CONNUBIO TRA FISICA E NEUROSCIENZE NELL'ANALISI VISIVA

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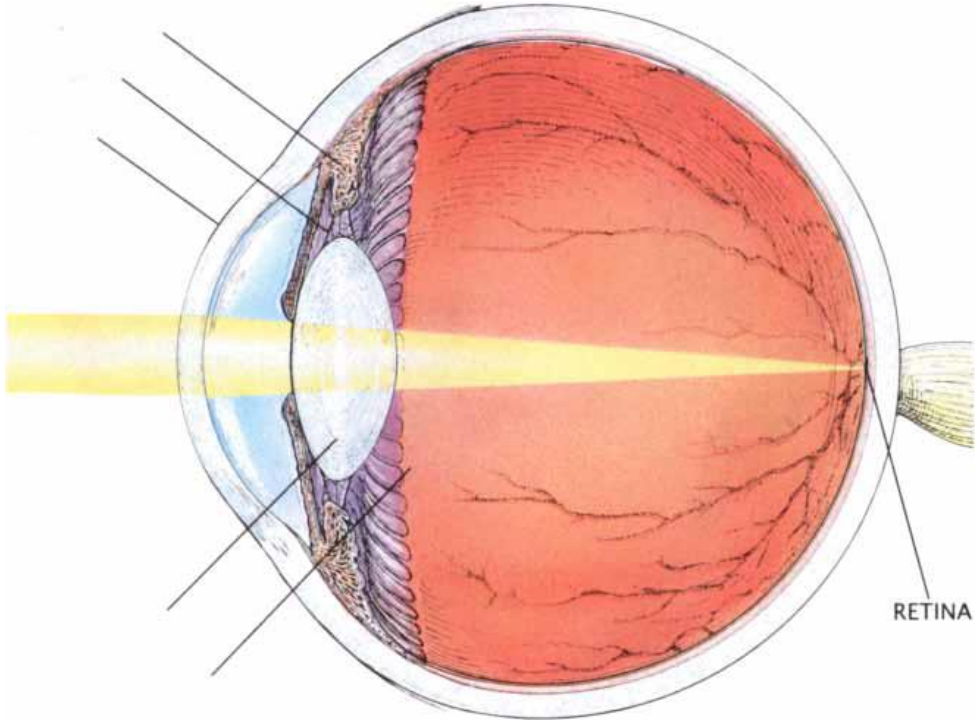
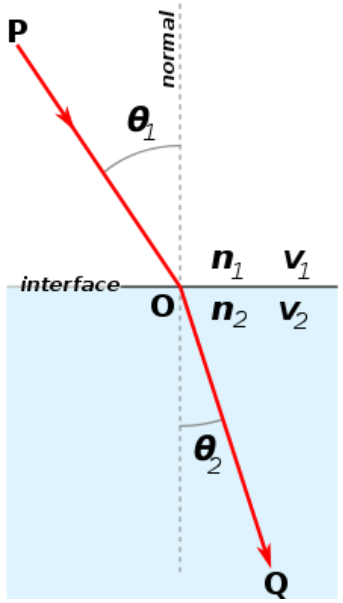
- Docente a.c. di Optometria Università di Milano Bicocca
- Laureato in Ottica e Optometria
- Master clinico in Optometria

