



Semantix[®]
All about data

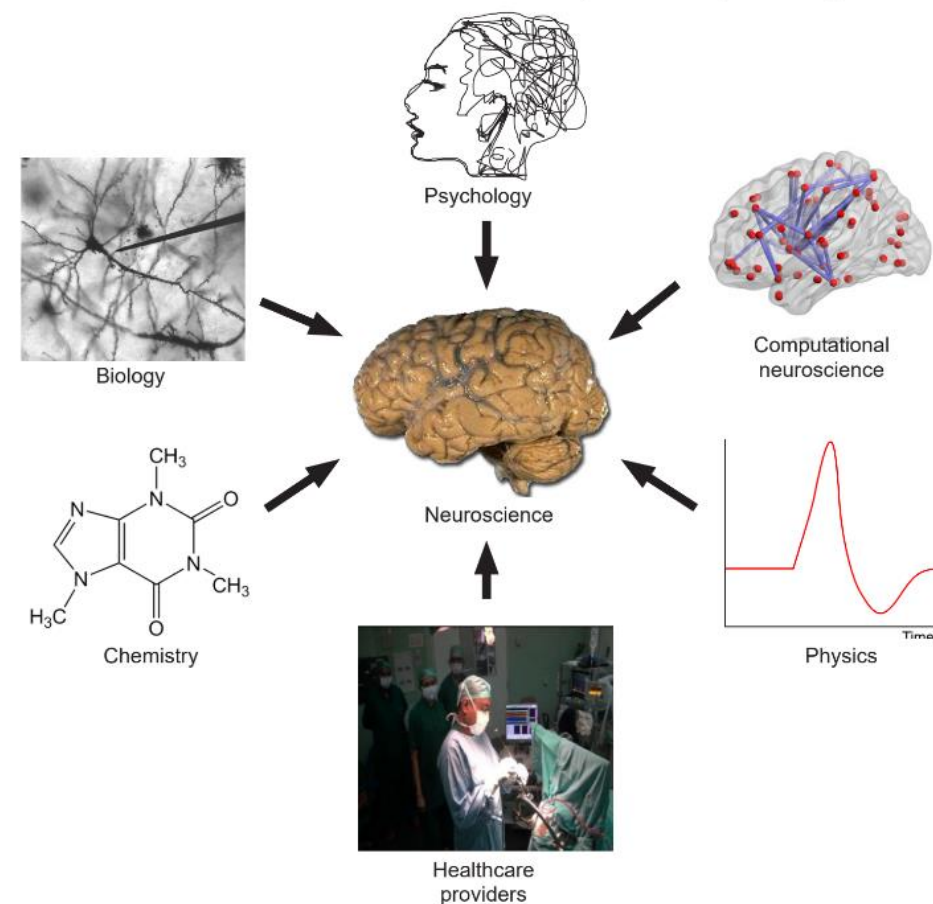
Redes Neurais Artificiais

Aula 2 – RNs e RNAs

Data

Nossa Inspiração - O Sistema Nervoso Central

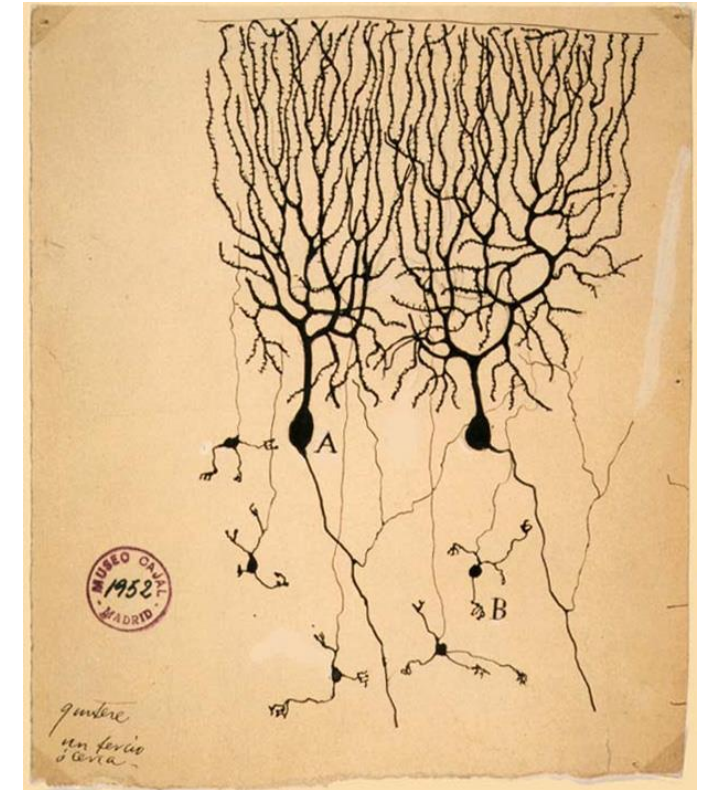
- O sistema nervoso animal é responsável pelas mais diversas atividades, dentre elas:
- Percepção
- Controle motor
- Excitação
- Homeostase
- Motivação



