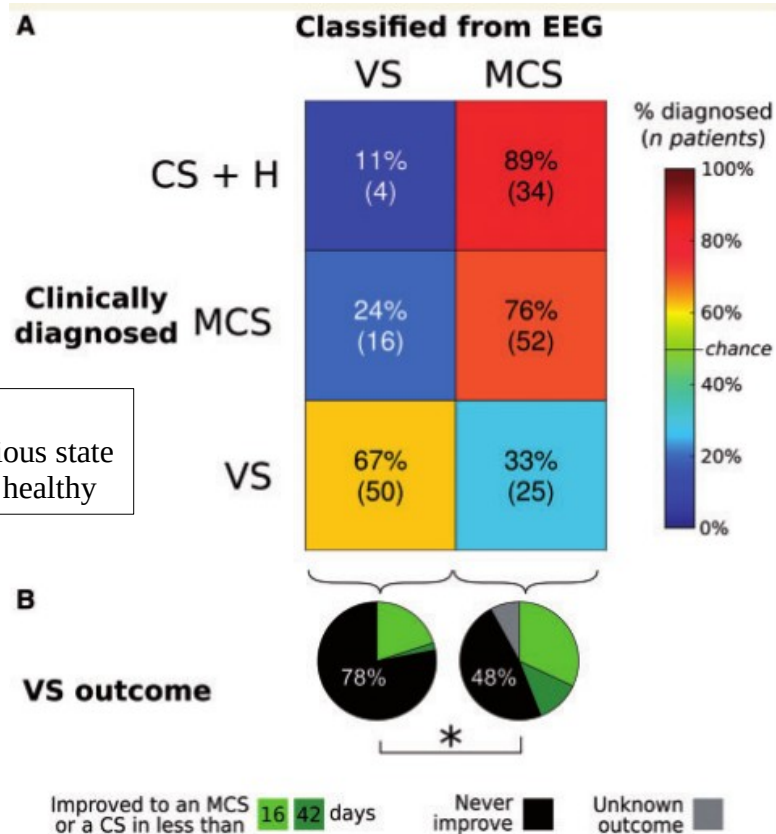
El Karoui et al, *Cereb. Cortex*, 2014

The local global paradigm
A tool to study consciousness

VS: vegetative state
MCS: minimally conscious state
CS+H: conscious state, healthy

