žmogaus regos sistema
nuo neurono lig minčių

jonas kubilius | nacionalinė moksleivių akademija | 2009 m. birželio 30 d.

planas

– neuronas
– akis
– pirminė regimoji žievė
– aukštesnieji regos centrai
– regos sistemos hierarchija
– standartinis regos modelis

marr trys analizės lygmenys

computational level

kokio reikia modelio ir kaip jį sukurti

algorithmic level

koks algoritmas reikalingas modeliui įgyvendinti

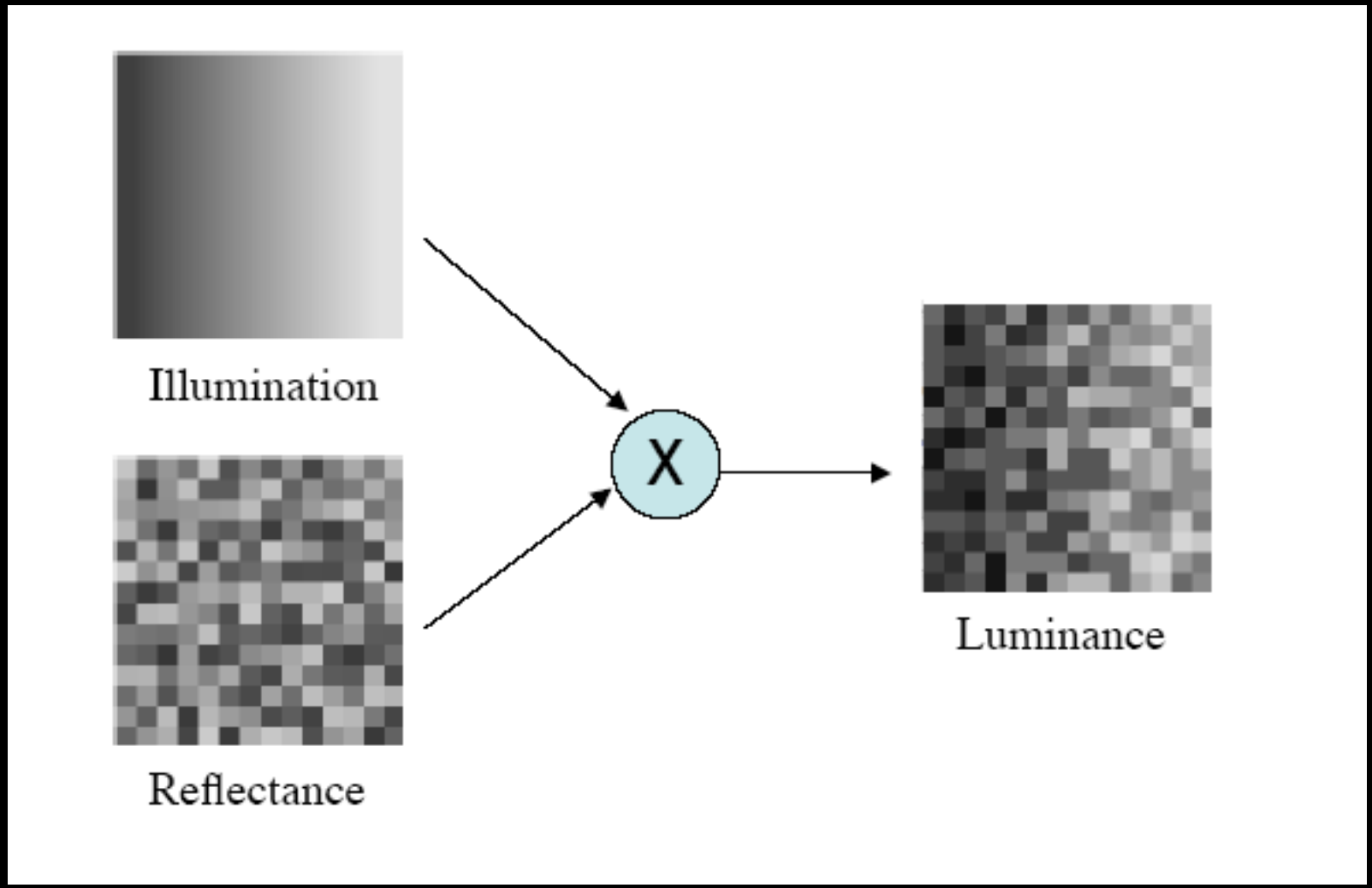
implementational level

kaip algoritmas įgyvendinamas duotoje sistemoje (pvz., smegenyse, turint neuronus)

marr pavyzdys iš regos

Lotto Lab

marr computational level



from B. Balas

marr computational level

apšvietimo ir atspindėjimo informacija regos sistemai nėra pasiekiama

kaip regai atstatyti šią informaciją?

prielaidos

- apšvietimas kinta pamažu, tolygiai
- atspindėjimas kinta staiga

marr algorithmic level

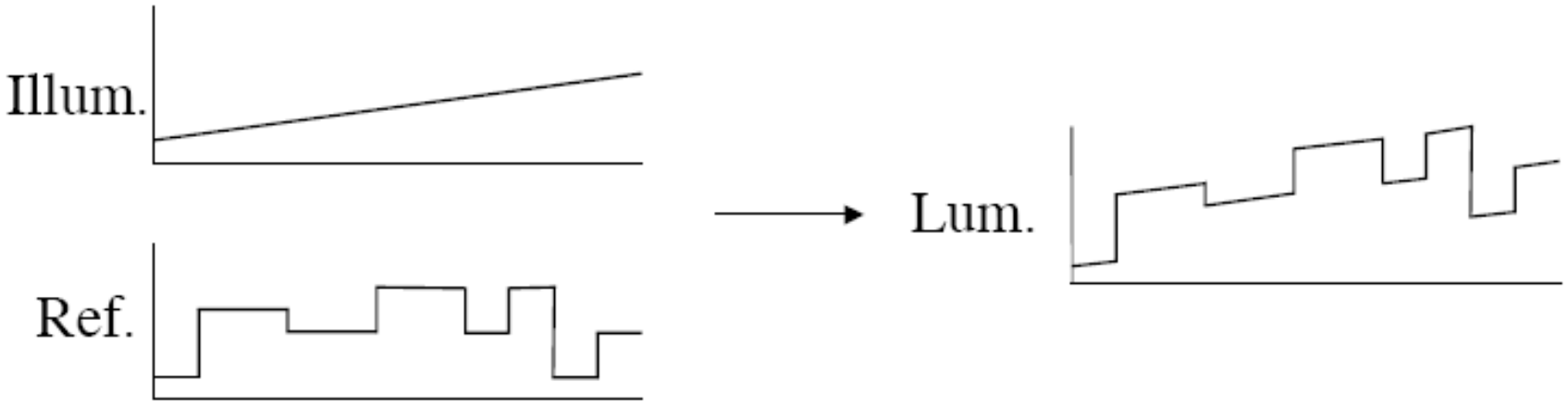
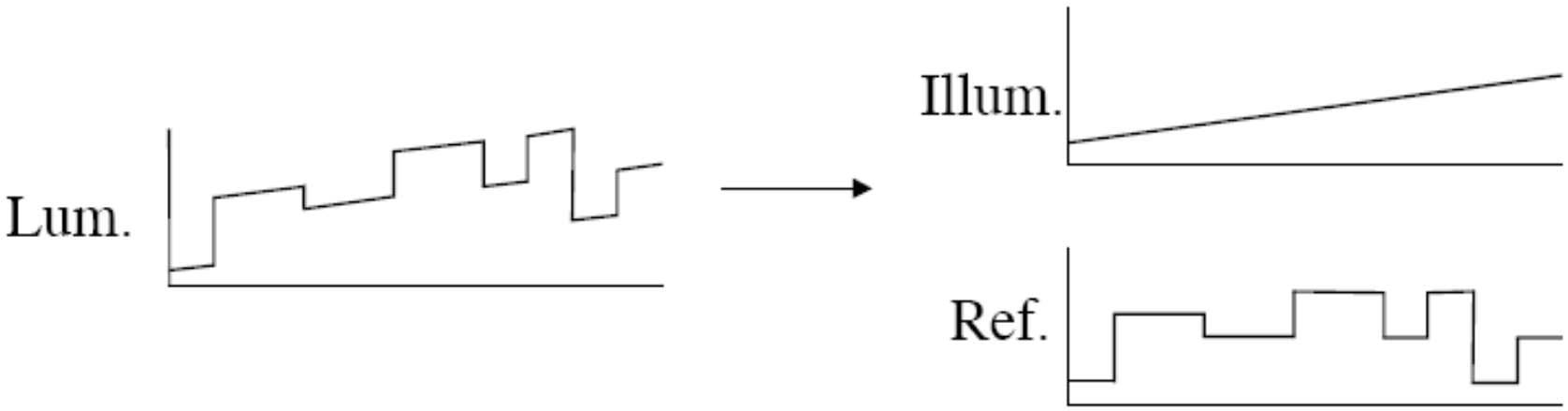


Image formation is the forward process



Vision is the inverse process.