<https://www.austinlim.com/open-neuroscience-initiative>

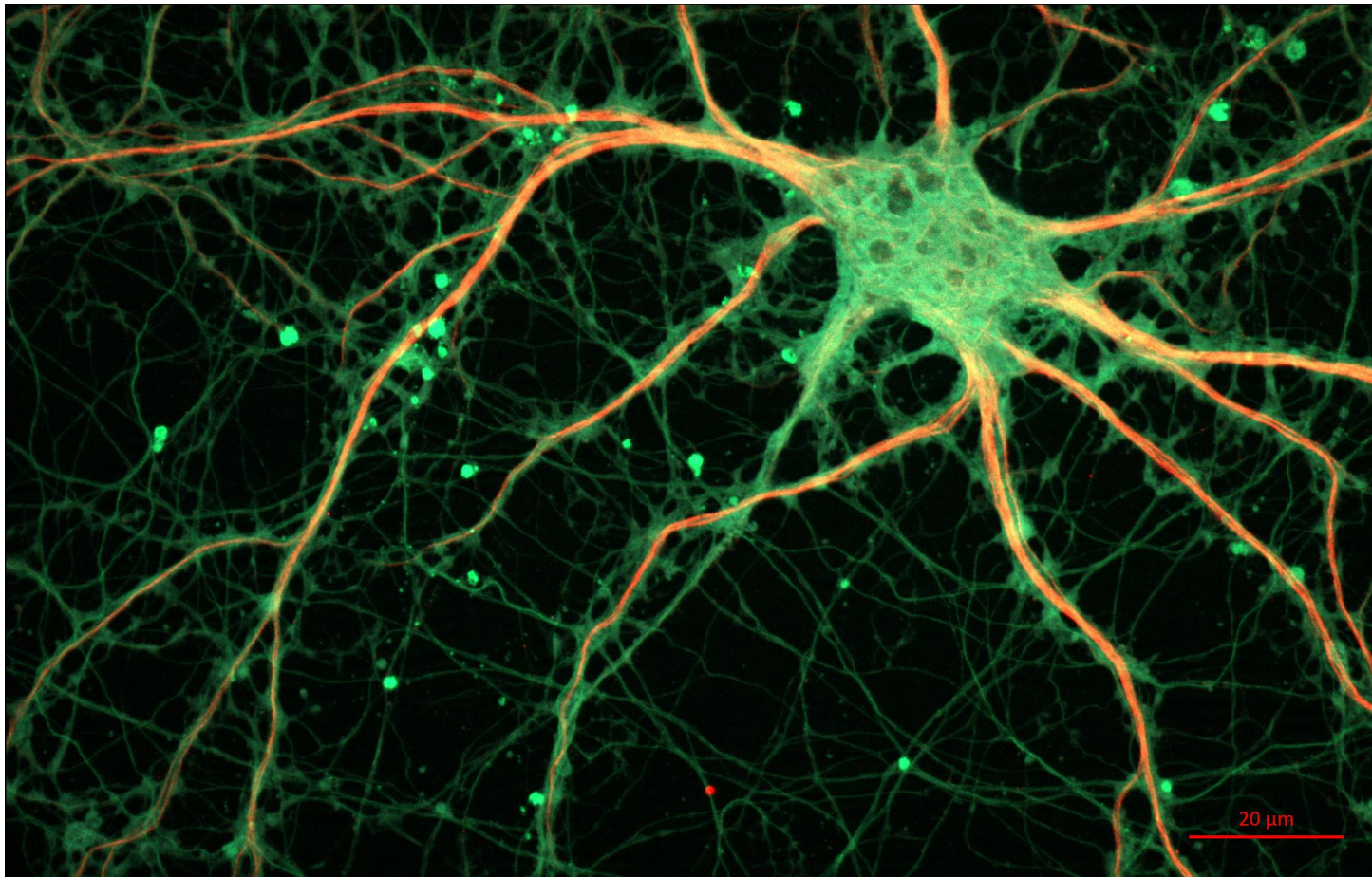
Aprendizado e Memória

- Quase todos os animais são capazes de modificar seu comportamento como resultado da experiência;
- Como o comportamento é impulsionado pela atividade cerebral, mudanças no comportamento devem, de alguma forma, corresponder a mudanças dentro do cérebro.
- No final do século XIX, teóricos como Santiago Ramón y Cajal argumentaram que a explicação mais plausível é que o aprendizado e a memória são expressos como mudanças nas conexões sinápticas entre os neurônios.



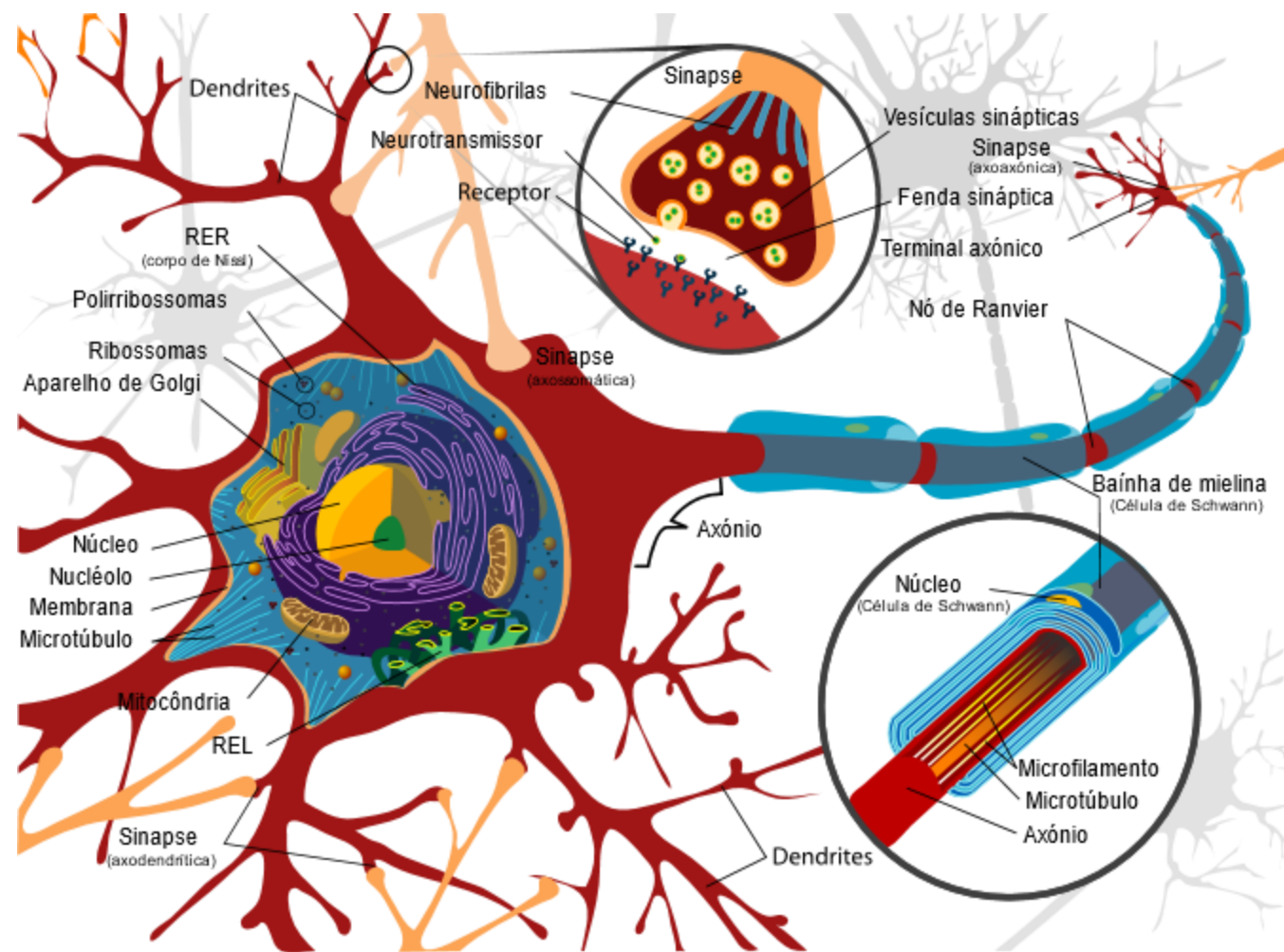
Domínio público, <https://commons.wikimedia.org/w/index.php?curid=612581>