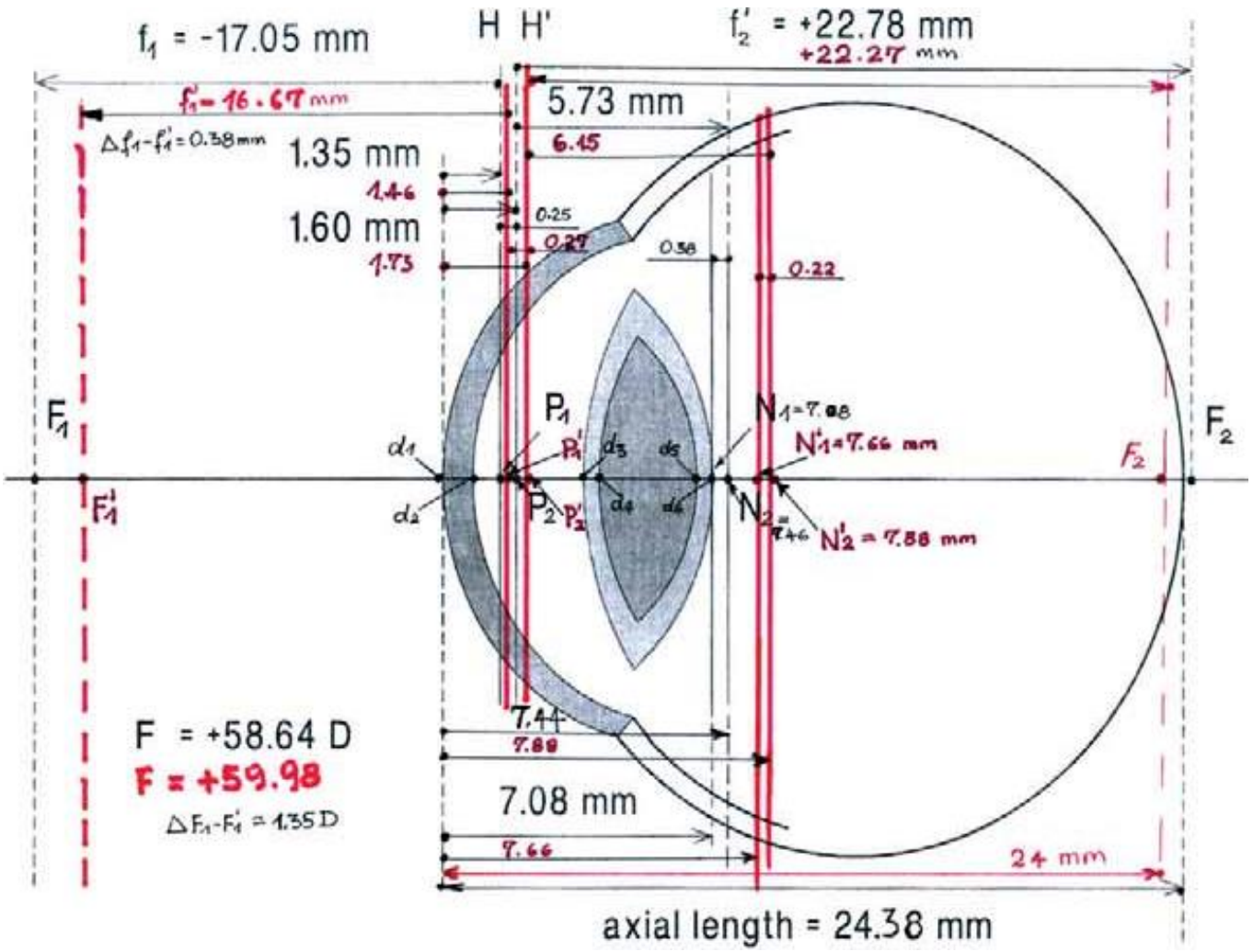
Snell law and light pathway





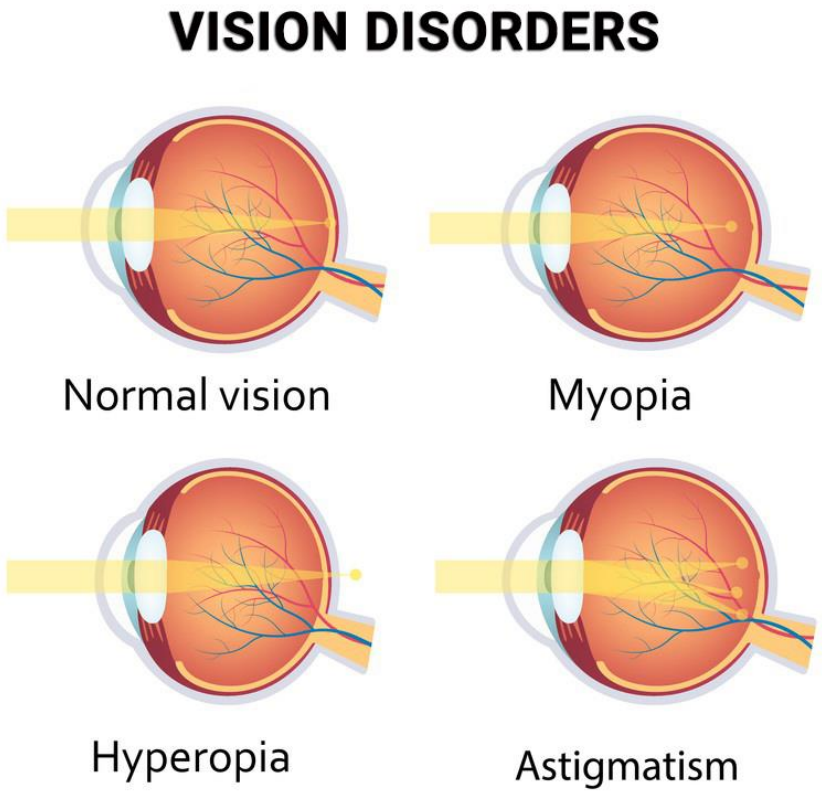
$$\frac{\sin\theta_1}{\sin\theta_2} = n_{21} = \frac{n_2}{n_1} = \frac{v_1}{v_2}$$

Gullstrad modified schematic eye



Vojniković B, Tamajo E. Gullstrand's optical schematic system of the eye--modified by Vojniković & Tamajo. Coll Antropol. 2013 Apr;37 Suppl 1:41-5. PMID: 23841130.