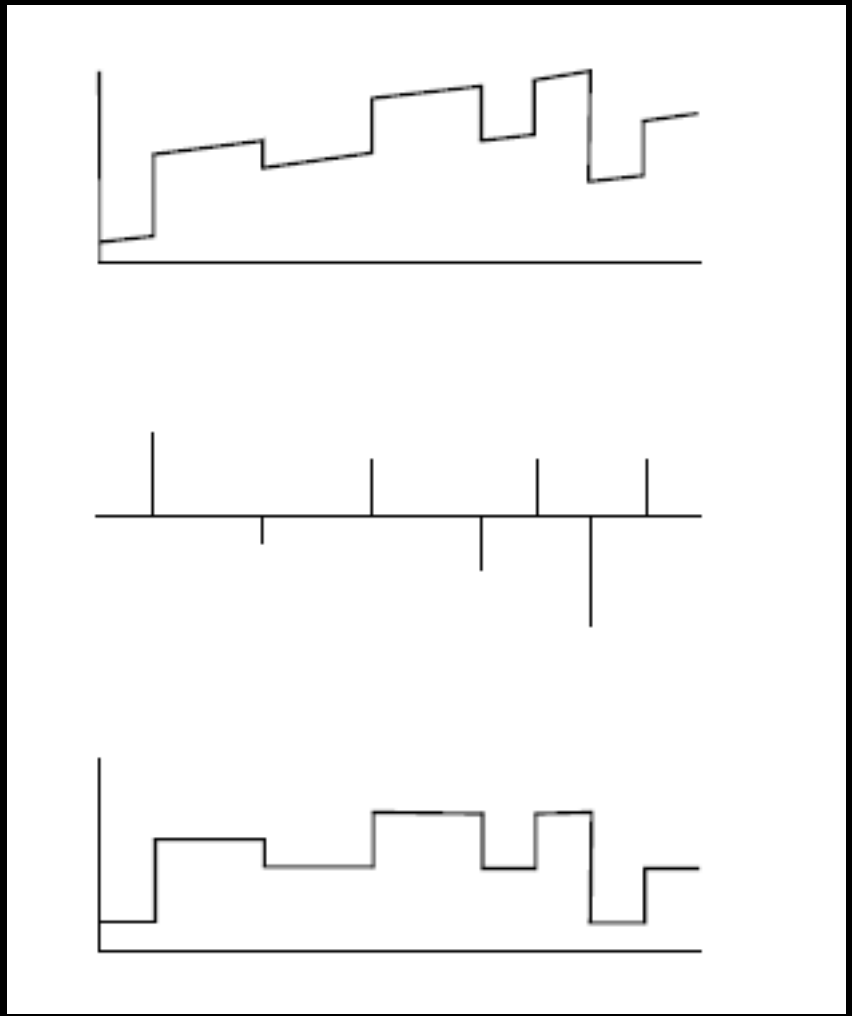
from B. Balas

marr algorithmic level

skaistis

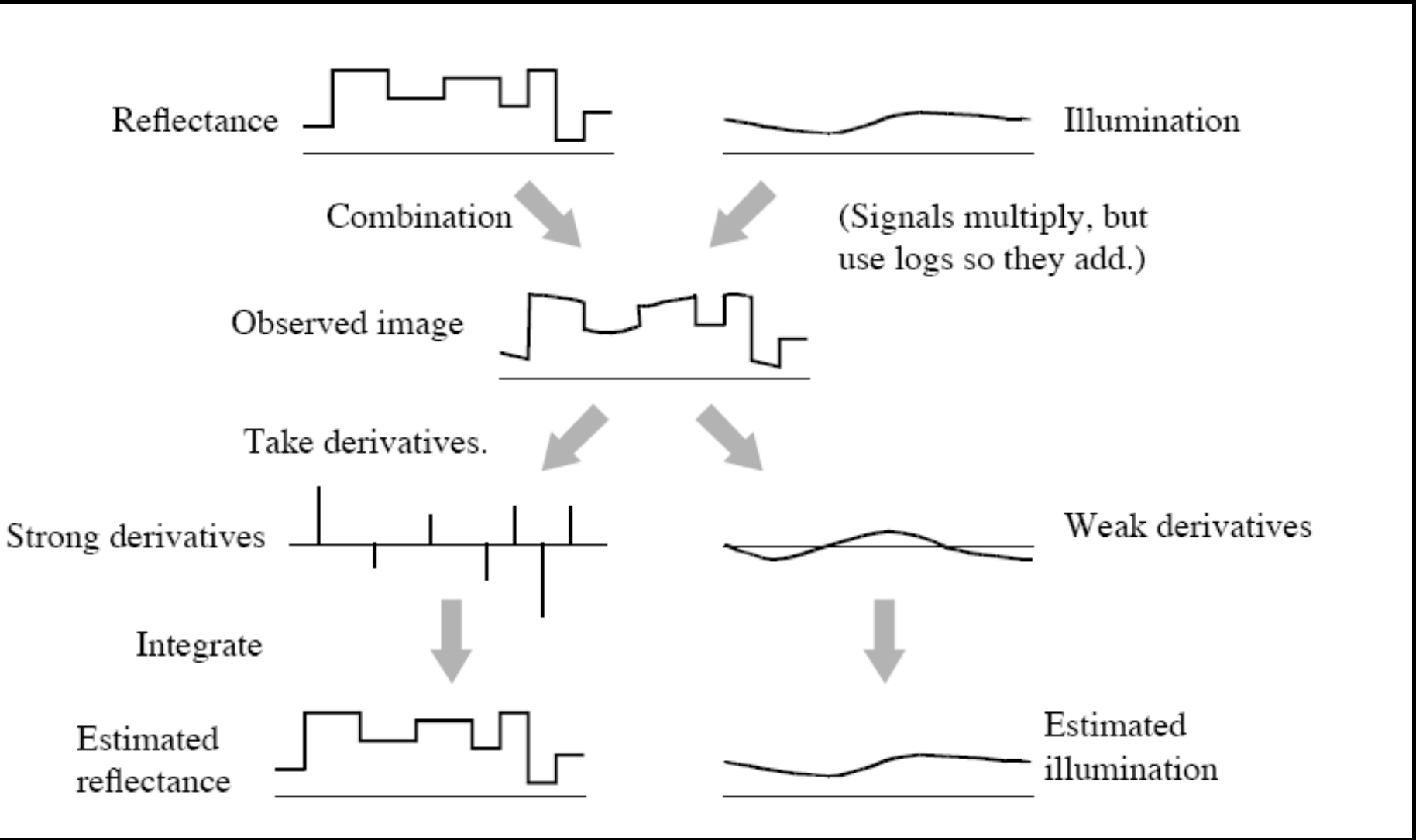
„išvestinė“

atspindėjimas



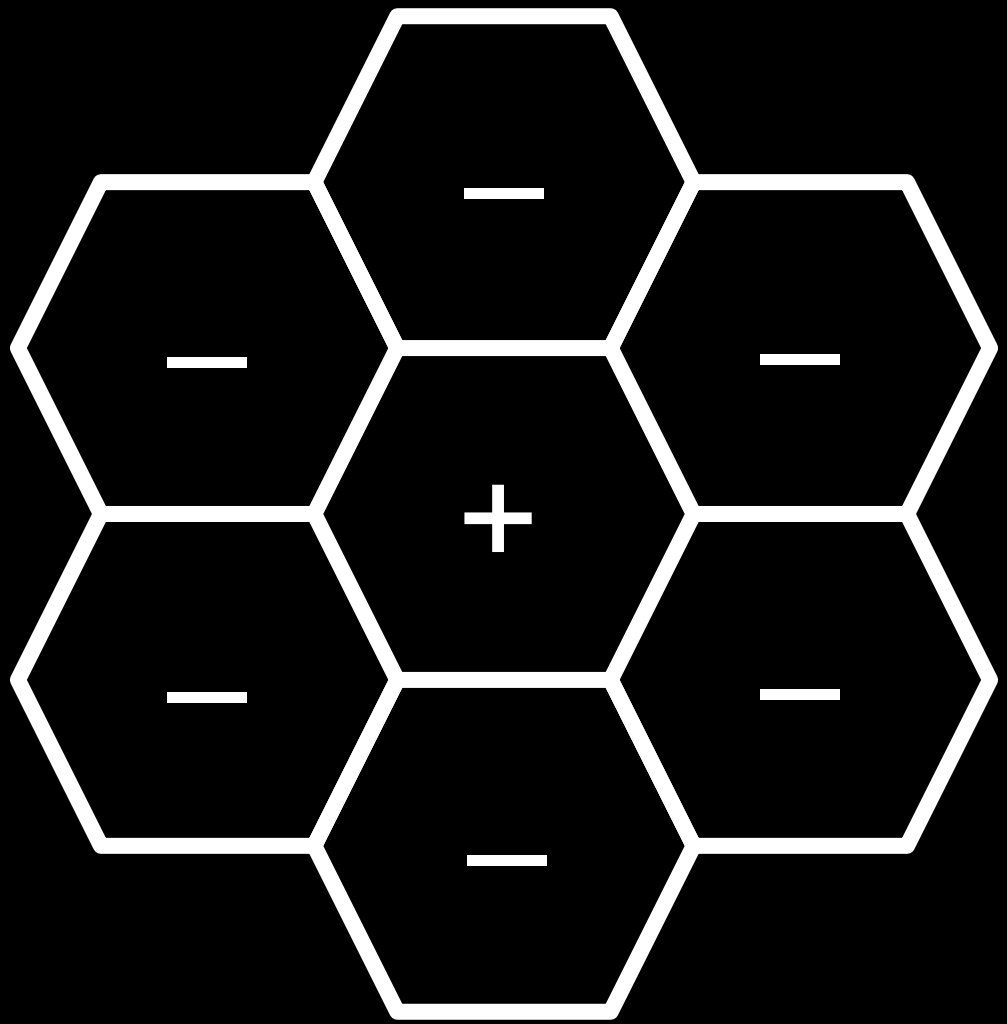
from B. Balas

marr algorithmic level