Bekinschtein et al, *PNAS* 2009
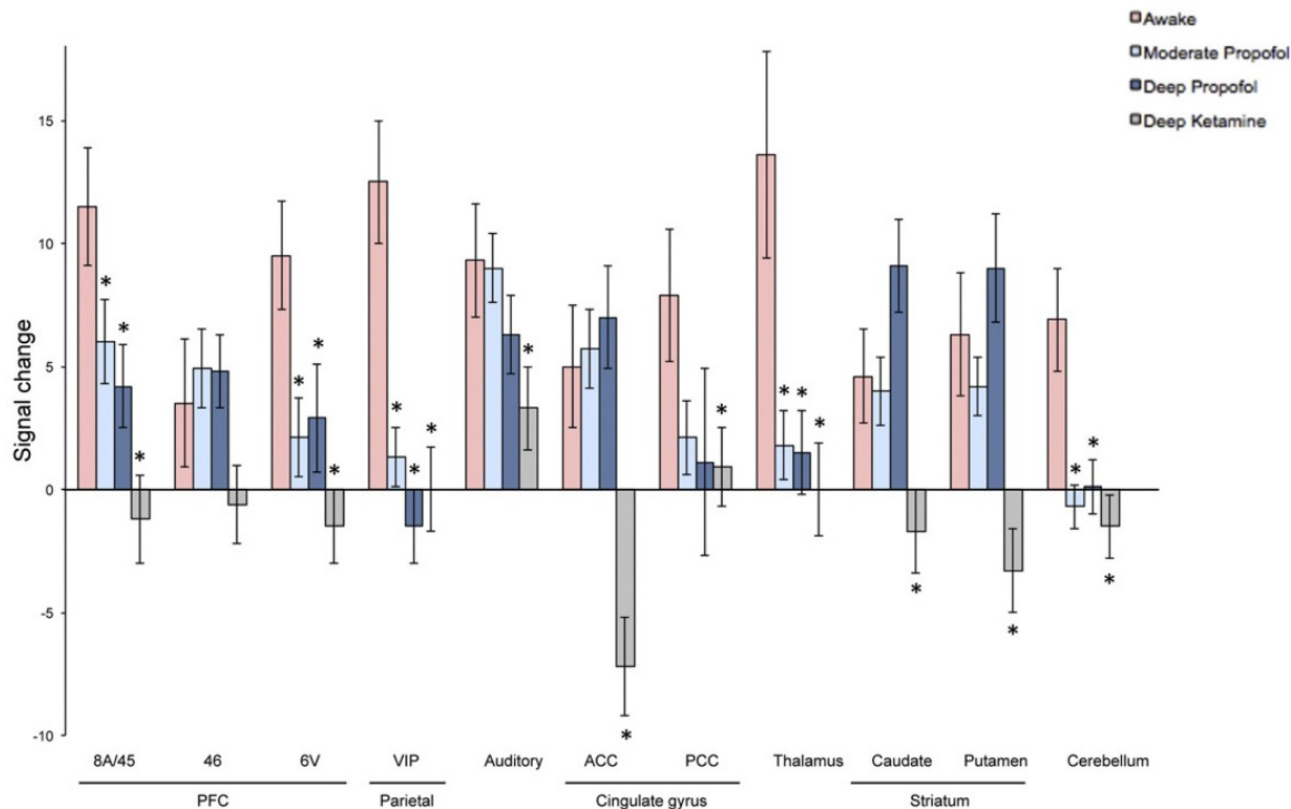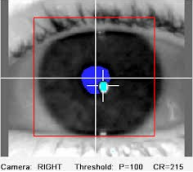
Sitt et al, *Brain* 2014

The local global paradigm
A tool to study consciousness (state)