O Neurônio



[ZEISS Microscopy - Cultured Rat Hippocampal Neuron \(CC\)](#)

O Neurônio



[Por Mariana Ruiz LadyofHats \(original English version\), Domínio público.](#)

Microanatomia Funcional do Neurônio

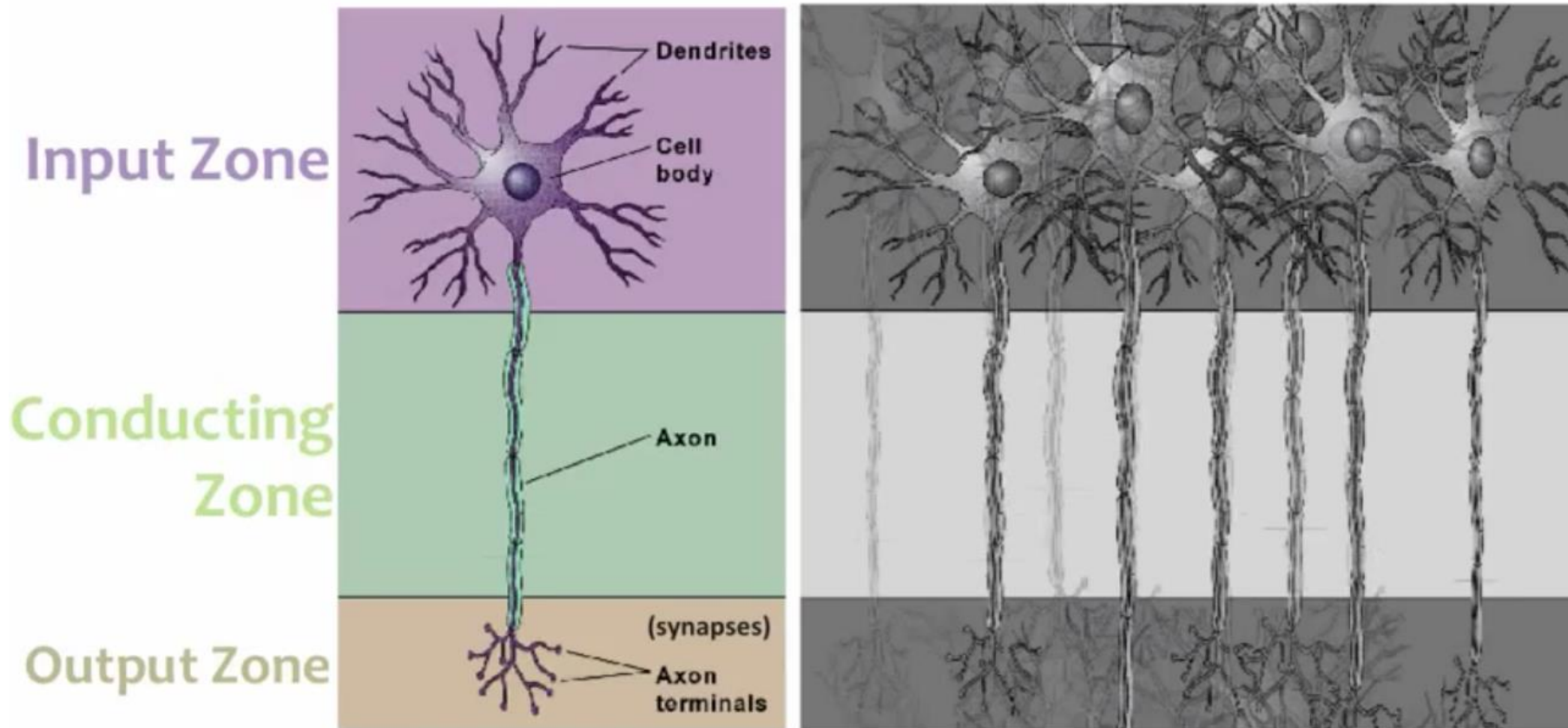
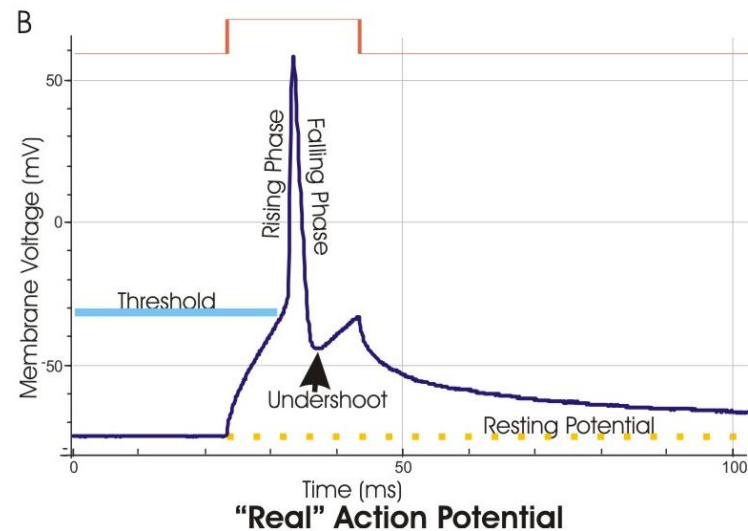
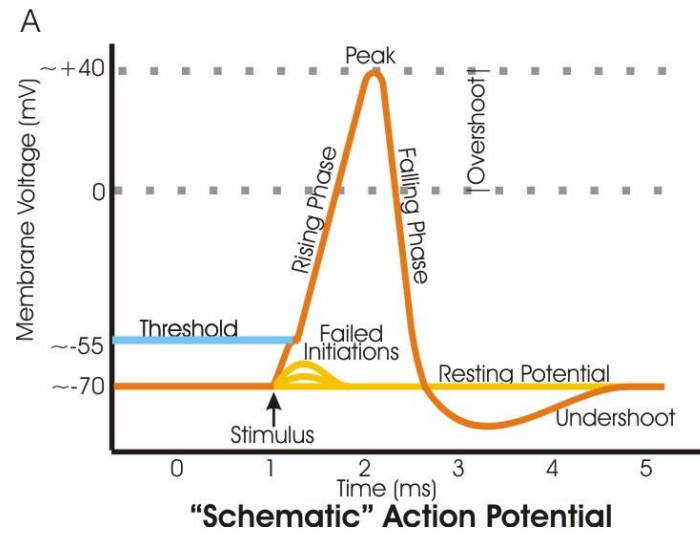


