

iLight

Workshop

Light sciences meet optical illusions

# ***Sensory adaptation drives illusory perceptual experiences***

Paolo Antonino Grasso

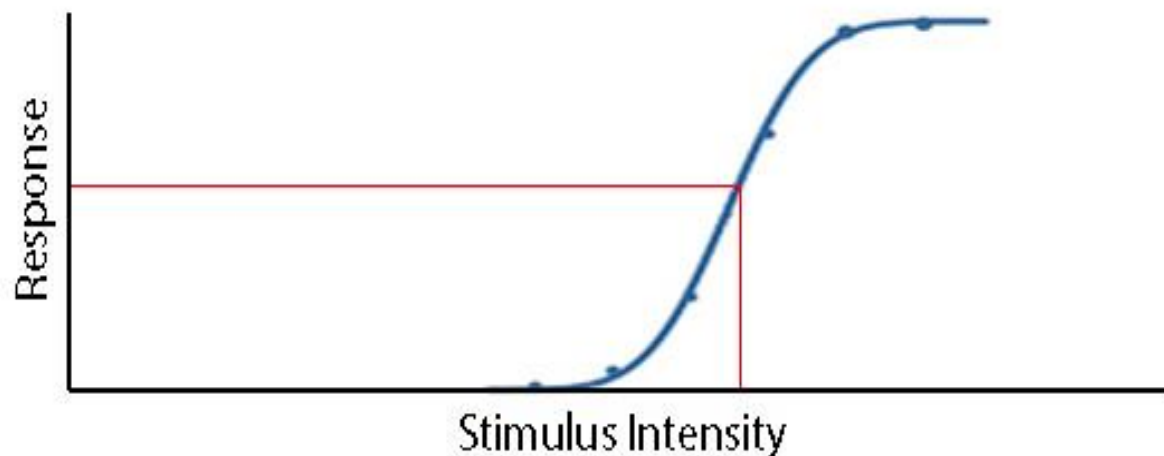


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**Sensory adaptation:**  
*Reduced sensitivity to a sensory stimulus as a consequence of prolonged exposure*



- A vital phenomenon that allows a quick recalibration of our perceptual system in order to meet changes in the environmental needs
- **It provides us with clues on the organization and functioning of sensorial systems**

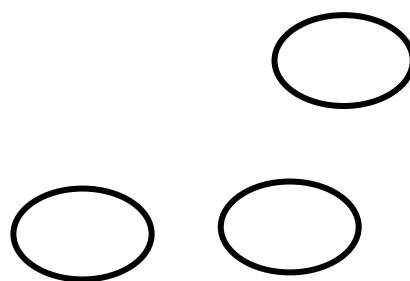


Adaptation reflects changes in the response properties of neurons induced by recent perceptual experience

Stimulus response function is re-centered to the prevailing stimulus intensity to **maintain good discrimination abilities**



