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## Abstract

This poster describes the history of orthoptics, from its early understanding of amblyopia, traced through a fascinating display of diagnostic instruments presented as part of the RANZCO Museum exhibition.

## Understanding Amblyopia

**2778-2723 BC:** Statues depict people with strabismus in *Ancient Egypt* [1].

**460-377 BC:** Earliest written reference to strabismus by *Hippocrates*. Described people with strabismus as *strebloi*, a derivative of the word *streboun*, meaning *to turn*.

**Pre-history:** Treatment of strabismus from pre-history to the 7<sup>th</sup> century was a salve, made from ingredients such as tortoise brain combined with oriental spices [2]. Up to the middle ages people with strabismus were thought to be cursed, as 'enemies of God' and were generally persecuted based on their appearance.

**625-690:** *Paullus of Aegina* first described amblyopia "an obscuration of vision from an invisible cause" but did not link strabismus as a causal factor [1].

**1743:** *G. L. Le Clerc* (*the Comte de Buffon 1707-1788*) described ocular dominance and defined amblyopia in the presence of strabismus. Believed amblyopia was related to anisometropia and had some personal understanding of it in that he had anisometropic myopia and exotropia. Thought that strabismus was only present in one eye at any given time and never both eyes at the same time. Revolutionary as the belief was that both eyes turned either in or out [2].