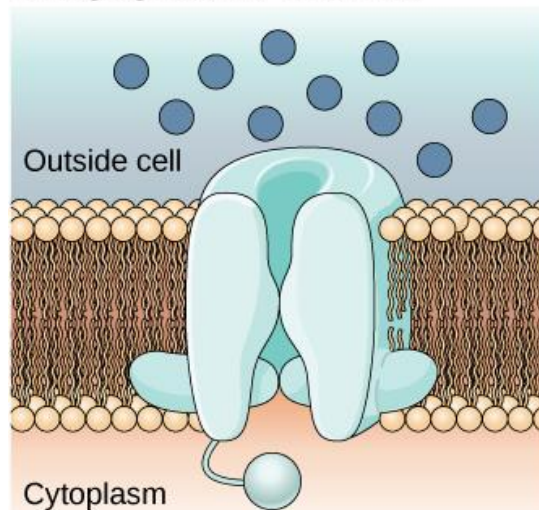
illustration courtesy of S. Mark Williams
Pyramis Studios, Durham NC

Potenciais de Ação

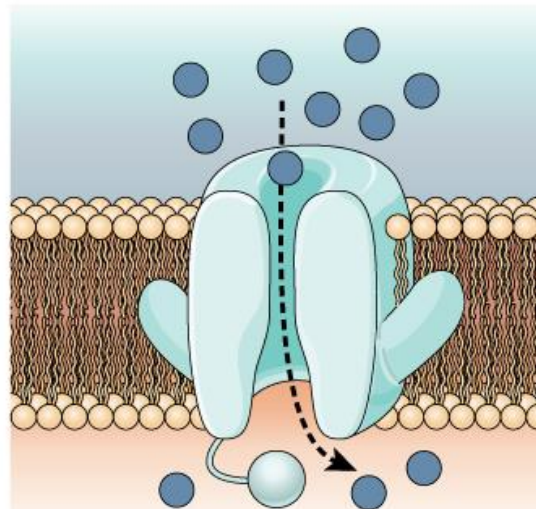


Mecanismos Moleculares do Potencial de Ação

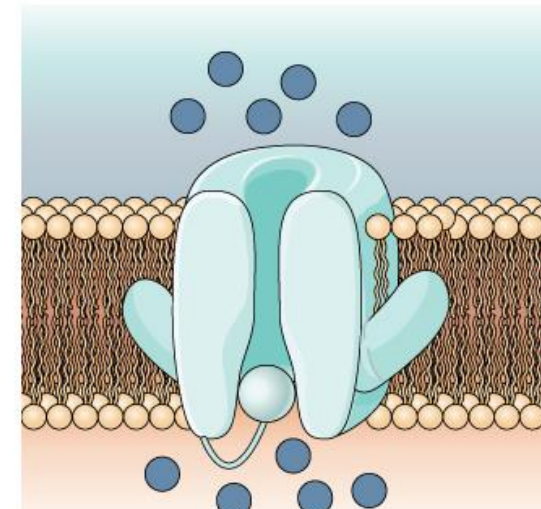
Voltage-gated Na^+ Channels



Closed At the resting potential, the channel is closed.



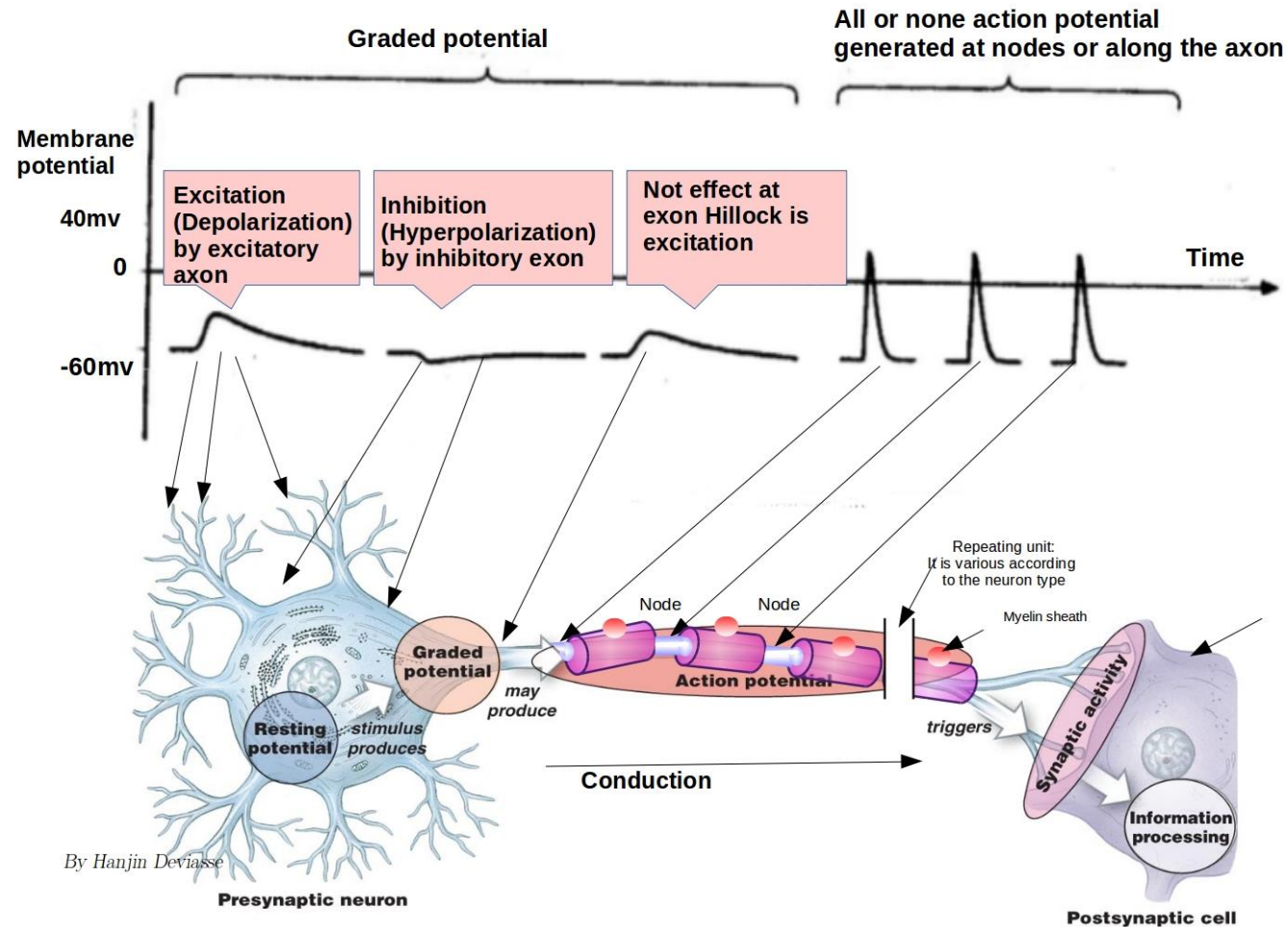
Open In response to a nerve impulse, the gate opens and Na^+ enters the cell.