Visual Acuity



Come riusciamo a vedere in 3 dimensioni?

Come diamo un senso alle immagini che vediamo?

Come ci serviamo delle informazioni visive per muoverci?

Come interpretiamo il movimento?

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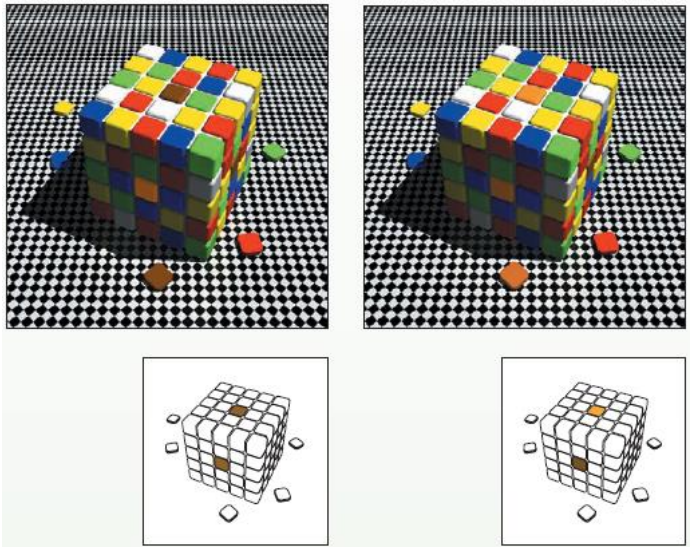
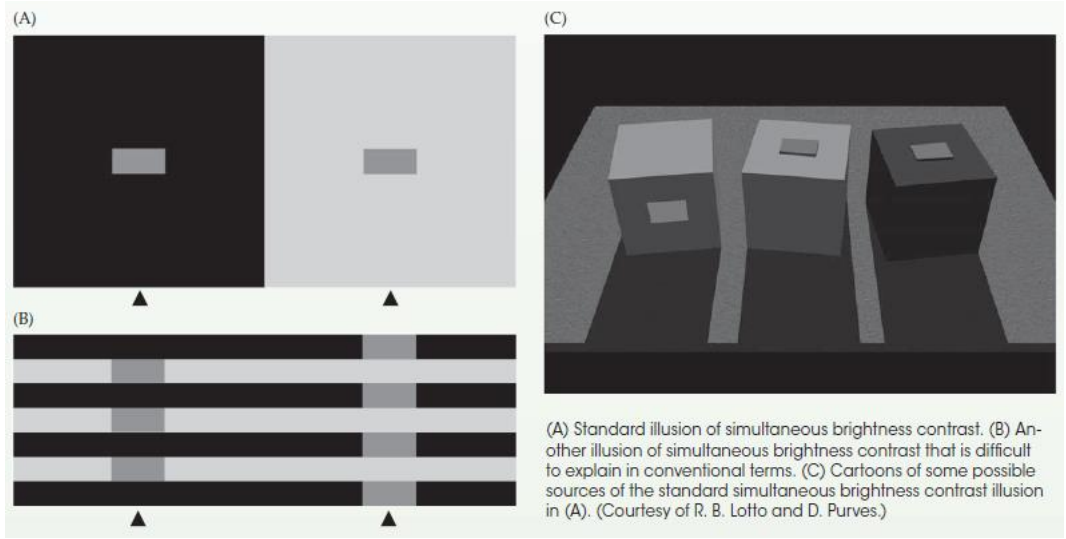
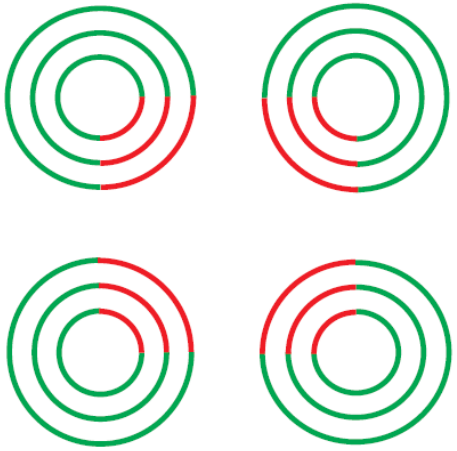
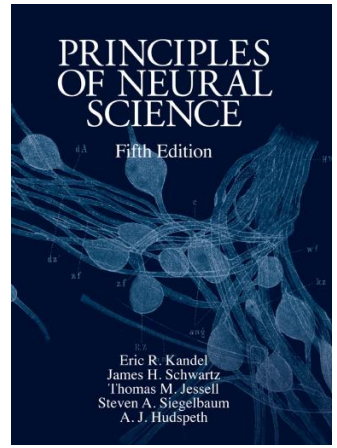
Optical illusions