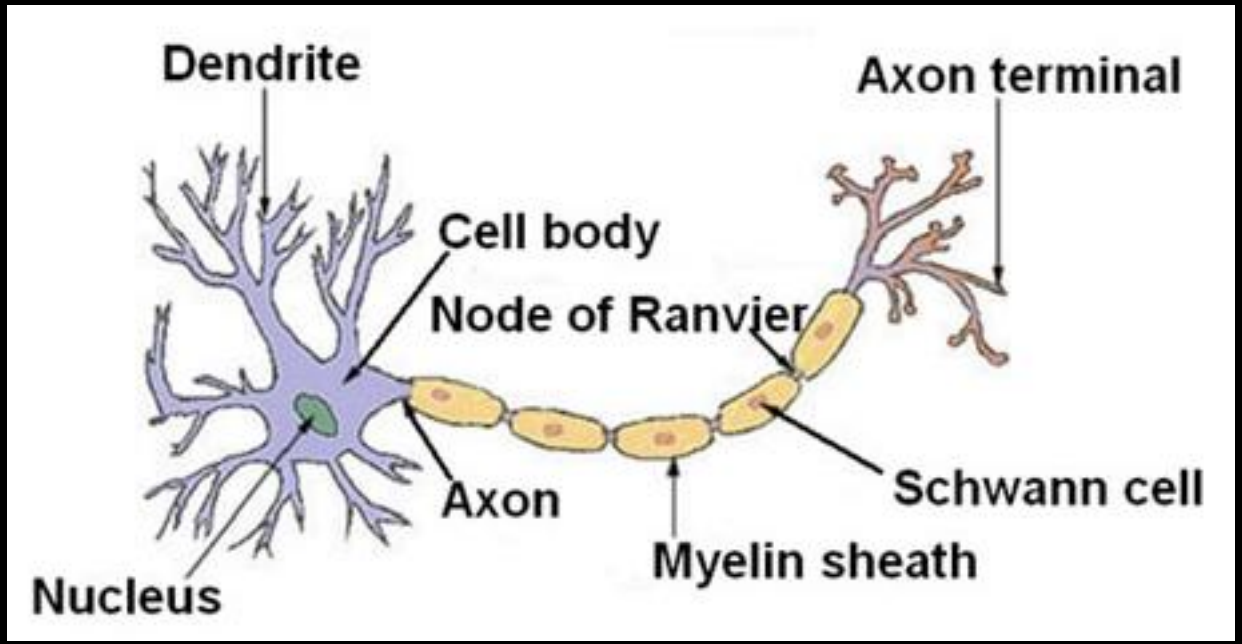


from B. Balas

marr implementational level



neuronas sandara



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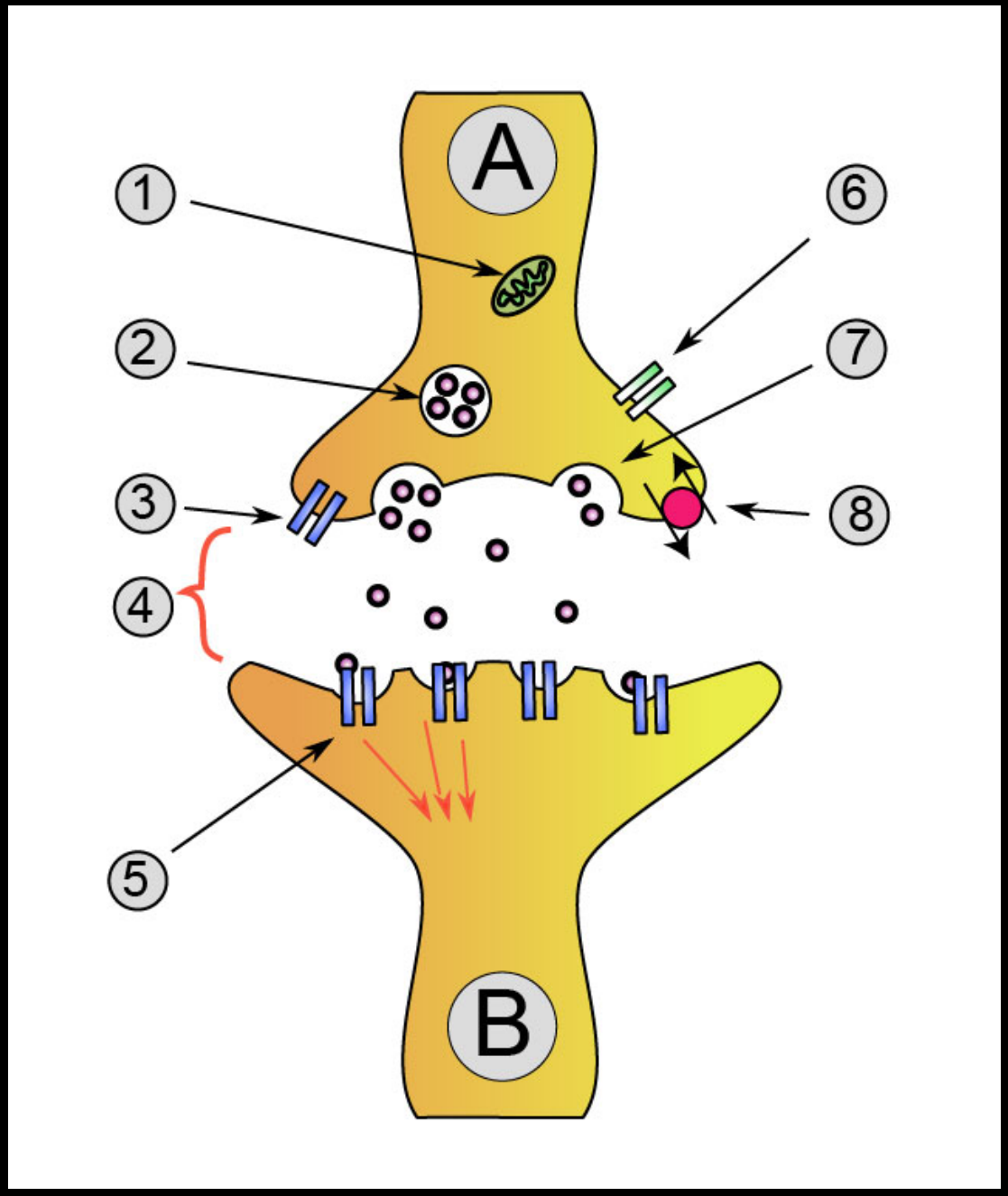
neuronas sinapsė