Inactivated For a brief period following activation, the channel does not open in response to a new signal.

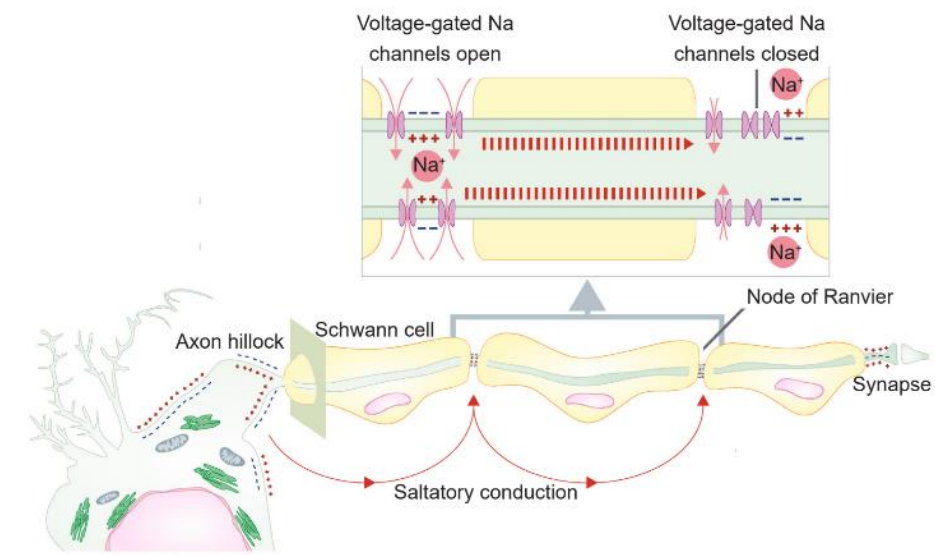
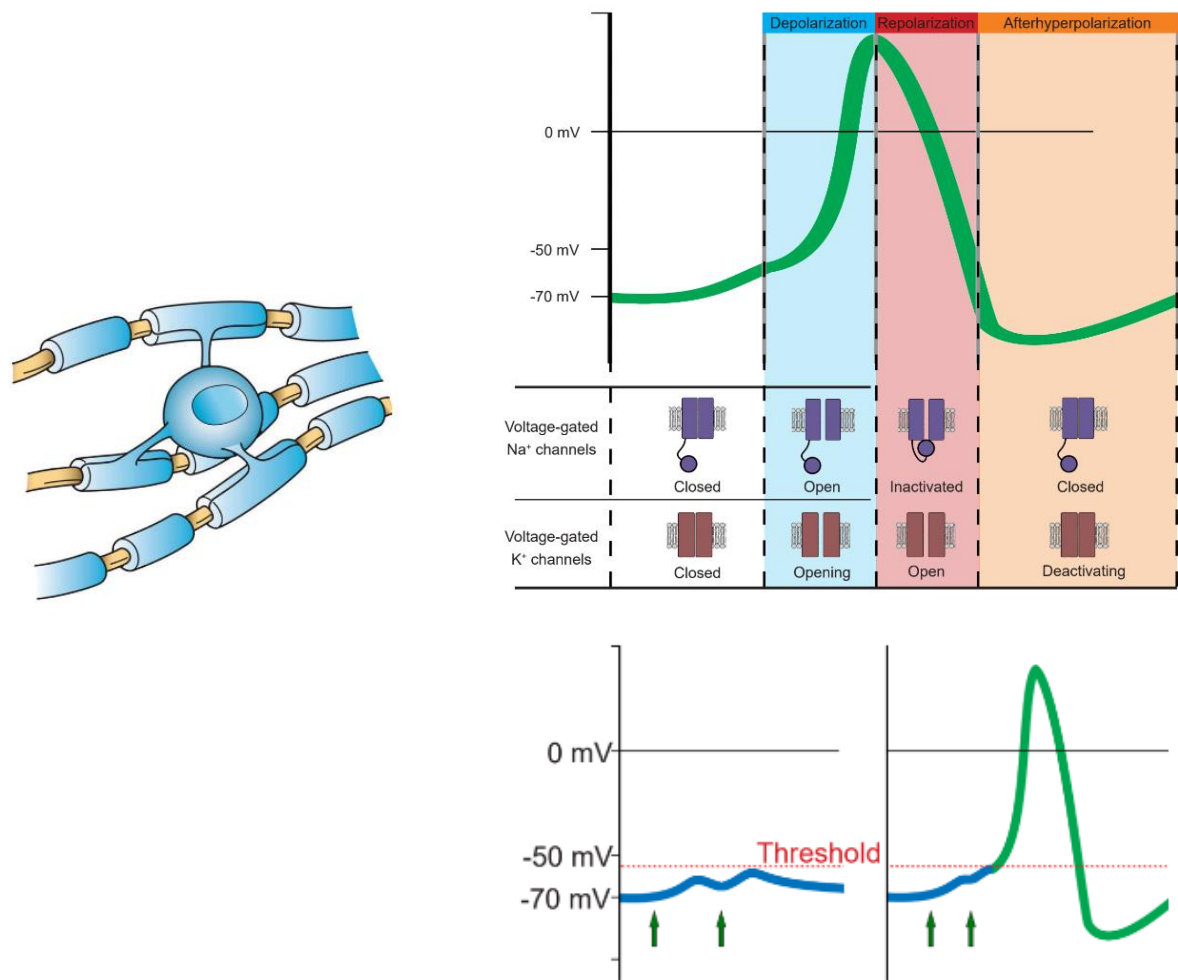
https://upload.wikimedia.org/wikipedia/commons/6/6d/Figure_35_02_01.jpg