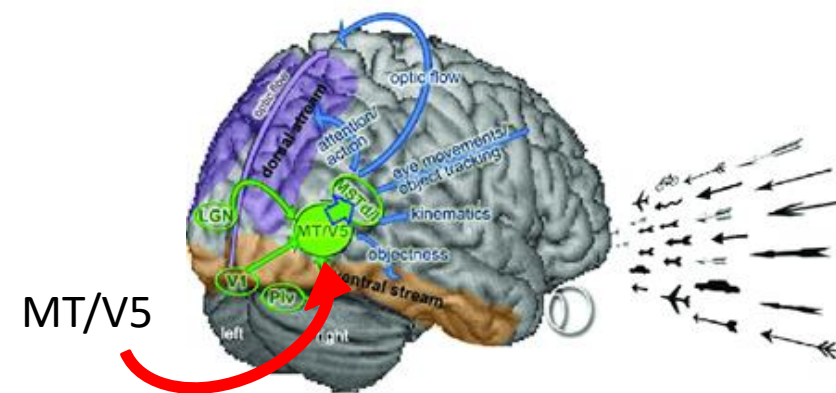
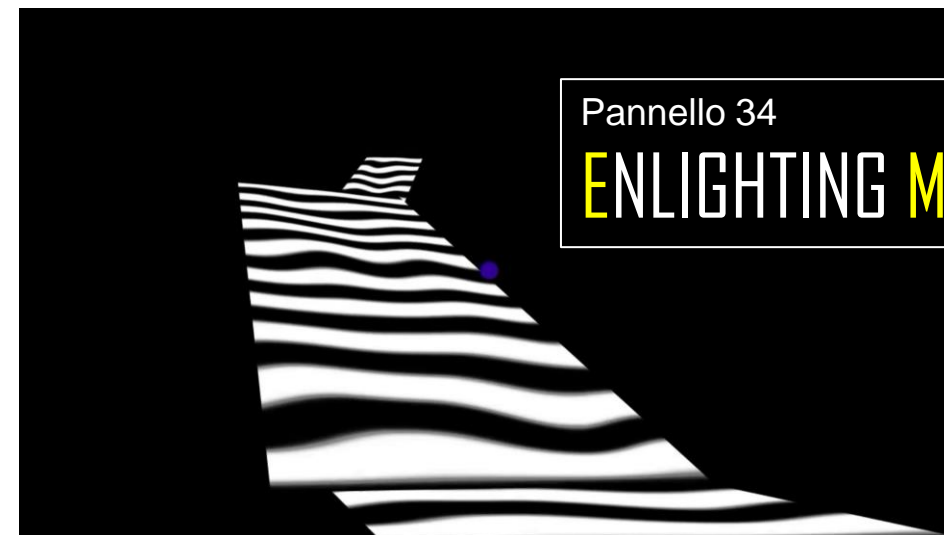
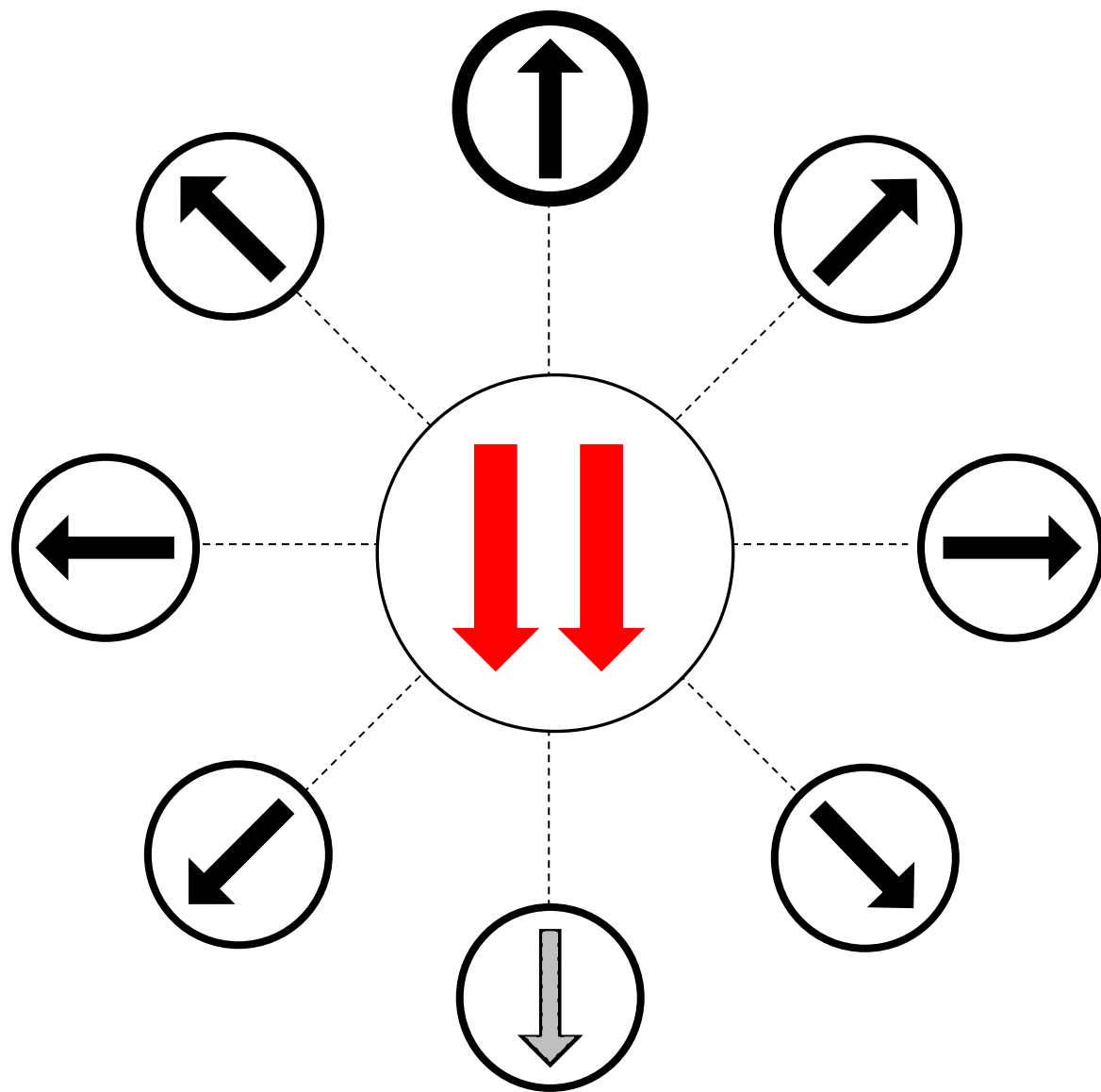
Are adaptation-  
induced changes in  
response properties  
of neurons always  
«optimal»?