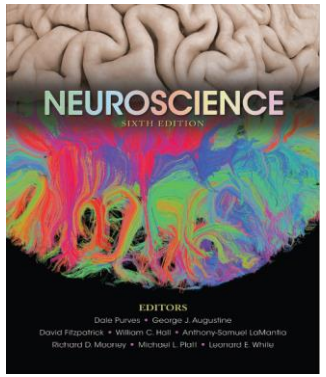




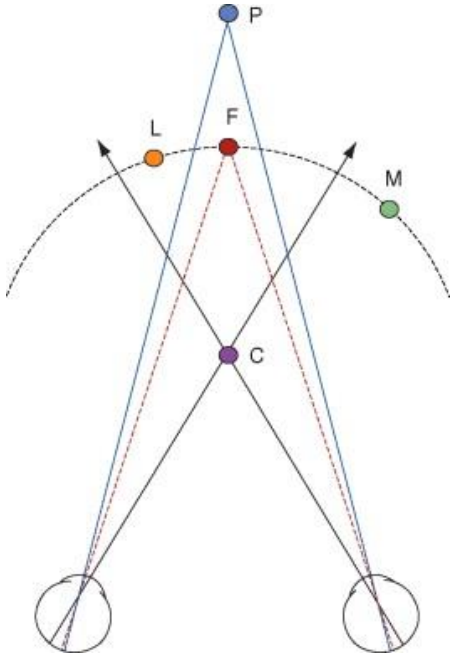
(A) Standard illusion of simultaneous brightness contrast. (B) Another illusion of simultaneous brightness contrast that is difficult to explain in conventional terms. (C) Cartoons of some possible sources of the standard simultaneous brightness contrast illusion in (A). (Courtesy of R. B. Lotto and D. Purves.)