Propagação do Potencial de Ação

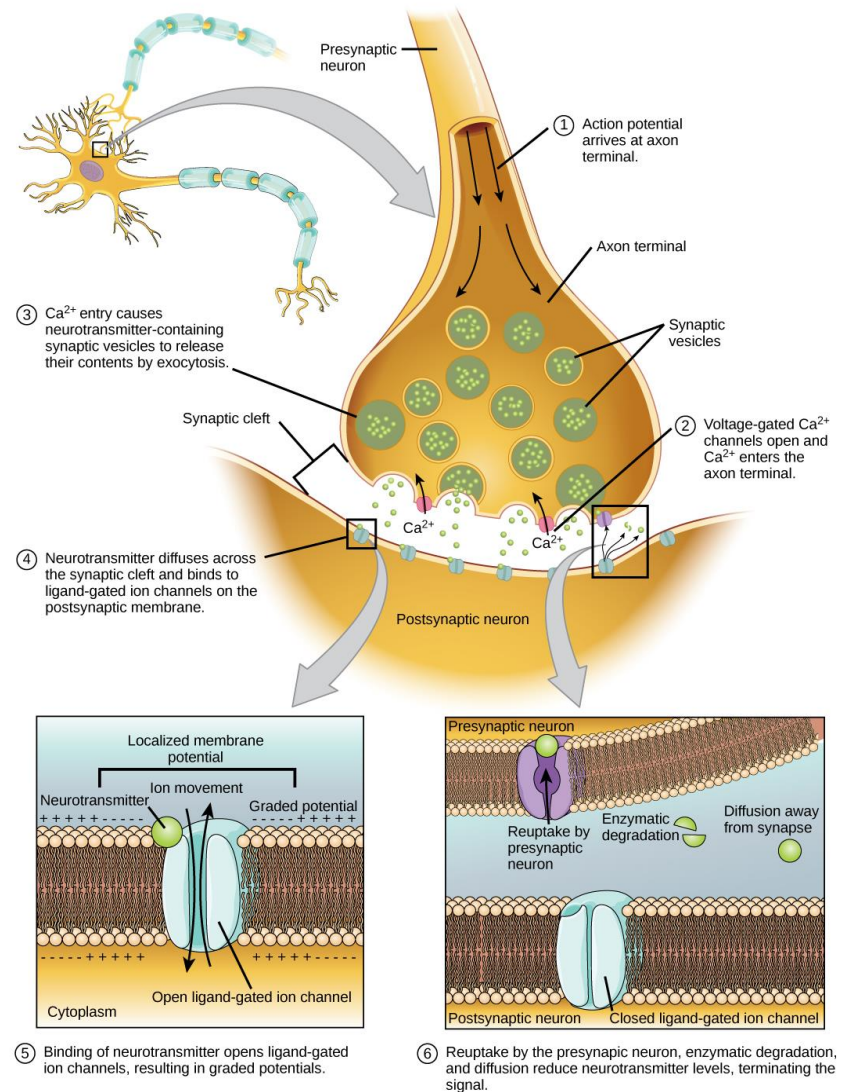


<https://upload.wikimedia.org/wikipedia/commons/a/a7/Neuronactivity.jpeg>

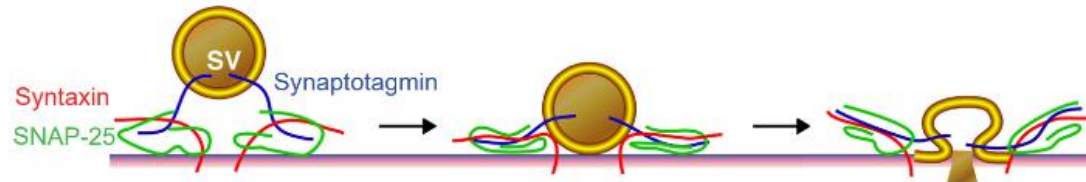
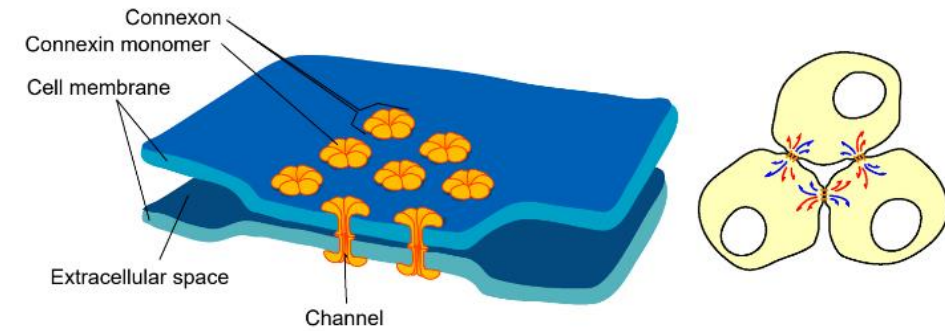
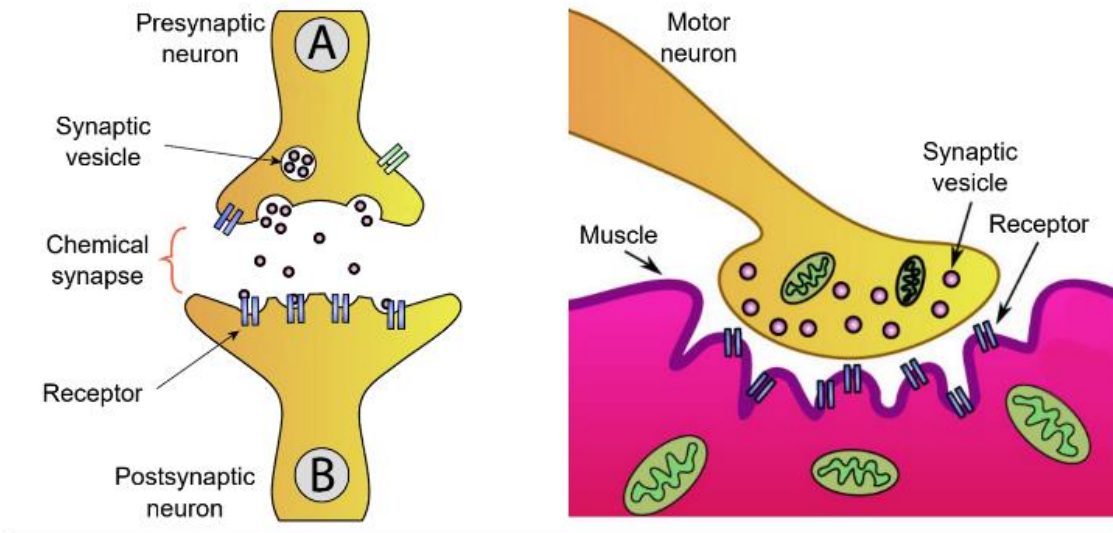
Potencial de Ação