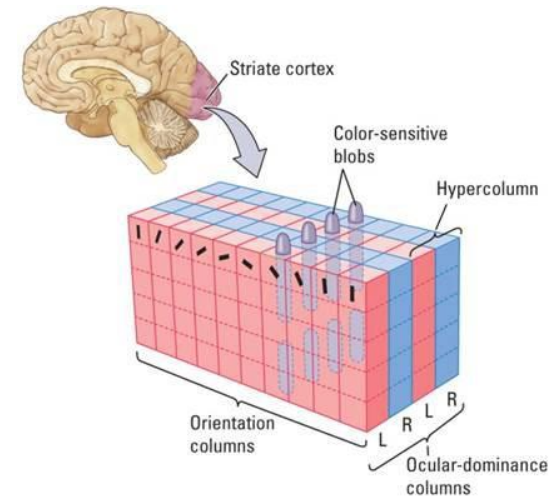
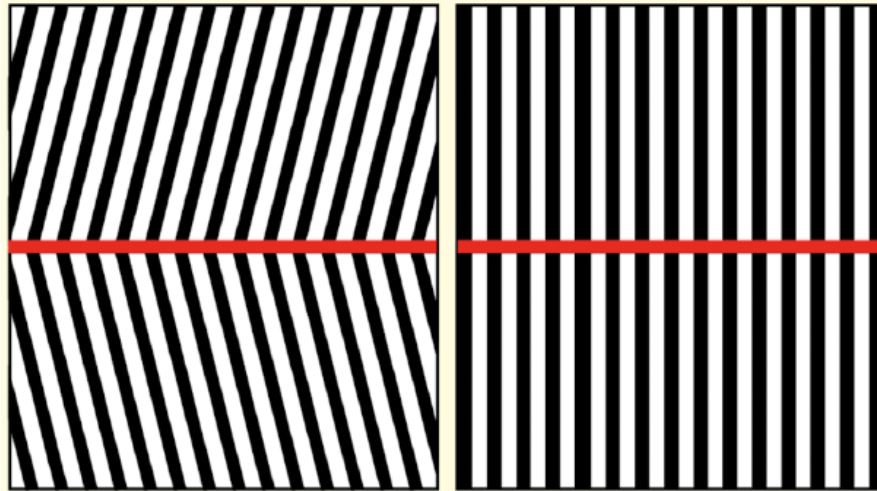