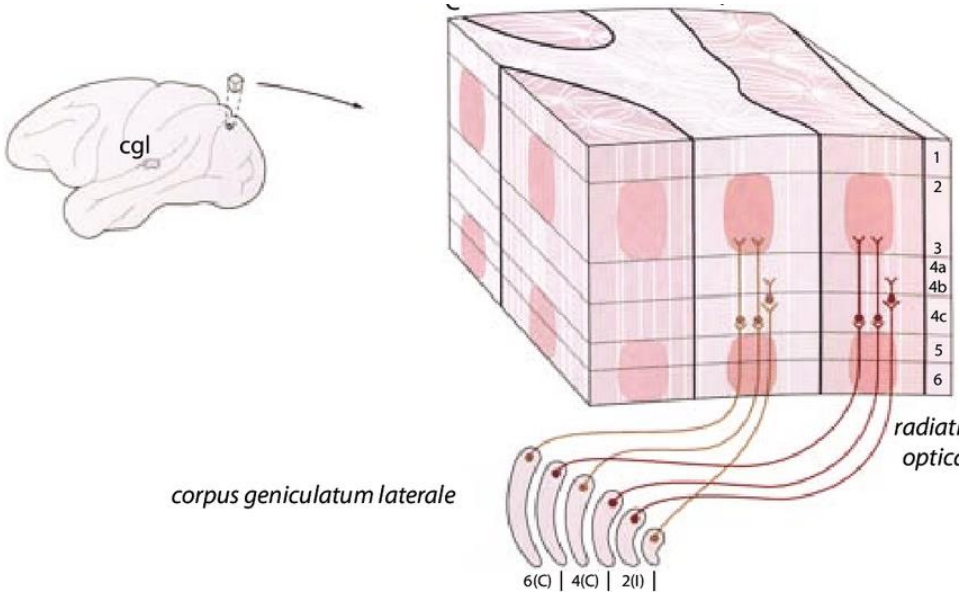






Stereoscopic vision





A.J. Parker,
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Editor(s): Larry R. Squire,
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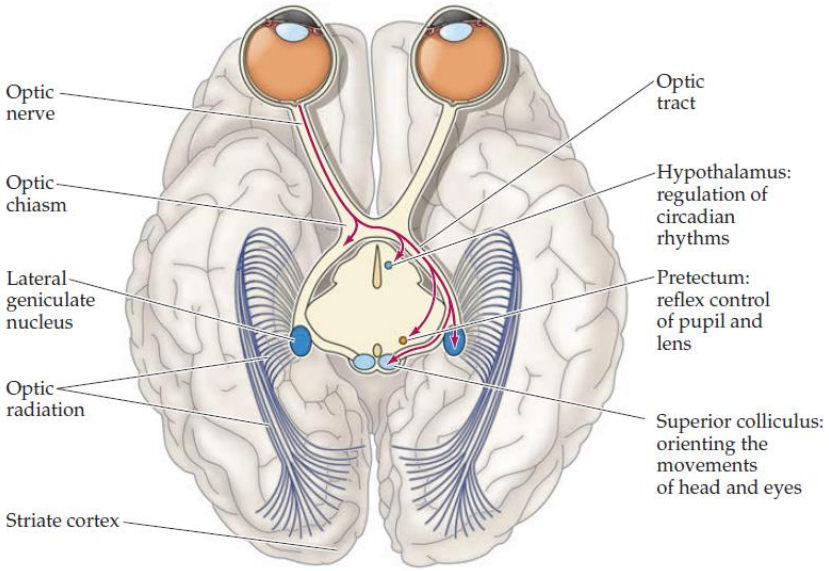
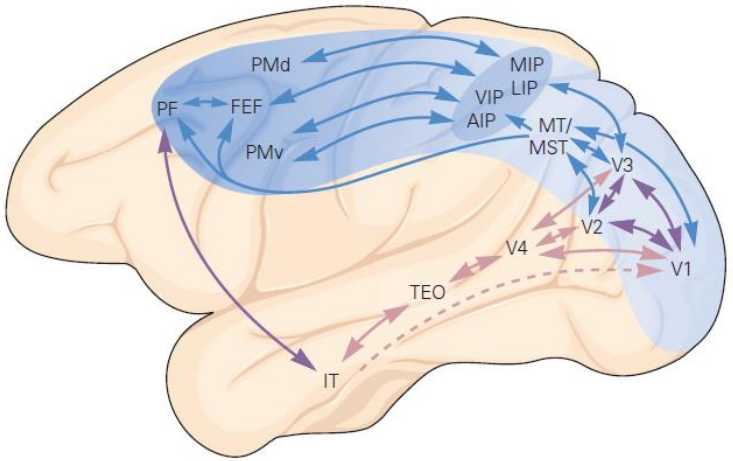
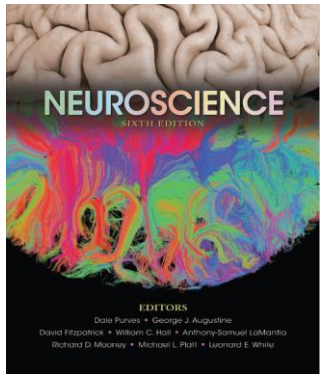
Blake R, Wilson H. Binocular vision. Vision Res. 2011 Apr 13;51(7):754-70. doi: 10.1016/j.visres.2010.10.009. Epub 2010 Oct 15. PMID: 20951722; PMCID: PMC3050089.

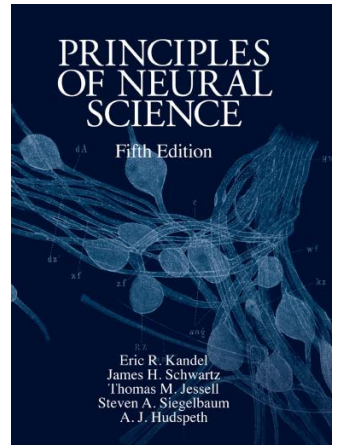
Ng CJ, Purves D. An Alternative Theory of Binocularity. Front Comput Neurosci. 2019 Oct 9;13:71. doi: 10.3389/fncom.2019.00071. PMID: 31649521; PMCID: PMC6794442.