Sinapse e a Plasticidade Neural



Sinapse e a Plasticidade Neural



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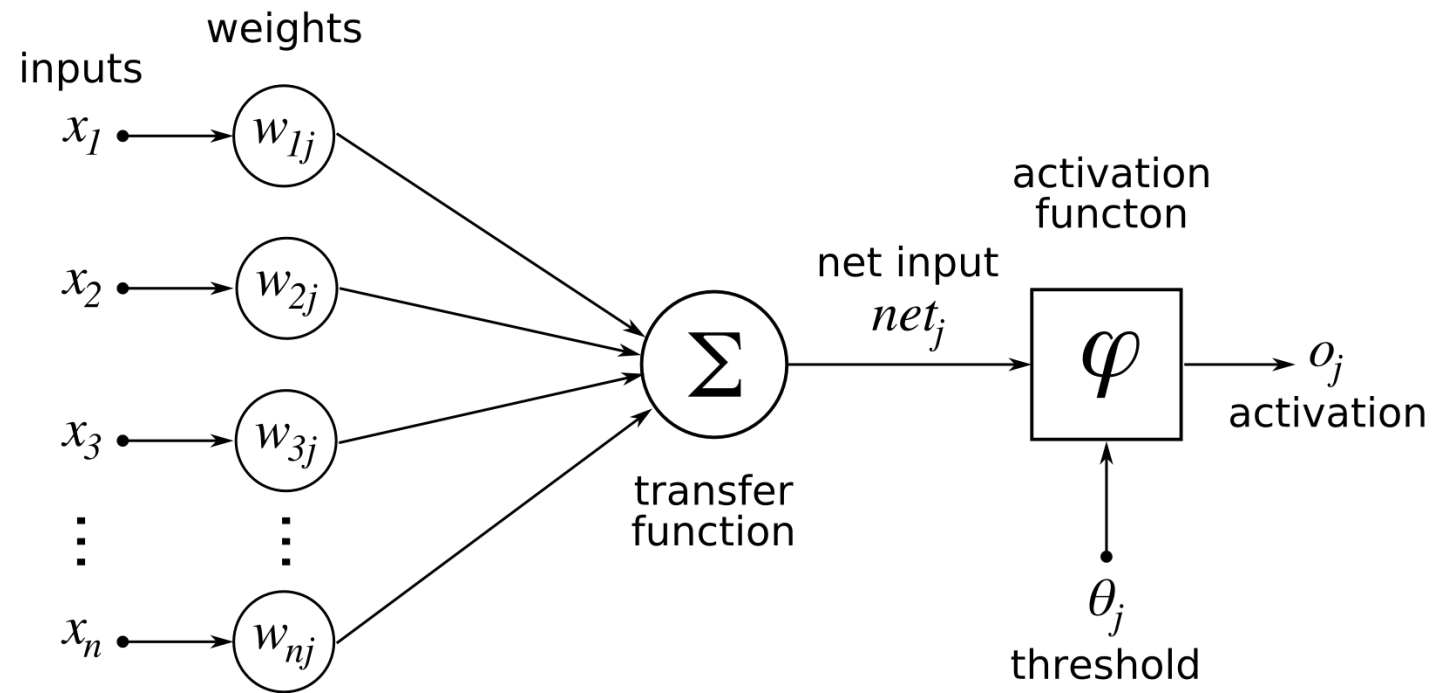
RNAs



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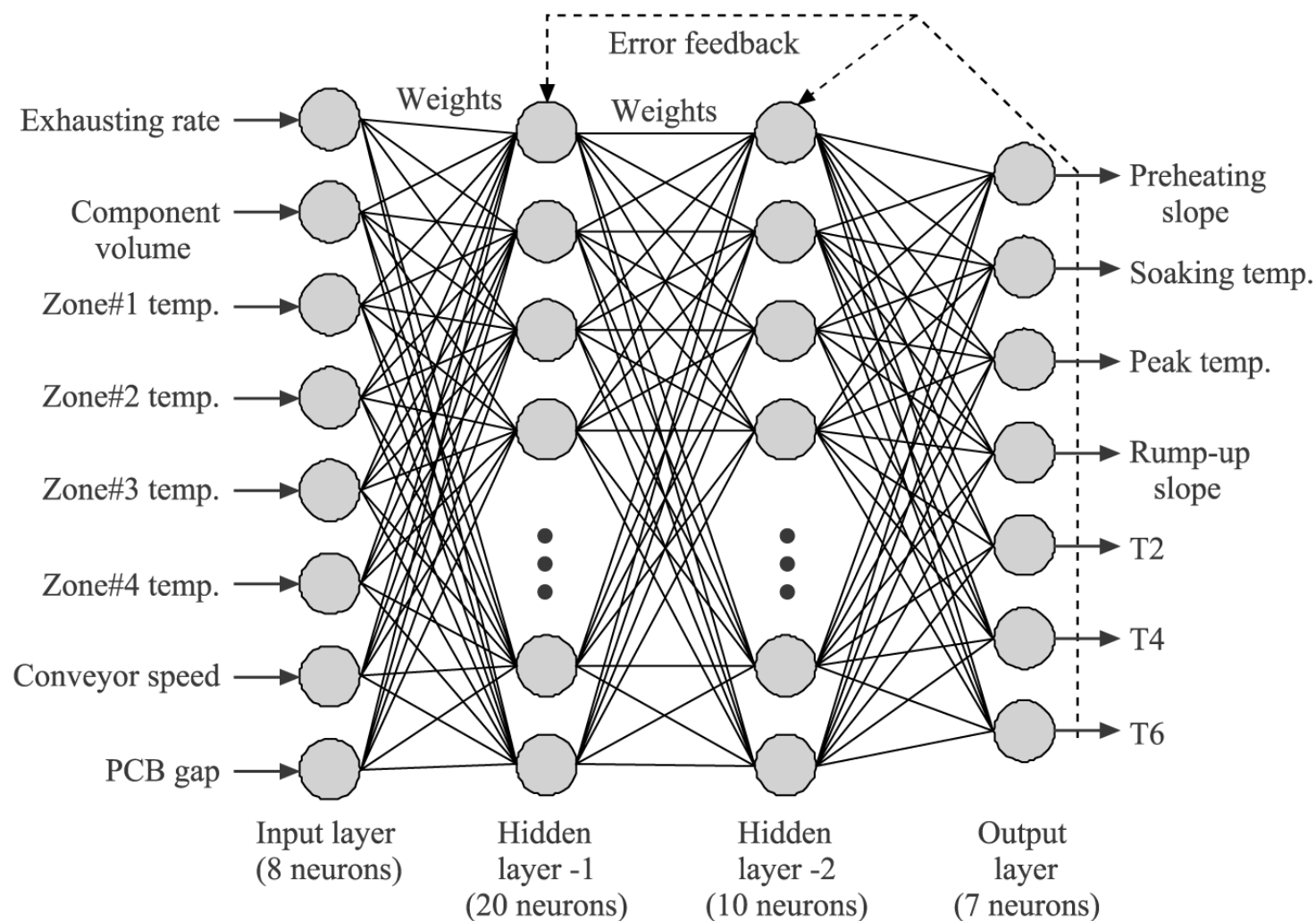
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Modelagem de um Neurônio Artificial