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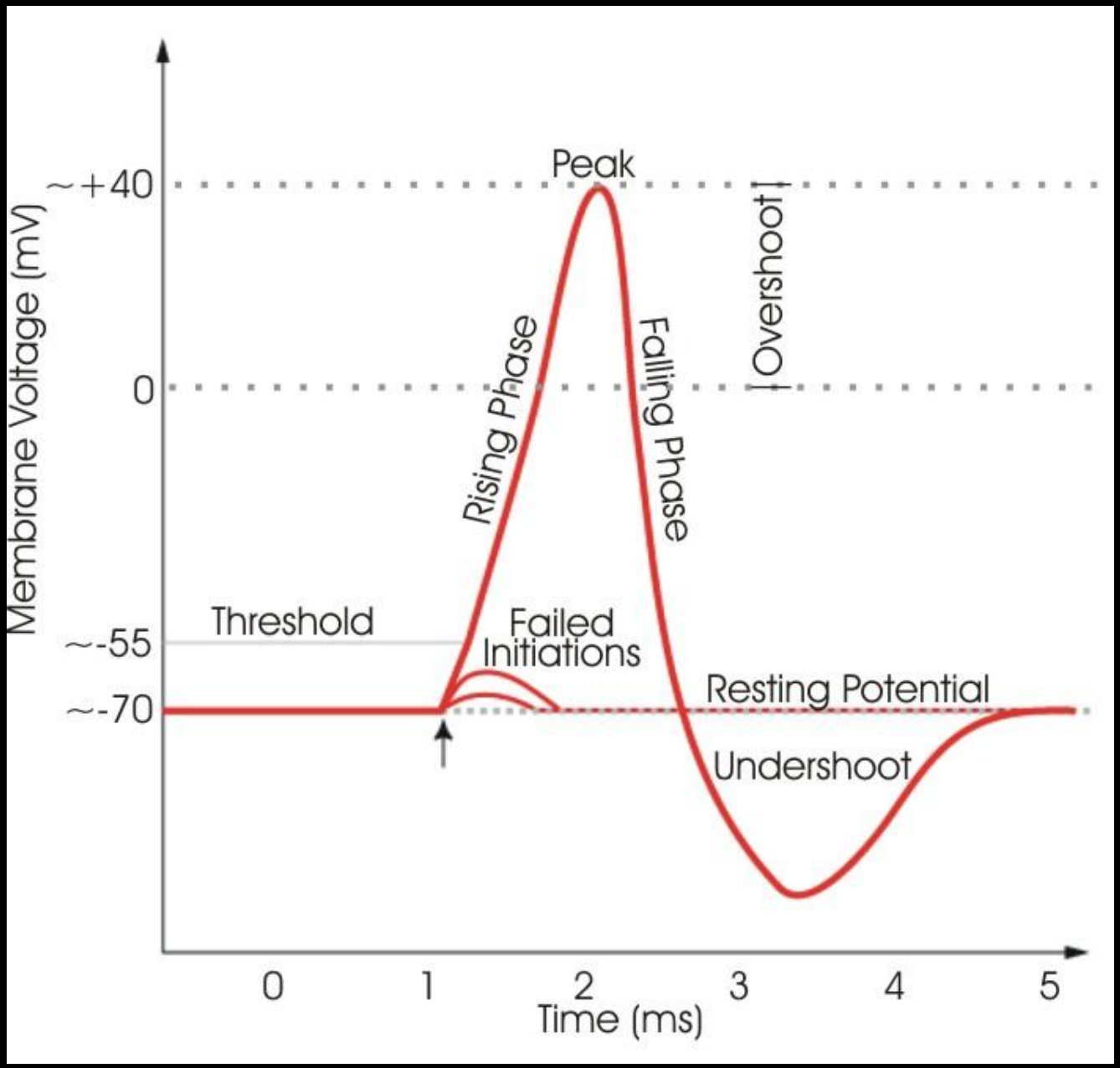
neuronas veikimo potencialas



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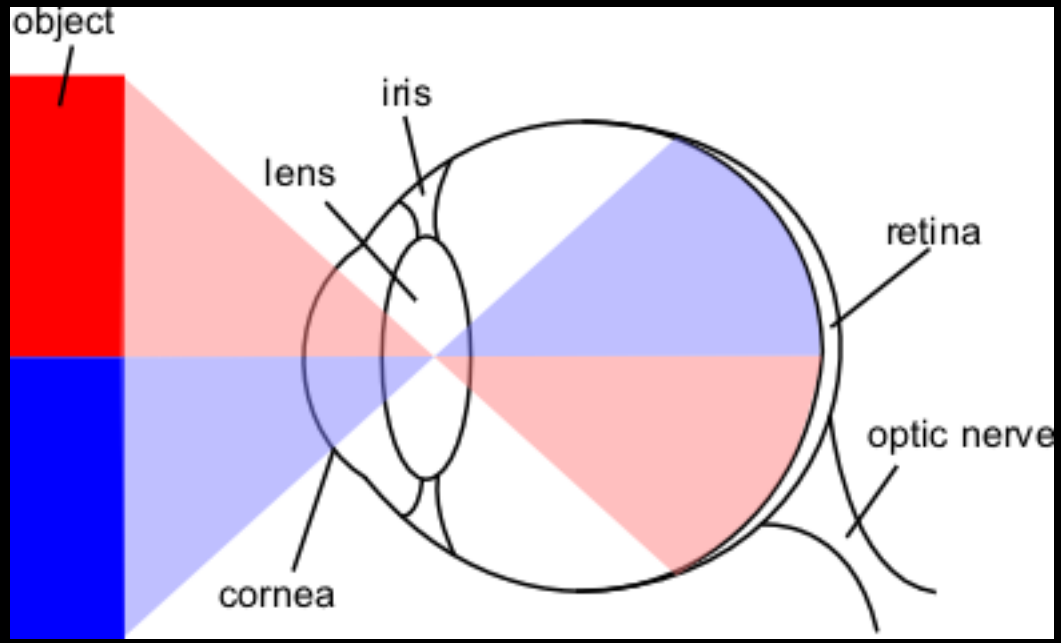
neuronas veikimo potencialas

[animacija]