*“During a recent tour of the Highlands of Scotland, I visited the celebrated Falls of Foyers on the border of Loch Ness, and there noticed the following phaenomenon. Having steadily looked for a few seconds at a particular part of the cascade, admiring the confluence and decussation of the currents forming the liquid drapery of waters, to observe the vertical face of the sombre age-worn rocks immediately contiguous to the waterfall, I saw the rocky surface as if in motion upwards, and with an apparent velocity equal to that of the descending water, which the moment before had prepared my eyes to behold this singular deception”*

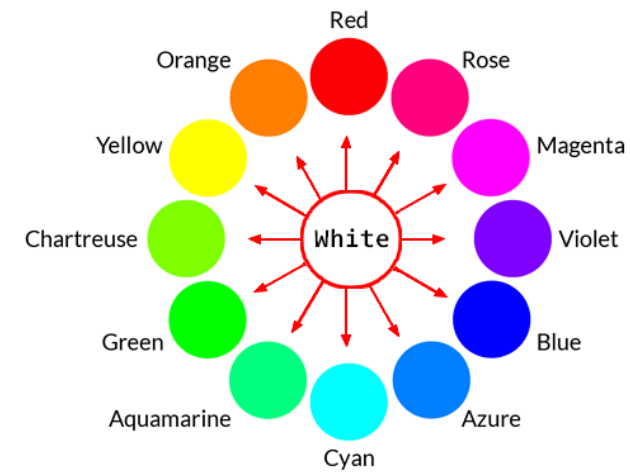
Robert Addams (1834)