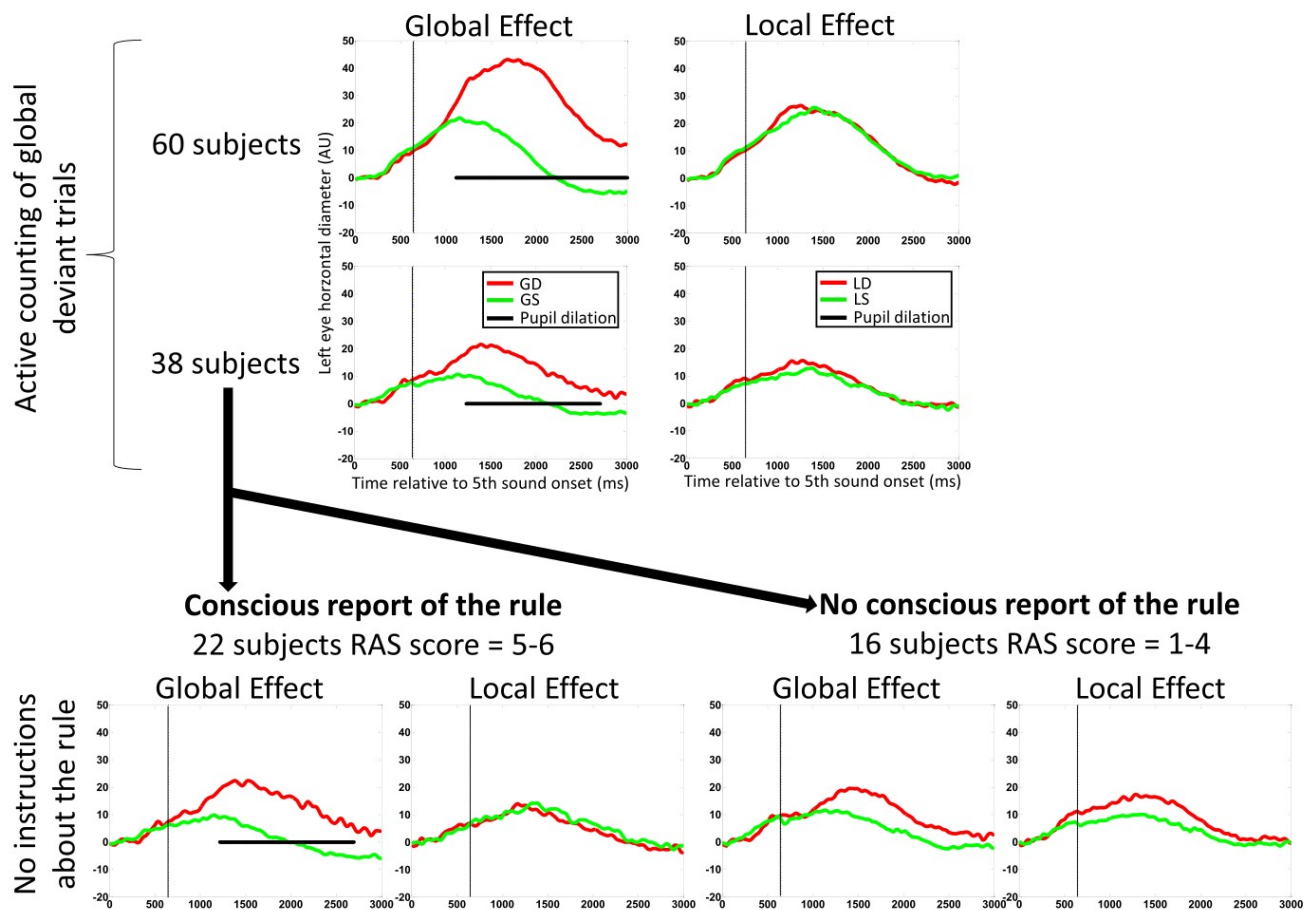Effect of anesthesia on the Global Novelty Effect