Visual Pathways

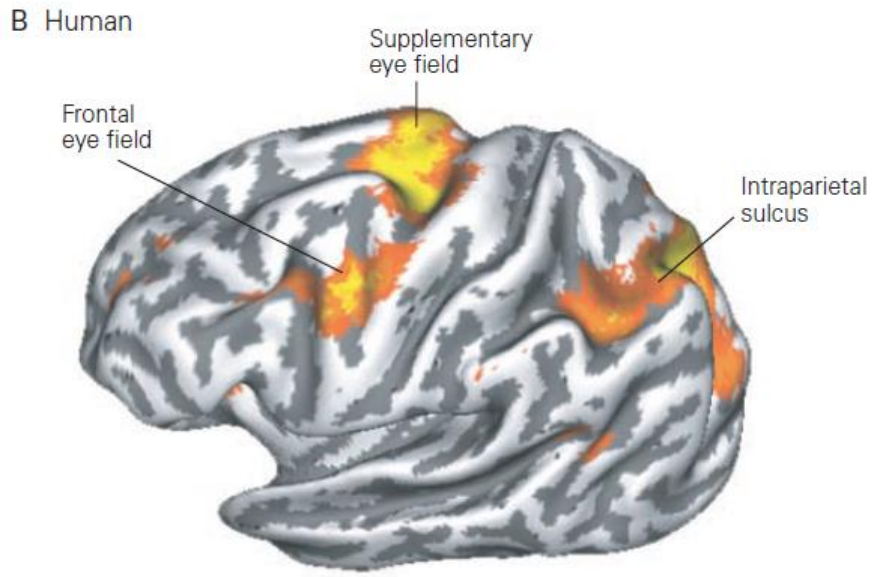


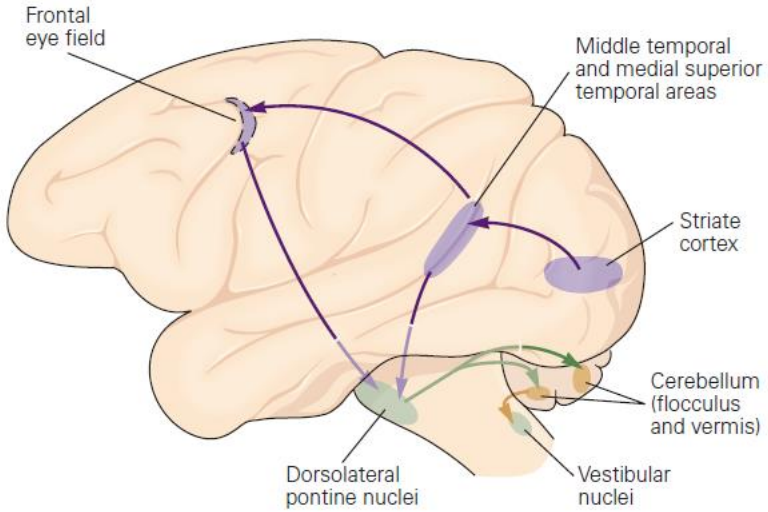


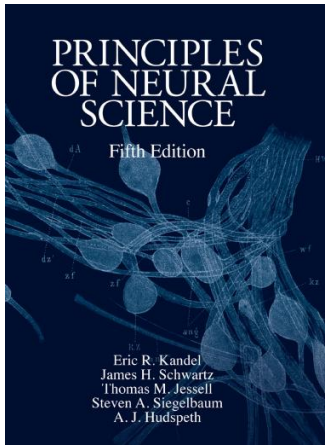




Vision, perception and action





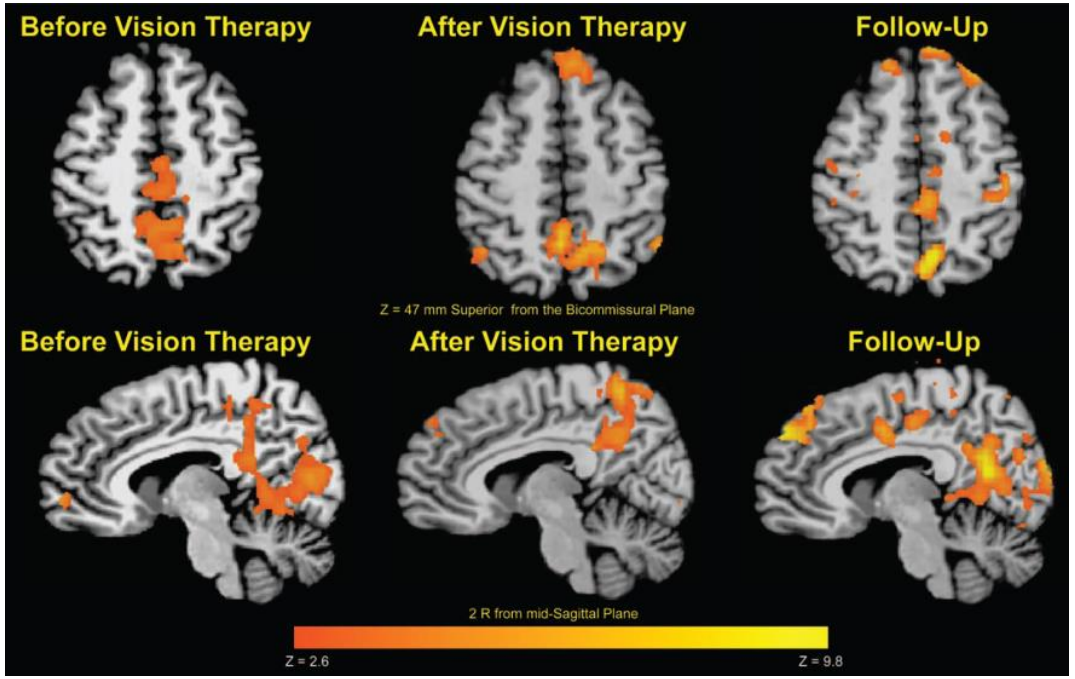


Vision Research
Volume 51, Issue 13, 1 July 2011, Pages 1567-1587

Review

Transforming vision into action

Melvyn A. Goodale



Neuroscience & Biobehavioral Reviews
Volume 112, May 2020, Pages 542-552

Review article

Neuroplasticity in adult human visual cortex

Elisa Castaldi [a], Claudia Lunghi [b], Maria Concetta Morrone [c d]