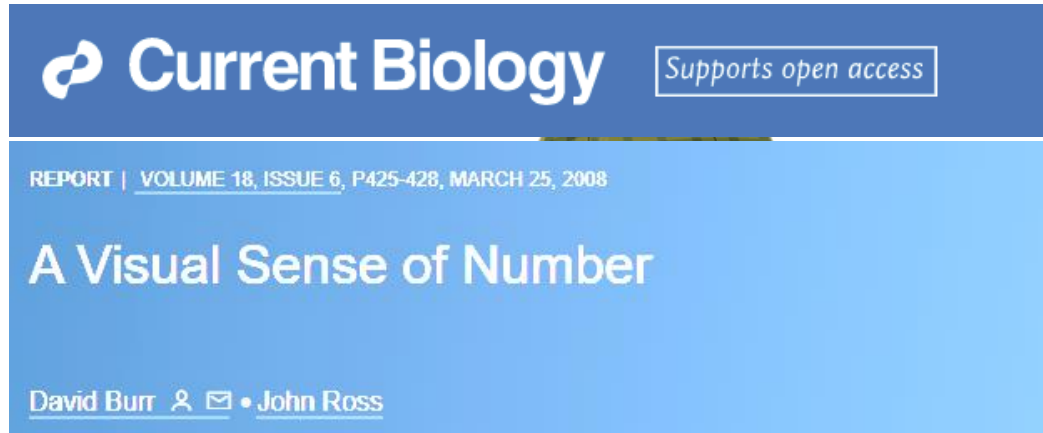




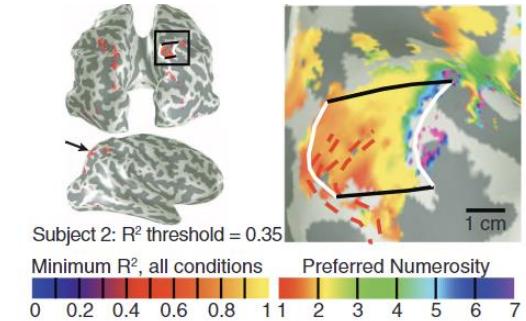
Pannello 32  
**ENLIGHTENING MIND**



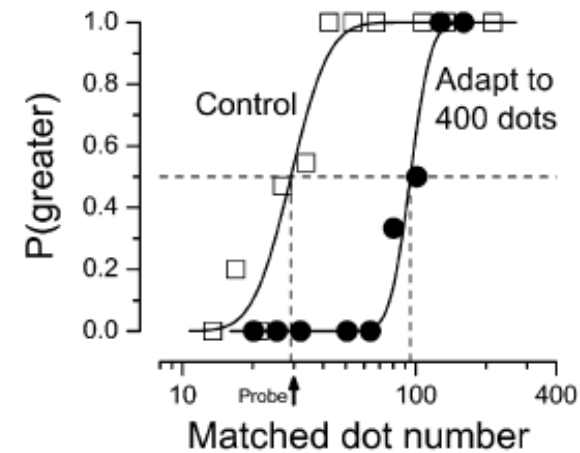
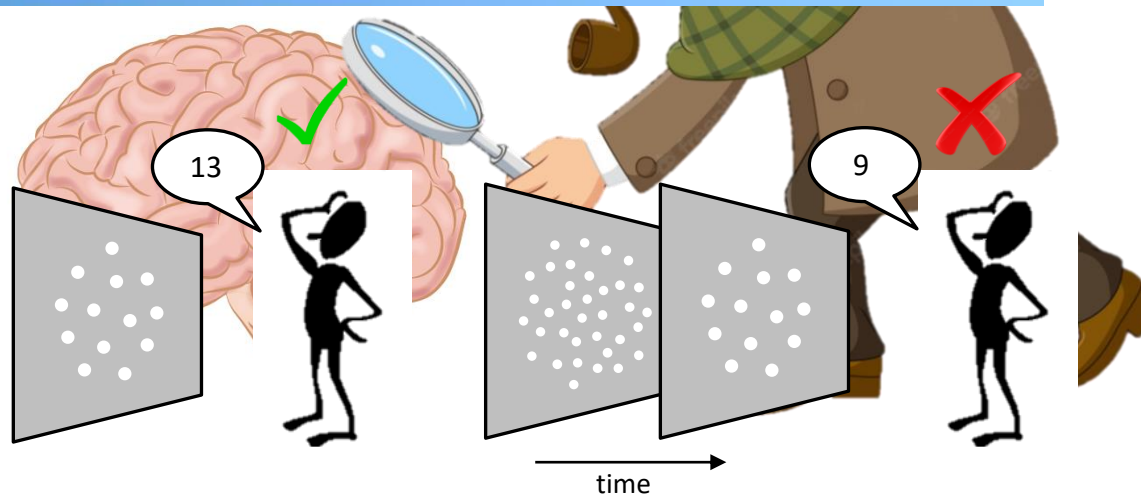
*If you can adapt it, then it is there!*



(Piazza et al., 2004, *Neuron*)



(Harvey et al., 2013, *Science*)