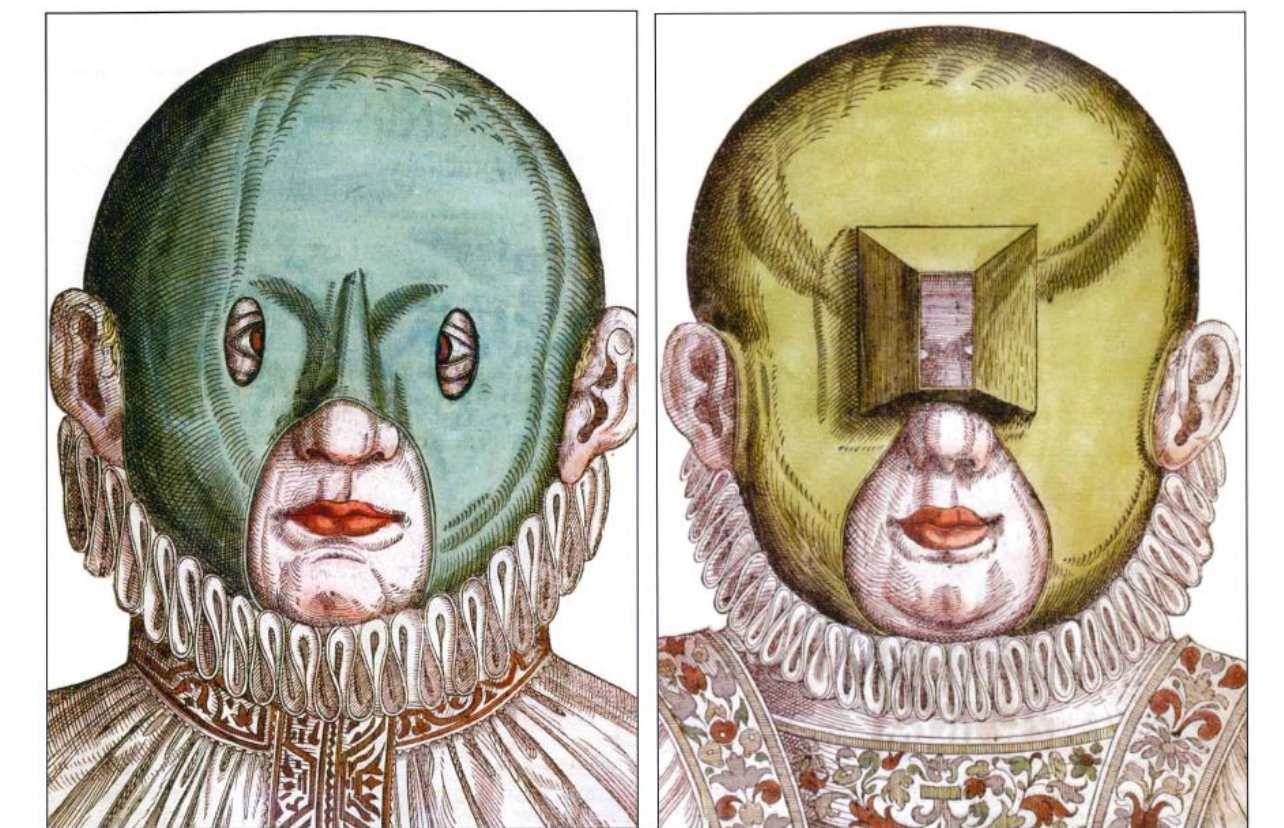
## Occlusion for Amblyopia

**7<sup>th</sup> century:** *Paullus of Aegina* describes a mask worn by children would correct their squint by forcing them to look straight ahead. No illustration or description of this type of mask exists.

**Mid-14<sup>th</sup> century:** *A. Paré* and *G. Bartsch* described the *Squint Mask*. The type of opening over the eyes depended upon whether the deviation was an eso or exo [1]. *Paré* then designed *Bésicles* which were a more comfortable version of his original *Squint Mask*. *Bésicles* had one significant limitation; they allowed the non strabismic eye to look through the hole whilst the strabismic eye remained in its abnormal position.

**18<sup>th</sup> and 19<sup>th</sup> century:** *Bésicles* adapted so that the holes in front of the eyes could be adjusted or completely occluded [1].

Overall principle of the *Squint Masks* and other types of occlusion (e.g. covering the eye with a dark cloth) was correction of strabismus. Occlusion was not originally intended as a treatment for amblyopia.



Bartisch's Squint Masks [1]

## Orthoptic Exercises

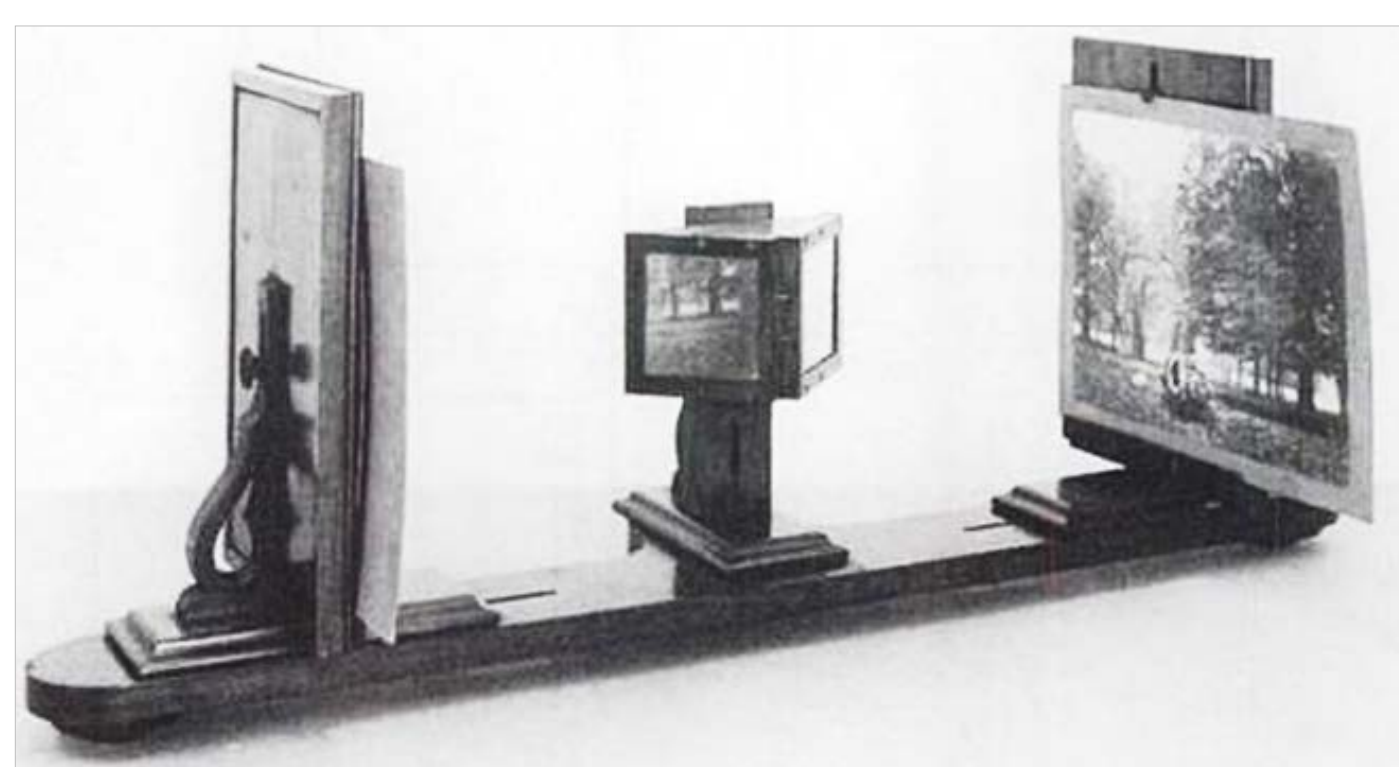
**1743:** Correction of refractive error and optical penalisation described by *Le Clerc*.