Alvarez TL, Vicci VR, Alkan Y, Kim EH, Gohel S, Barrett AM, Chiaravalloti N, Biswal BB. Vision therapy in adults with convergence insufficiency: clinical and functional magnetic resonance imaging measures. Optom Vis Sci. 2010 Dec;87(12):E985-1002. doi: 10.1097/OPX.0b013e3181fef1aa. PMID: 21057347; PMCID: PMC3134155.

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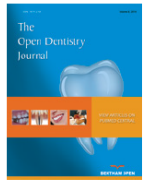


REVIEW ARTICLE

Dental Occlusion and Ophthalmology: A Literature Review

Nicola Marchili*, Eleonora Ortu, Davide Pietropaoli, Ruggero Cattaneo and Annalisa Monaco

Hindawi
BioMed Research International
Volume 2018, Article ID 2694517, 12 pages
https://doi.org/10.1155/2018/2694517

Review Article

Correlations between the Visual Apparatus and Dental Occlusion: A Literature Review

Alberto Baldini [1] Alessandro Nota [2,3] Silvia Caruso [3] and Simona Tecco

Background. The development of visual functions takes place in the first months of postnatal life and is completed around the one year of age. In this period, the maturation of the retina and the visual pathways occur, and binocular bonds are established at the level of the visual cortex. During this phase and then for a few years, a certain plasticity of the visual functions remains, which seem therefore susceptible to change both in a pejorative sense (by pathogens) and in an improving sense (for example, by therapeutic measures). This plasticity involves also the oculomotor system. Due to this plasticity, many researchers believe that there are some functional correlations between the visual and the stomatognathic apparatus. But the scientific evidence of this statement has not been clarified yet. *Aim.* The purpose of this review is therefore to analyze the clinical data in this field and finally to establish their level of evidence. Studies have been collected from the main databases, based on keywords. *Results.* The results showed a middle level of evidence since most of the data derive from case-control studies and cross-sectional studies. *Conclusions.* The level of evidence allows establishing that there is a correlation between ocular disorders (myopia, hyperopia, astigmatism, exophoria, and an unphysiological gait due to ocular convergence defects) and dental occlusion, but it is not possible to establish the cause-effect relationship. Future studies should be aimed at establishing higher levels of evidence (prospective, controlled, and randomized studies).