The local global paradigm
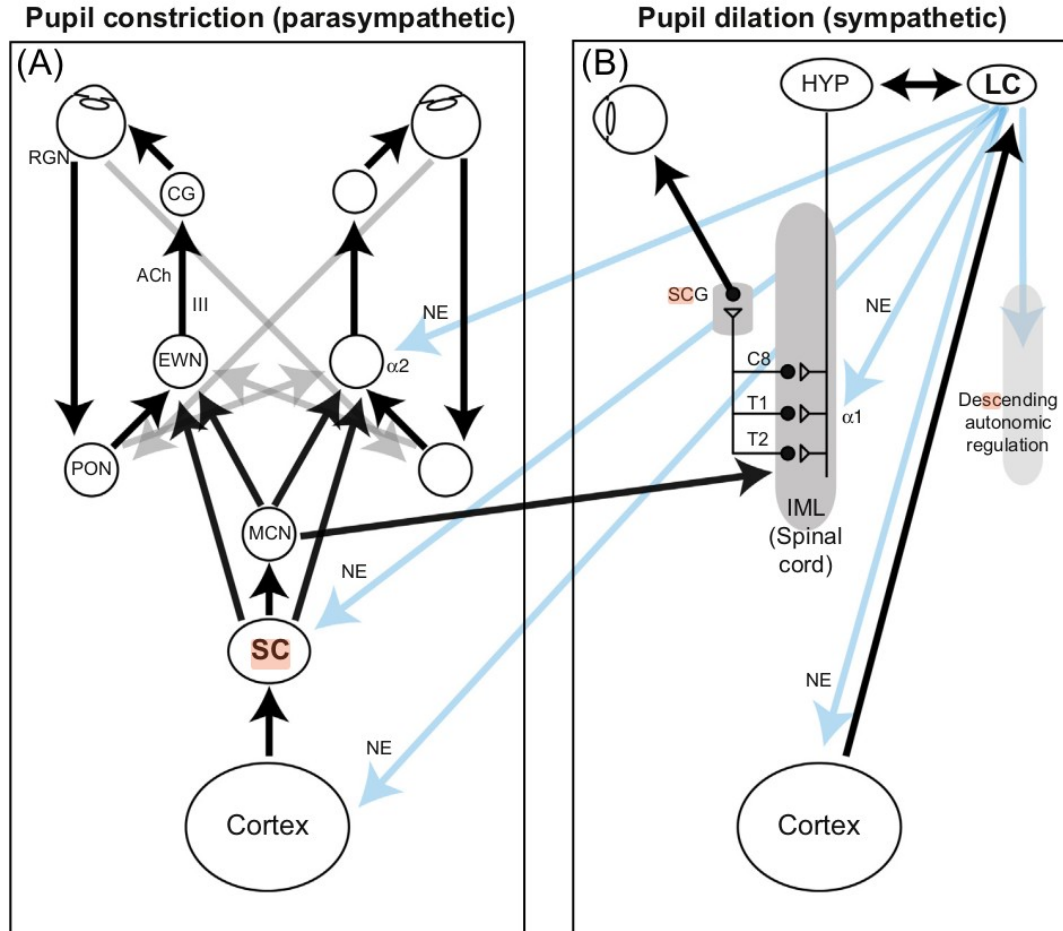# A tool to study consciousness (content)

- Auditory task
- Constant luminance

Quirins et al, *Scientific Report* 2018

# Pupil diameter: A window onto central noradrenaline

- LC: locus coeruleus (Noradrenaline)
- C8, T1, T2: segments of the intermediolateral cell column (spinal cord)
- SC: superior colliculus
- ACh, acetylcholine
- CG, ciliary ganglion
- EWN, Edinger–Westphal nucleus (midbrain)
- HYP, hypothalamus
- III, third cranial nerve
- IML, intermediolateral cell column
- MCN, mesencephalic cuneiform nucleus
- NE, norepinephrine (=noradrenaline)
- PON, pretectal olivary nucleus (midbrain)
- RGN, retinal ganglion neuron
- SCG, superior cervical sympathetic ganglion