**Mid 1700s:** Alternating occlusion introduced [1].

**Mid 1800s:** Exercises for fixation first reported (e.g. *patient stands next to black wall while fixating on a white dot located in the opposite direction to the squint*). Exercises prescribed intensively, many hours for many weeks. *J. Diffenbach* described these "*ocular gymnastics*" as "*useless eye torture*" [1].

**1778:** *E. Darwin* pioneers orthoptic exercises and uses a *Gnomon* made of paper/brass as a binocular exercise to improve the angle of deviation in strabismic patients [3].

**1838:** *C. Wheatstone* invents *Mirror Stereoscope* which presents a separate picture to each eye, pictures were termed *Stereograms* [4, 5].



Stereoscope by Wheatstone [4]

**1860s:** *E. L. Javal* constructed his own version of the *Stereoscope* which moved into 5 directions of gaze and pioneered visual training for the treatment of strabismus. Principle of training was to maintain fusion whilst decreasing the angle of strabismus. Recommended training 4 hrs/day for several sessions a week over several years [4, 5]. His exercises were effective, but also very time-consuming for him and his patients. Perhaps overwhelmed by his workload he wrote "*The first time that I revealed my methods to von Graefe, he astounded me by saying that people are not worth the effort. Life's experience has shown me that von Graefe was correct*".

**1920s:** *E. Maddox*, a London-based ophthalmologist was treating amblyopic patients. As his orthoptic treatment methods gained popularity, he was inundated with patients and did not have the time to devote to the intensive program. He taught the techniques to his daughter Mary, now considered *the first orthoptist*.

**1928:** *Mary Maddox* opens her own private clinic [5].

## Amblyopia & Pleoptics

**1895:** *C. Worth* modified Wheatstone's stereoscope and called it an *amblyoscope*. It was used to train the amblyopic eye, not just improve the angle of strabismus. Worth recommended orthoptic exercises be given before the age of 5 years and developed new targets for simultaneous perception and fusion [2, 4].

**Post World War II:** *Amblyoscope* was a pre-cursor to the introduction of pleoptics for the treatment of amblyopia. *Pleoptics* arose from the need for new treatment approaches due to a large proportion of people with "deep amblyopia" combined with steady eccentric fixation as a result of 'medical neglect' during the war combined with a displacement of people across Europe. However, by the time patients presented for treatment they had passed the critical period, hence the development of pleoptic treatment [2, 4].

**1947:** *A. Bangerter* founded the *School for Pleoptics and Orthoptics*. Invented various pleoptic instruments, including the *Localisator*, *Centrophore*, *Separation difficulty trainer*, *Corrector* and *Mnemoscope*.