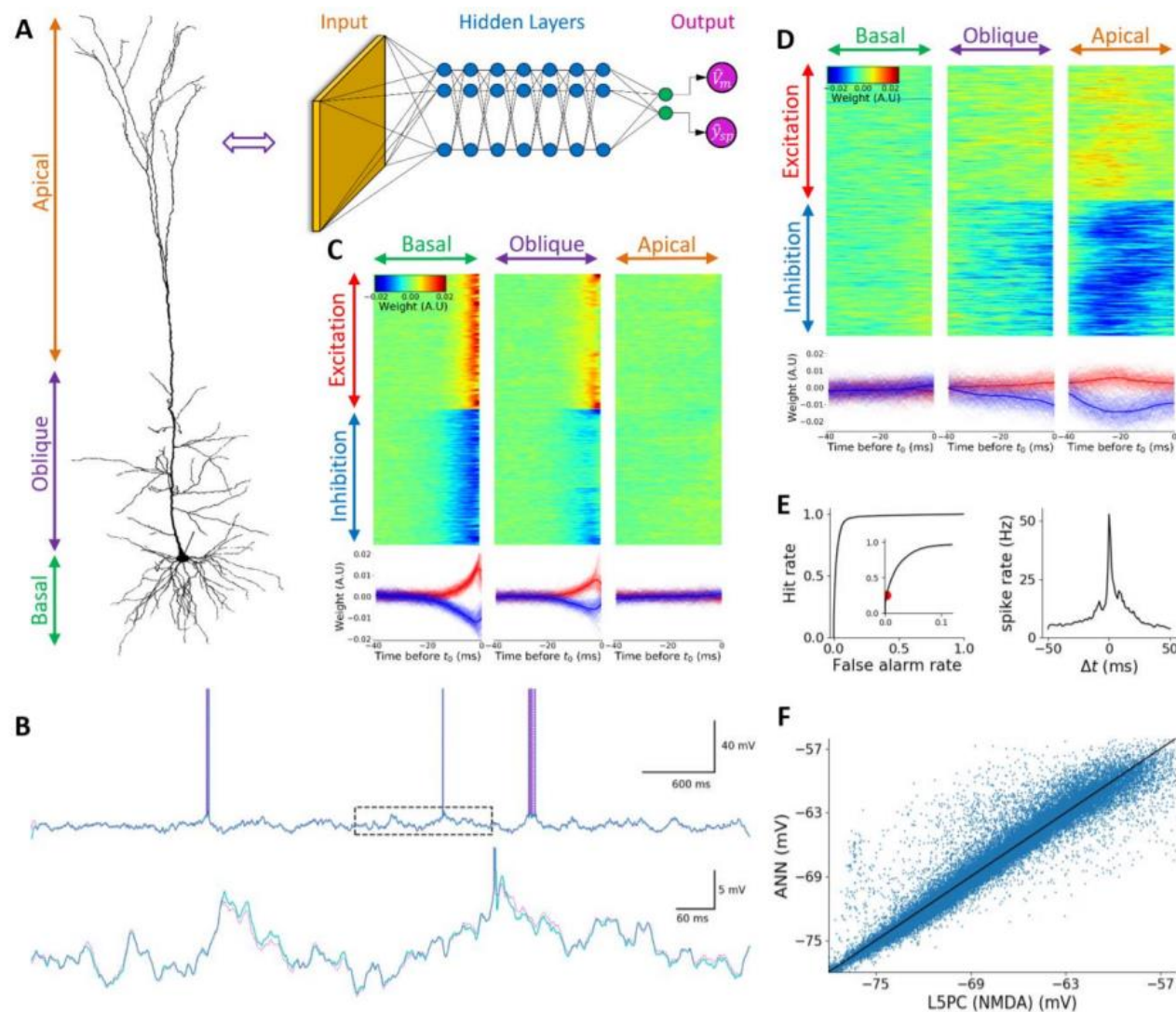
https://commons.wikimedia.org/wiki/File:ArtificialNeuronModel_english.png

Redes Neurais de Múltiplas Camadas



Tsung-Nan Tsai, Taho Yang, (2005) "A neuro-computing approach to the thermal profile control of the second-side reflow process in surface mount assembly", Journal of Manufacturing Technology Management, Vol. 16 Iss: 3, pp.343 - 359 [[Link da Figura CC](#)]

Neurônio Biológico vs RNAs



Tentativas recentes de entender a complexidade do neurônio vs seu modelo simplificado foram feitas por Beniaguev et al no artigo intitulado *"Single Cortical Neurons as Deep Artificial Neural Networks"*

Para simular o sinal de **um único** neurônio piramidal foi necessária uma **DNN com 7 camadas e 128 neurônios em cada camada!**

Referências

<https://towardsdatascience.com/the-mostly-complete-chart-of-neural-networks-explained-3fb6f2367464>

Aplicações de Redes Neurais: <https://medium.com/@datamonsters/artificial-neural-networks-in-natural-language-processing-bcf62aa9151a>

Aplicação completo Tensorflow + Séries Temporais: https://www.tensorflow.org/tutorials/structured_data/time_series

<https://www.biorxiv.org/content/10.1101/613141v1.full.pdf>



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