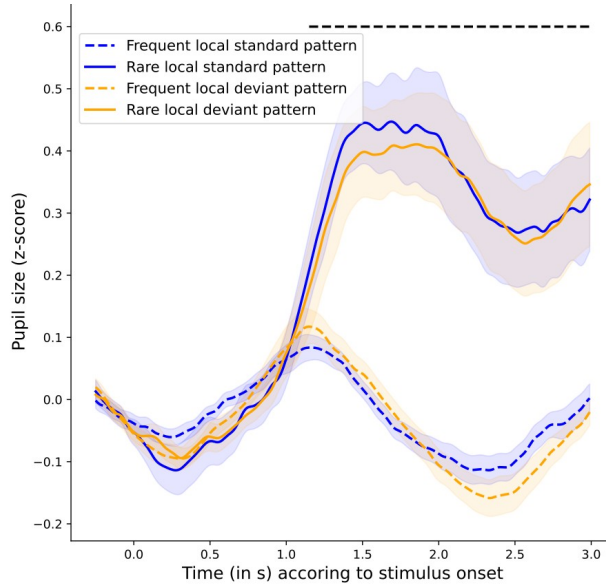# Pupil diameter: A window onto central noradrenaline *that lacks specificity*
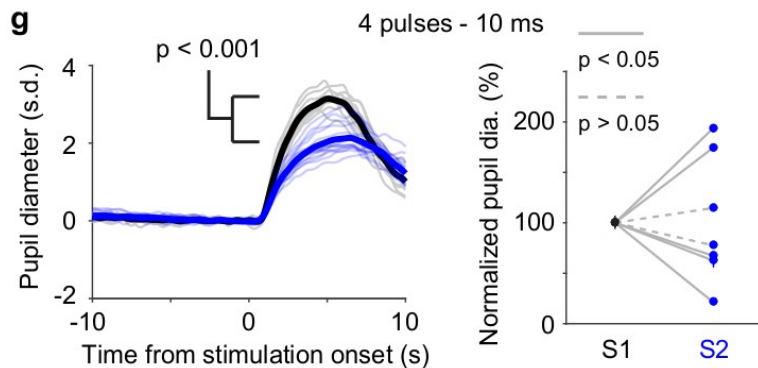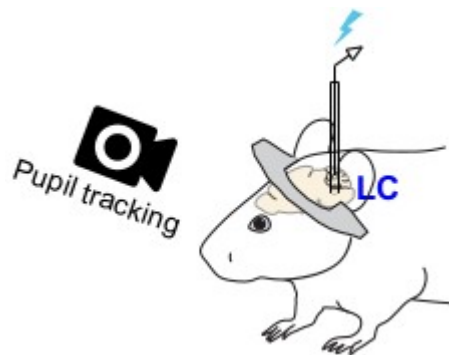
LC activity always drive pupil dilation, but with considerable variability
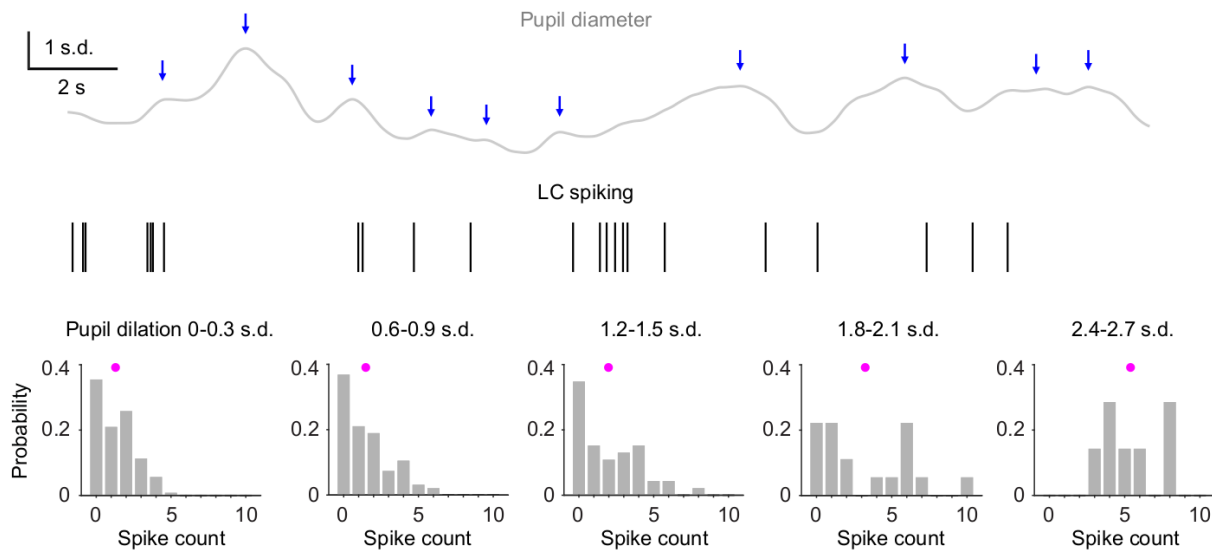
Pupil dilation often, but not always preceded by LC activity (→ lack of specificity)

Goals of today

- Collect pupil data in the local-global paradigm
- Analyze the signal of an example participant

Dehaene, Meyniel, Wacongne, Wang & Pallier, *Neuron* 2015