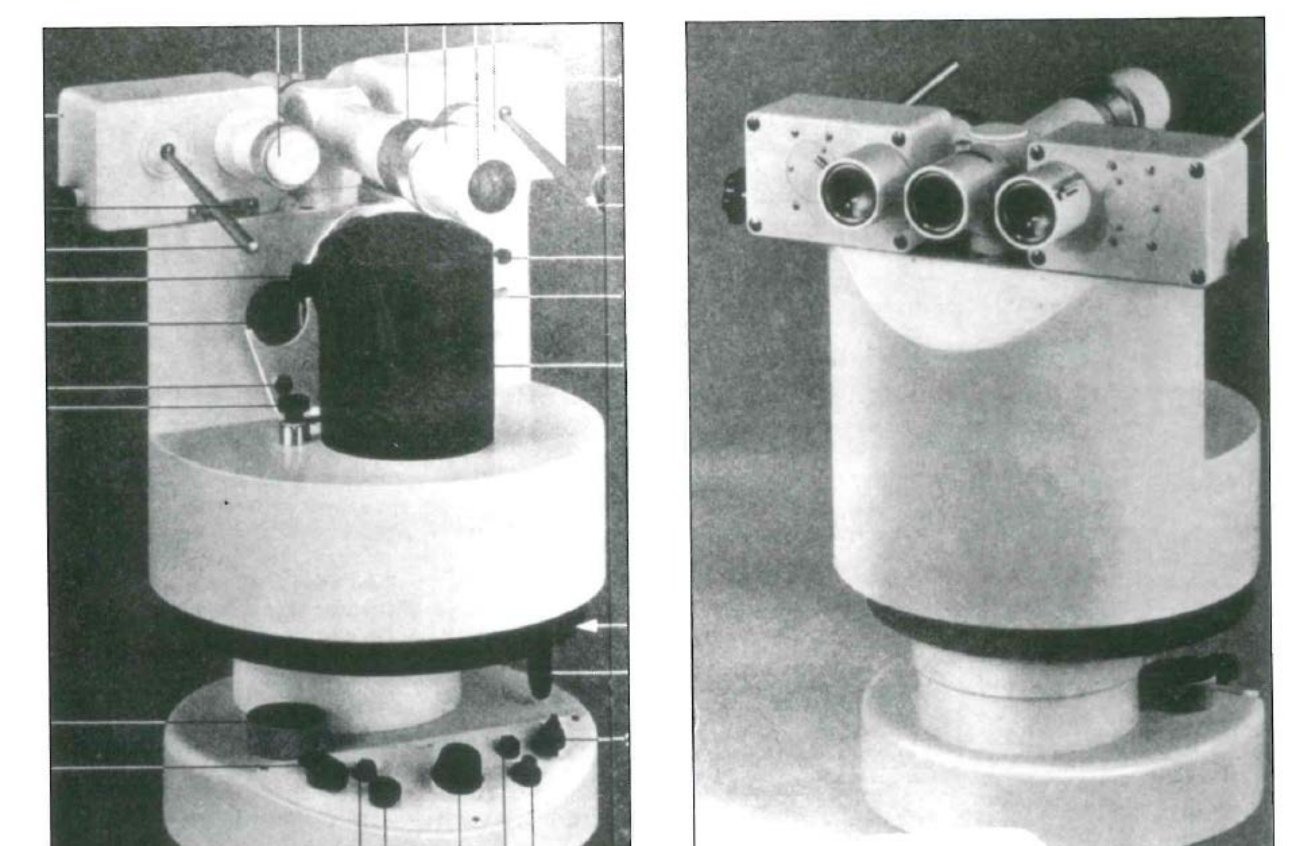
**1950s:** *C. Cüppers* invents the *Visuoscope* by adapting his ophthalmoscope for the purpose of diagnosing fixation behaviour [2, 4]. Overall aim of pleoptics was to normalise fixation behaviour of the amblyopic eye. *Pleoptophore* invented to visualise the fundus whilst giving the treatment. [2,4].

*Synoptophore* used for training of binocular vision due to the push by Cüppers and Bangerter who were adamant that amblyopia treatment needed to be supplemented by binocular vision training to be successful.

Invention and use of pleoptics rejuvenated the interest in strabismus and amblyopia treatment across Europe /UK.

**1960s:** Use of pleoptics started to decline, replaced by conventional occlusion treatment. Reasons? Lack of evidence that patients improved. Time consuming training by the orthoptist.

**1978:** Resurgence in pleoptic treatment with introduction of the *Cambridge Amblyopic Vision Stimulator* (CAM) which promised to be a faster method of vision training [6]. Eventually replaced by conventional occlusion due to lack of evidence.



Pleoptophor  
L)examiner's view R) patient's view [3]

## References

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