akis sandara



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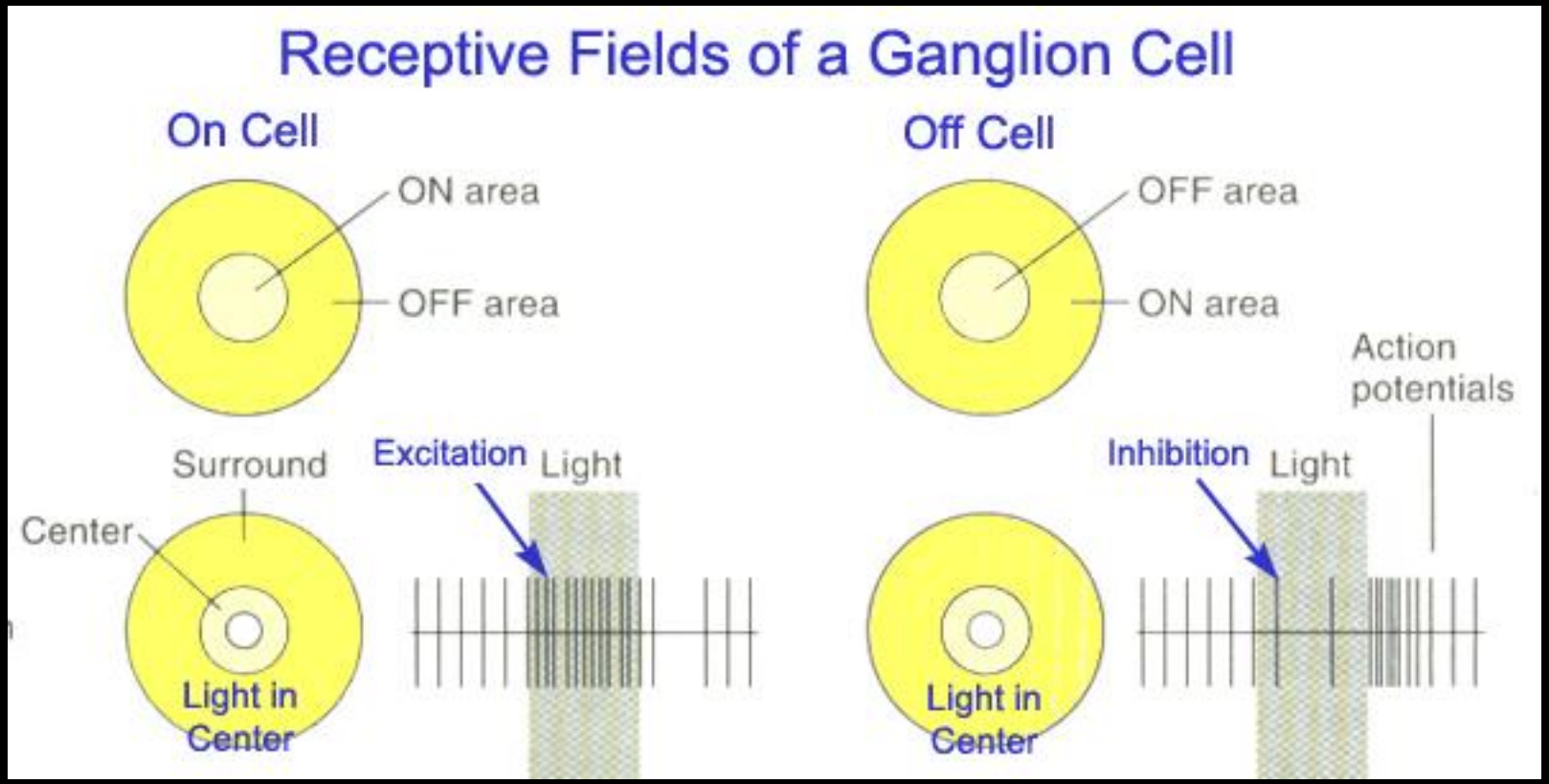
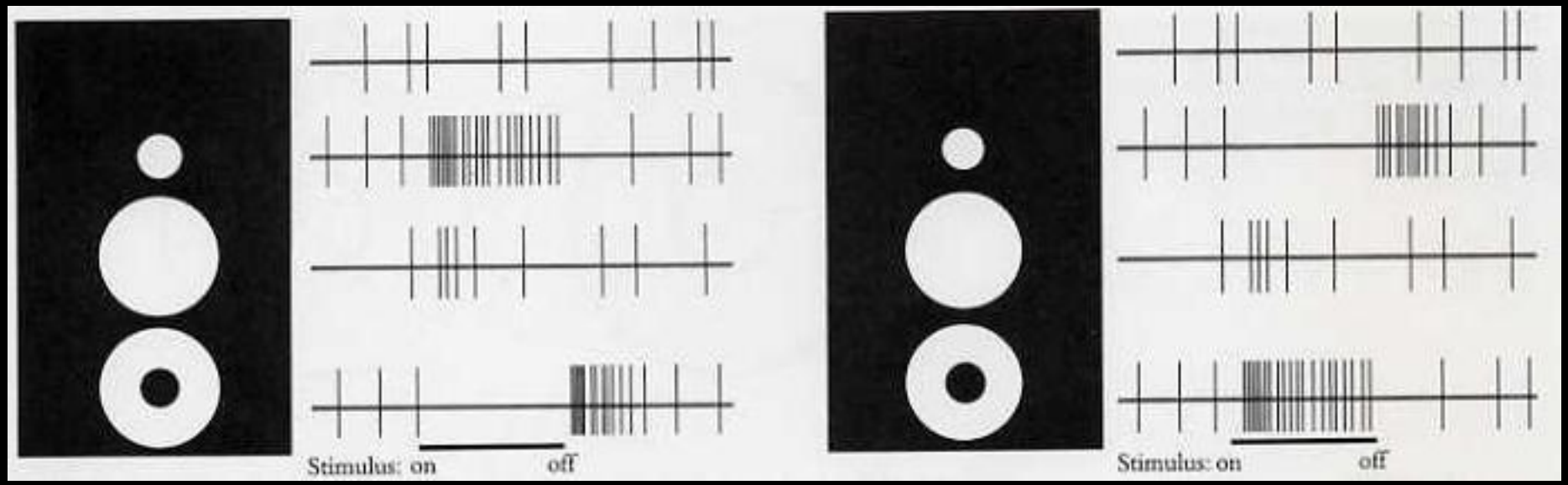
akis tinklainė



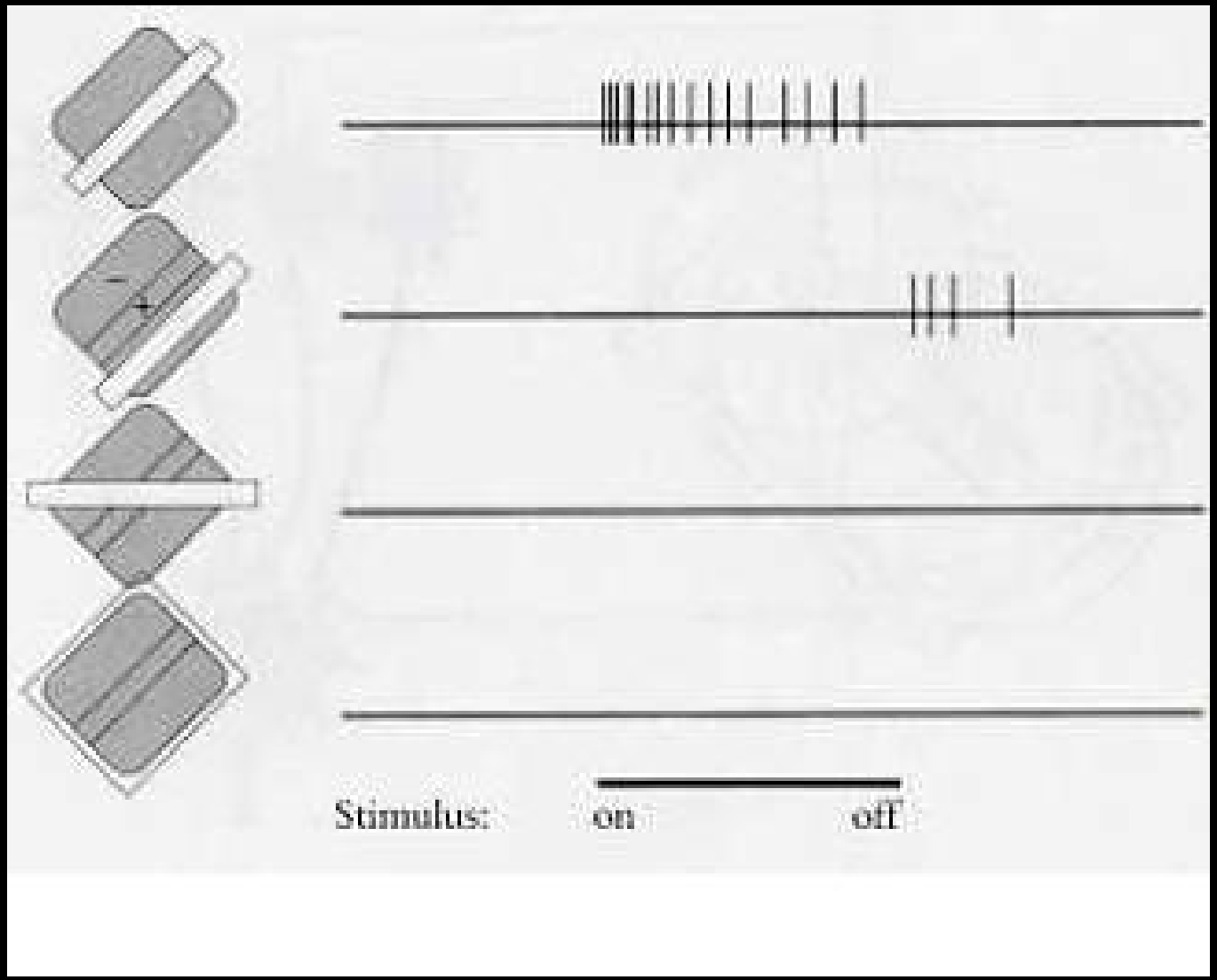
Colorado U.