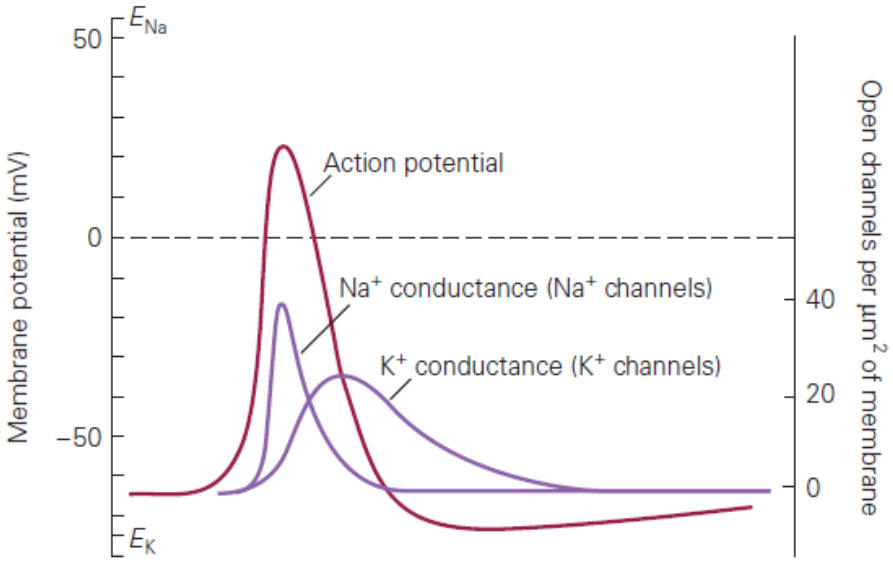
Marcus Gunn Phenomenon

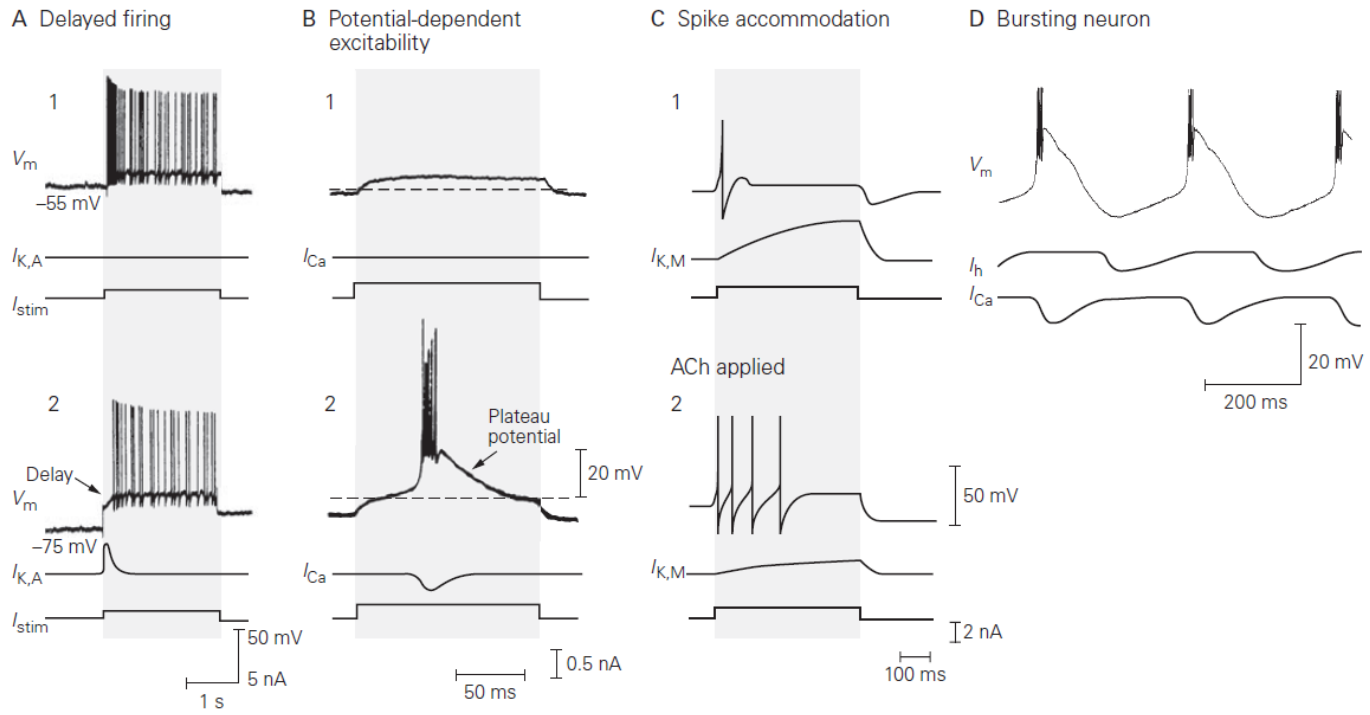
A 1-month-old boy presented with left ptosis. His mother reported that eyelid drooping was detected within a few days after birth. The child was the product of nonconsanguineous parents, and he was born after a normal pregnancy at full term by cesarean delivery with no history of trauma. On physical examination, the infant displayed rhythmic elevation of the left eyelid occurring consistently when he sucked on a pacifier. The upper eyelid was elevated completely with each suck and returned to a mild ptotic alignment between sucks, with otherwise-normal findings on physical and neurologic examinations (Videos 1 and 2 and Figure; Videos available at www.jpeds.com). Marcus Gunn phenomenon (MGP) was diagnosed, and the patient was referred to an ophthalmologist.

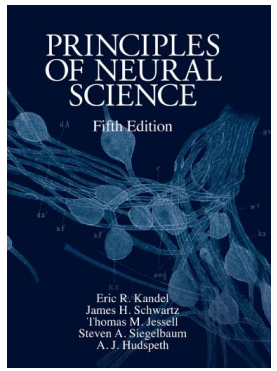
First described more than 100 years ago by Scottish ophthalmologist Robert Marcus Gunn, this condition is characterized by ptosis associated with synkinetic "winking" movement of the upper eyelid and masticating movements of jaw.[1] The etiology of MGP is not understood. It is thought to result from an abnormal branch of the trigeminal nerve, which has been misdirected congenitally to the oculomotor nerve supplying the levator muscle, but other theories have been suggested, including genetic predisposition and phylogenetic atavism. Although most cases of MGP are considered to be congenital, acquired forms exist, due to complications of surgery, trauma, infection, and pontine tumors.[2]

Figure. Elevation of the left eyelid due to suction.

Action potential







THANK YOU

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