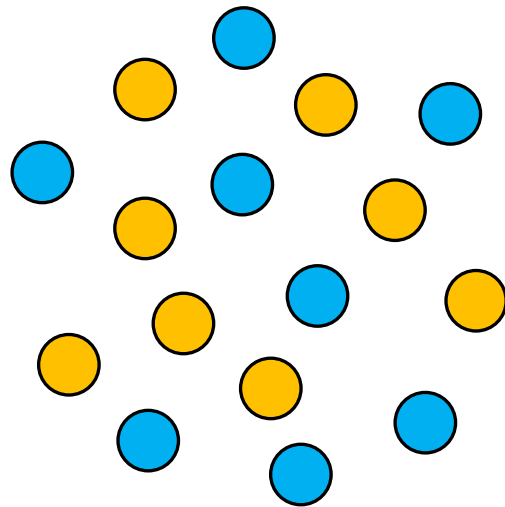






## Numerosity of what?

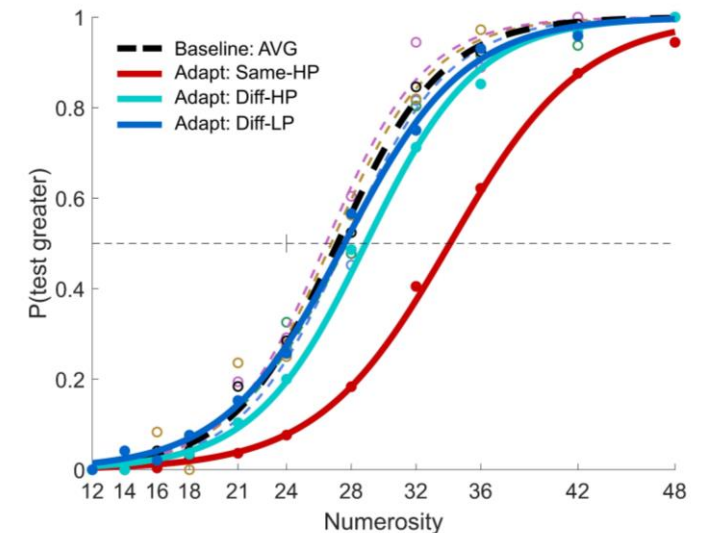
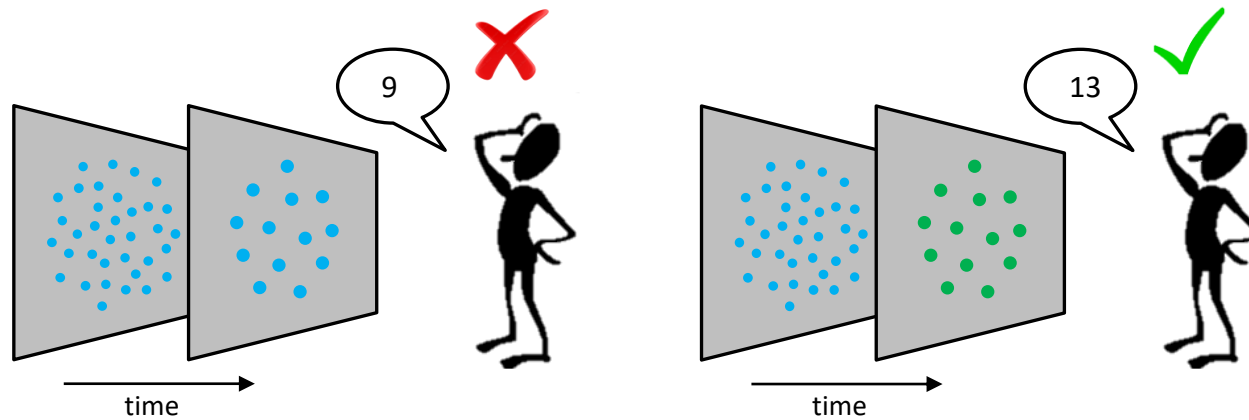
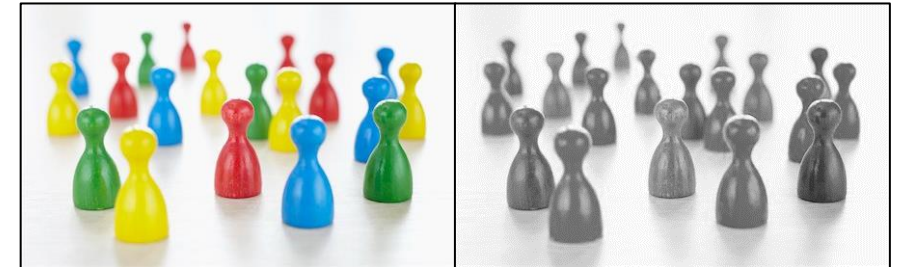
Does our brain encode numerosity of objects regardless of the basic perceptual features (i.e. size, color, shape) that are essential to determine their belonging category?