akis tinklainė



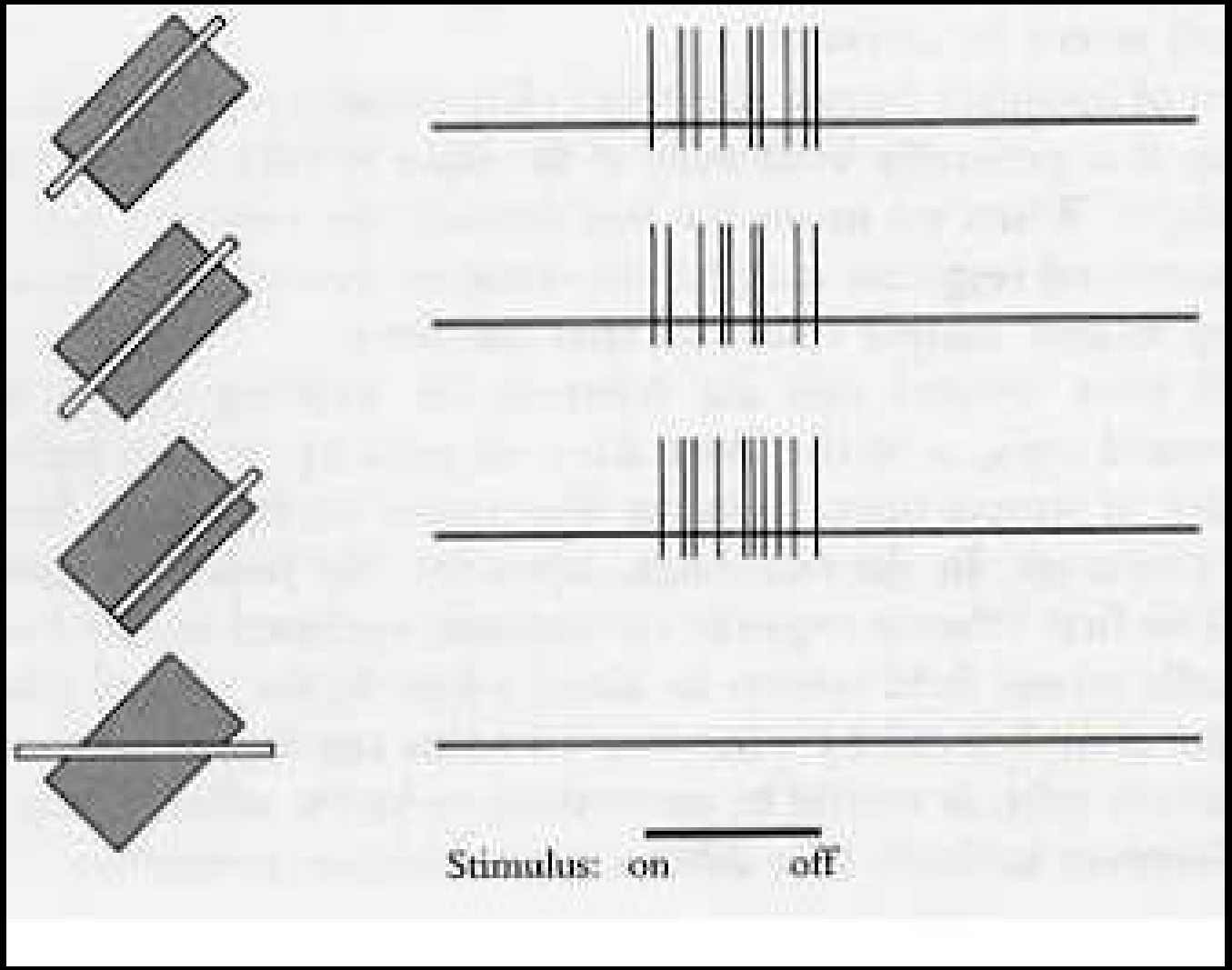
D. Hubel

pirminė regimoji žievė simple cells



D. Hubel

pirminė regimoji žievė complex cells



D. Hubel

IT savybės

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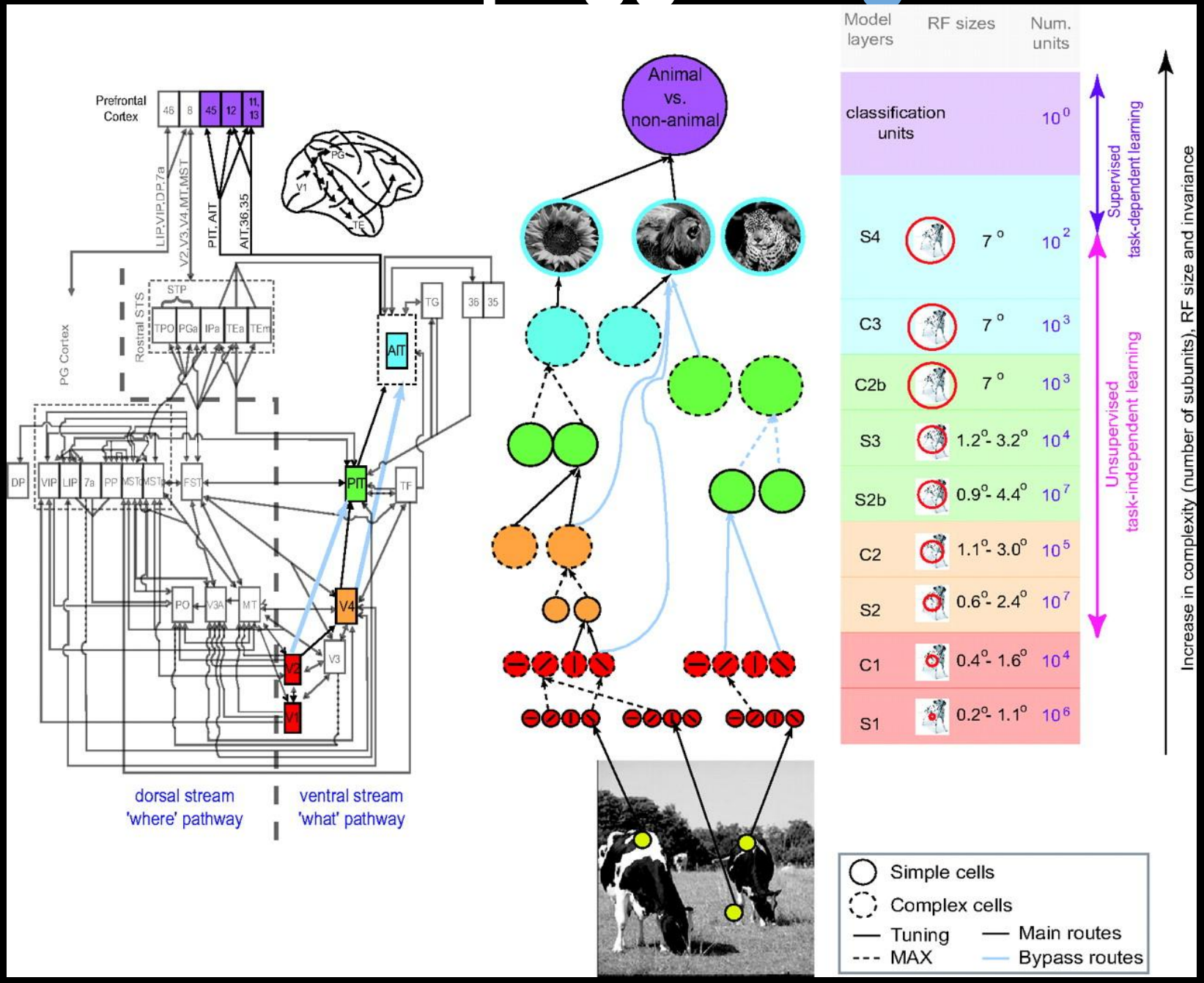
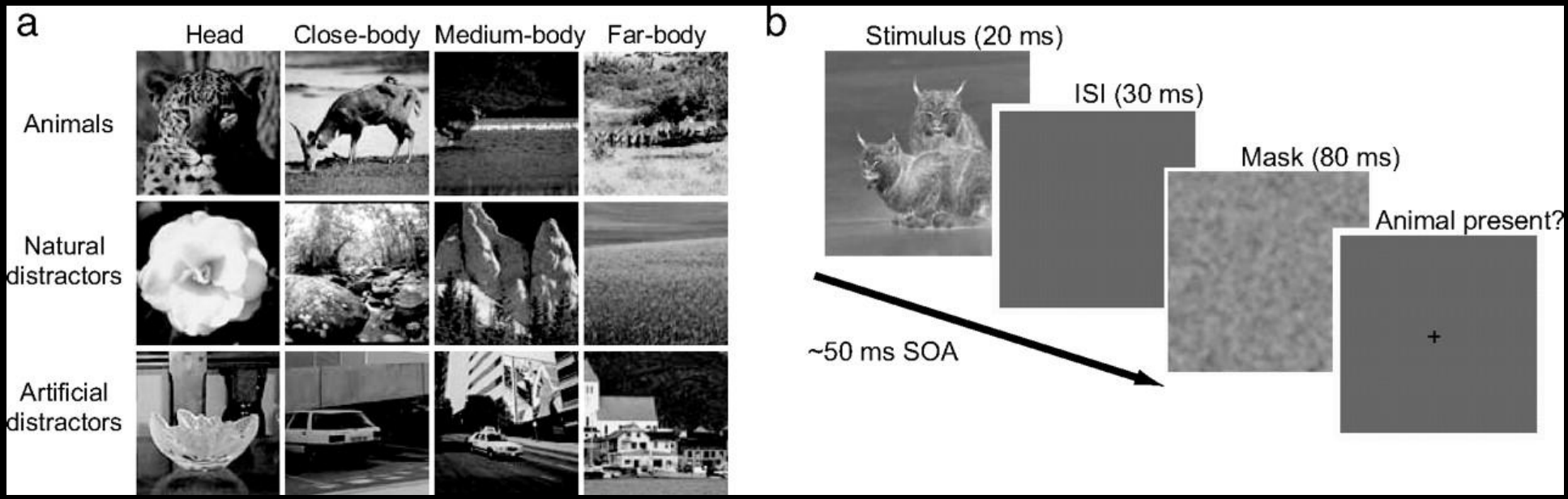
poggio regos modelis



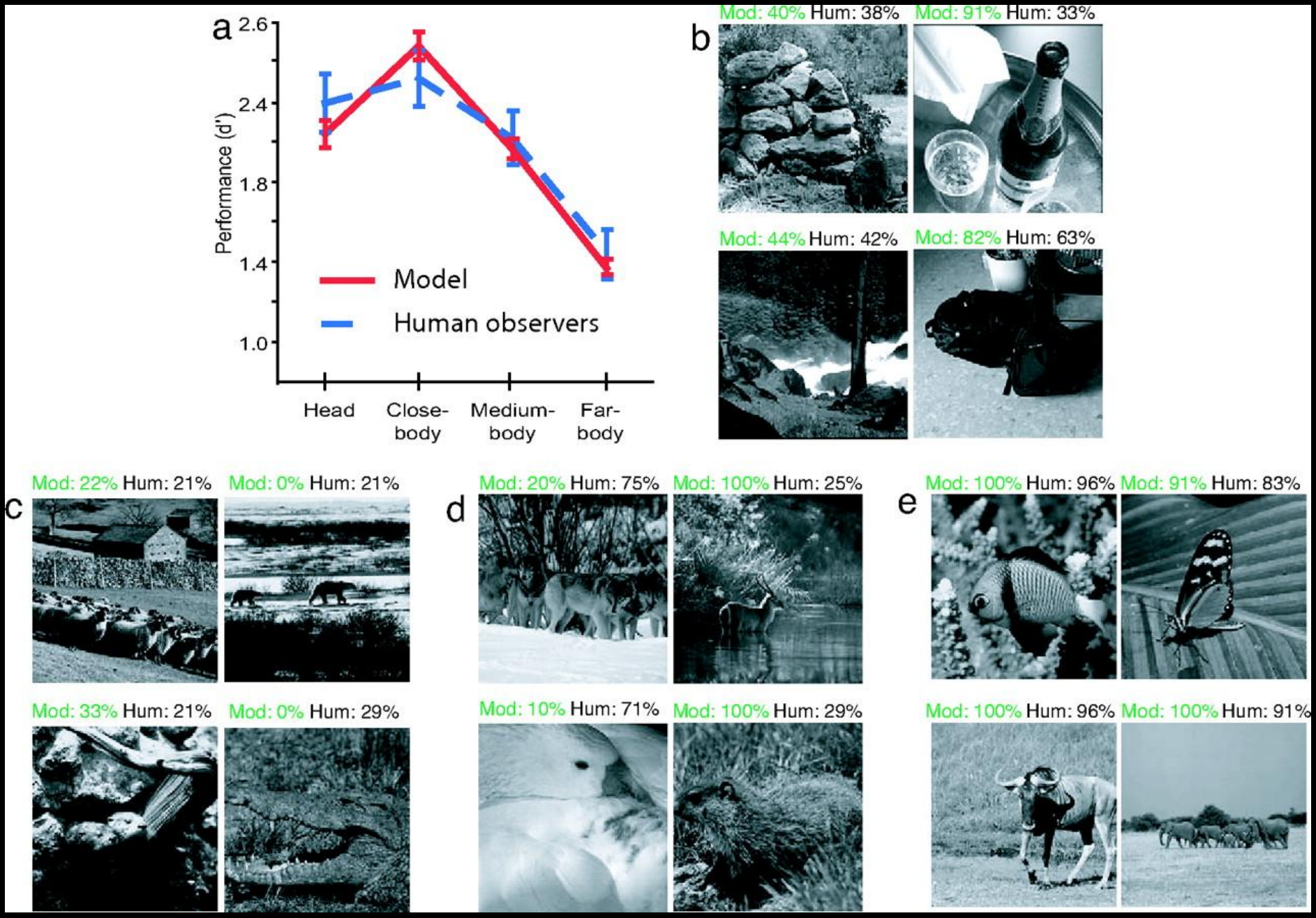
Serre et al., *PNAS* (2007)

poggio regos modelis



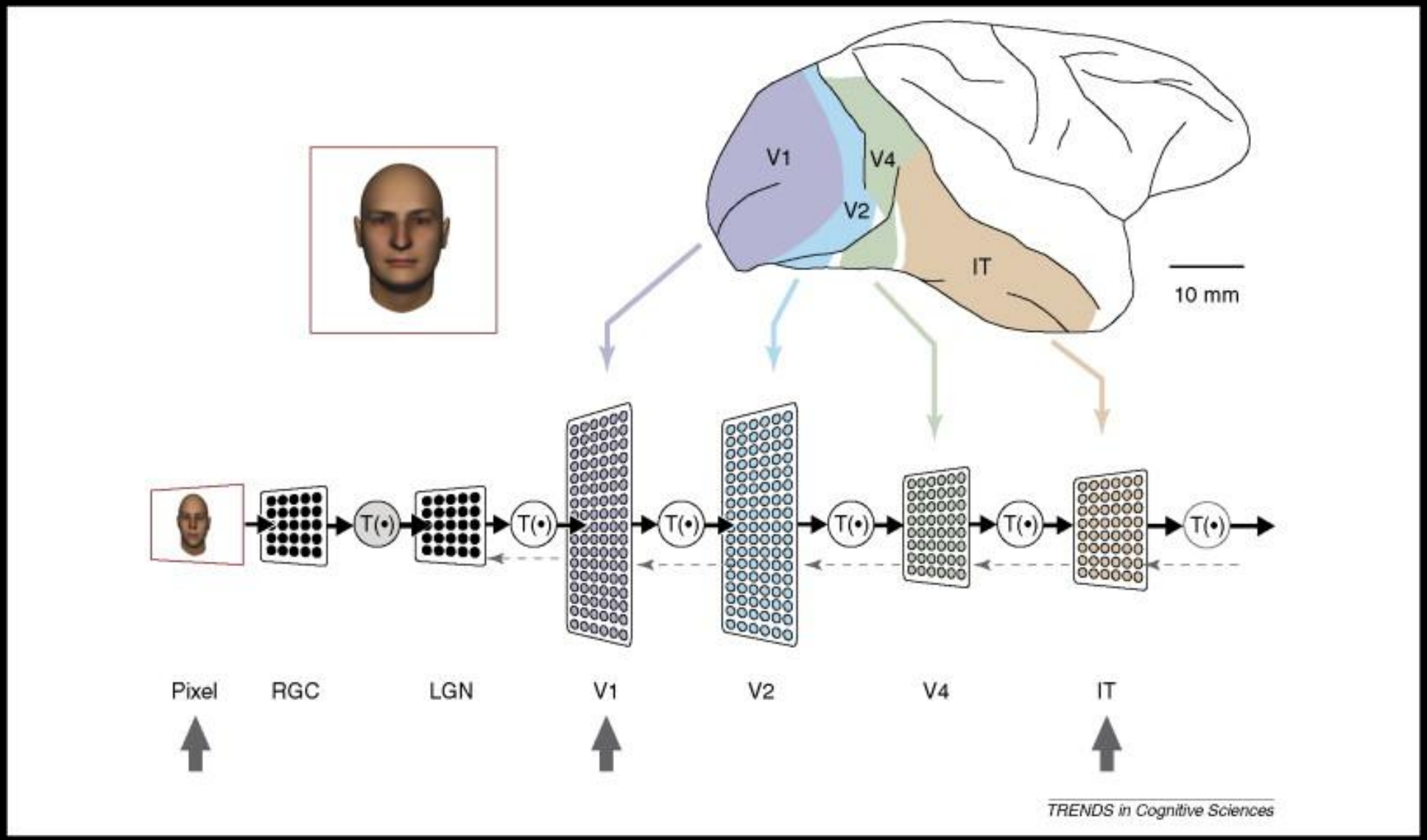
Serre et al., *PNAS* (2007)