# Numerosity perception is tuned to salient environmental features

Paolo Antonino Grasso <sup>3</sup> • [Giovanni Anobile](#) • [Roberto Arrighi](#) • [David Charles Burr](#) •

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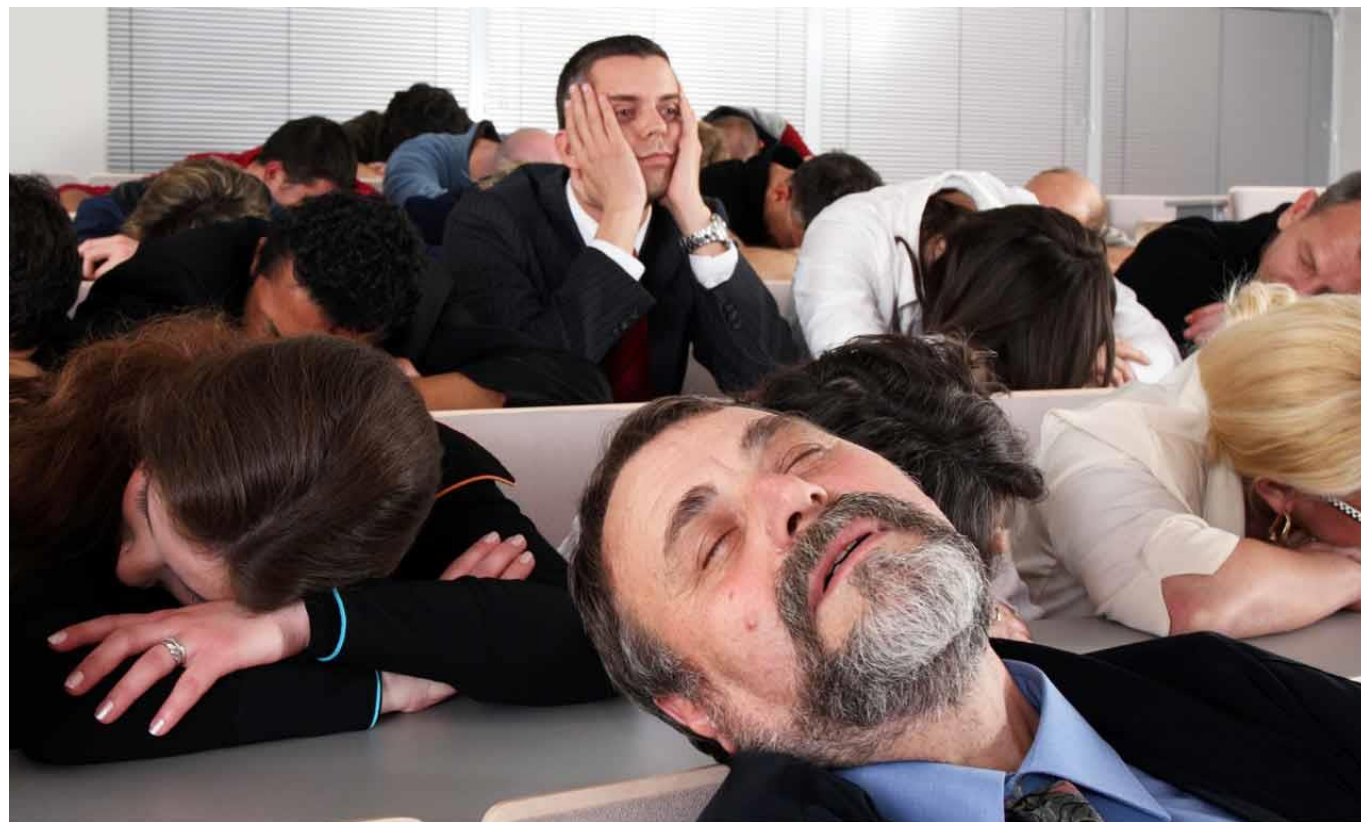


## TAKE HOME MESSAGE

- Sensory adaptation is crucial in our daily living, but it can deceive our senses
- It helps us understanding more in depth the mechanisms subtending the processing of sensorial information

*«It's a long way to the top»*





**THANK YOU  
FOR YOUR ATTENTION**

[paolo.grasso@unifi.it](mailto:paolo.grasso@unifi.it)