poggio regos modelis



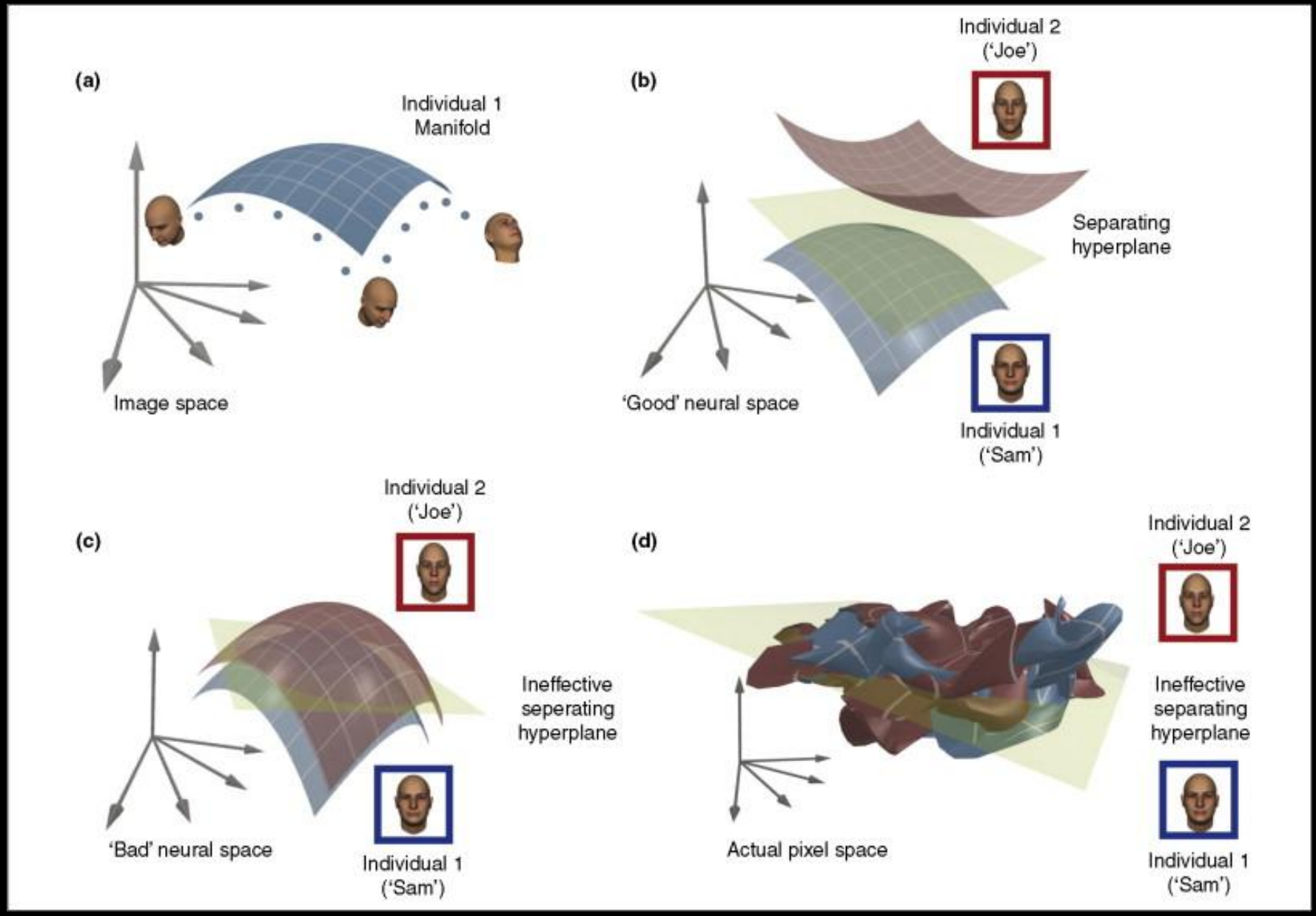
Serre et al., *PNAS* (2007)

dicarlo regos hierarchija



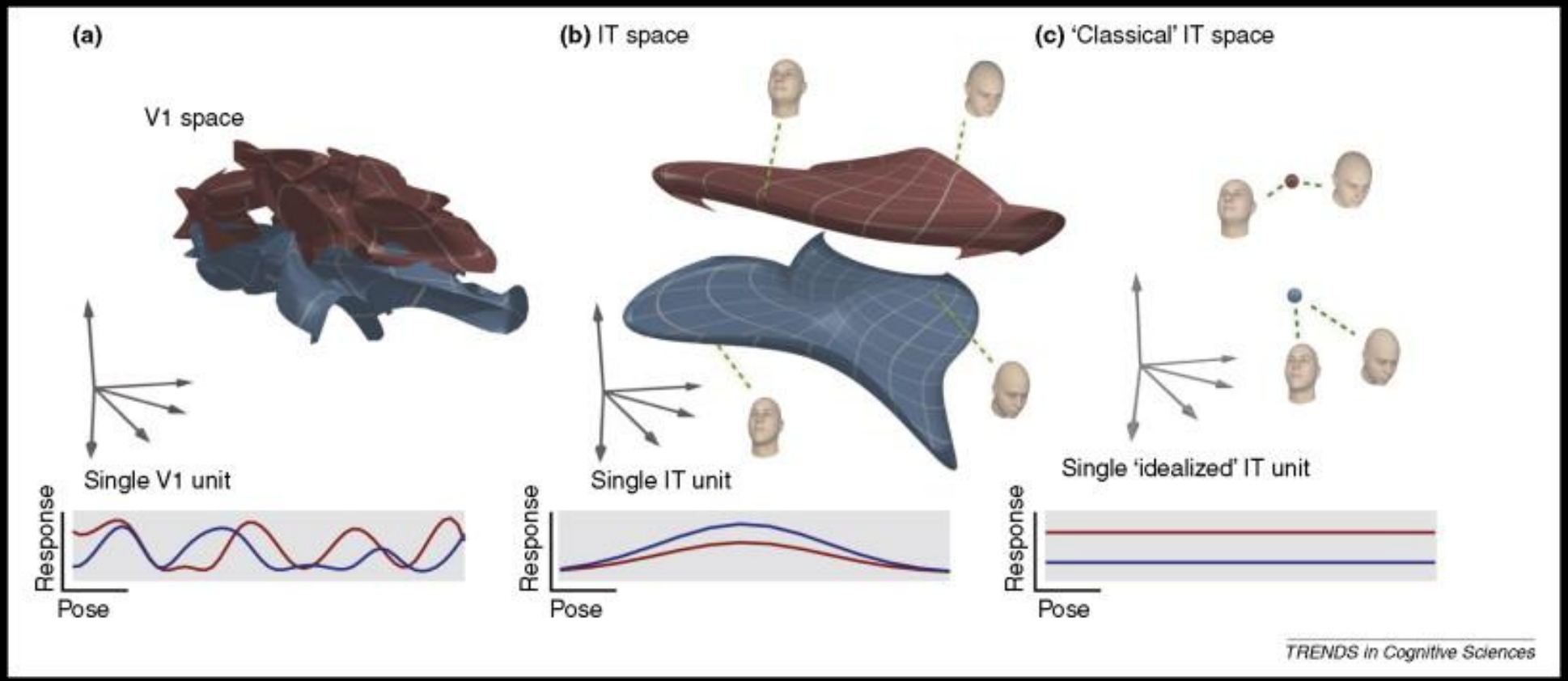
DiCarlo & Cox, *TiCS* (2007)

dicarlo regos hierarchija



DiCarlo & Cox, *TiCS* (2007)

dicarlo regos hierarchija



DiCarlo & Cox, *TiCS* (2007)