Classification of strabismus

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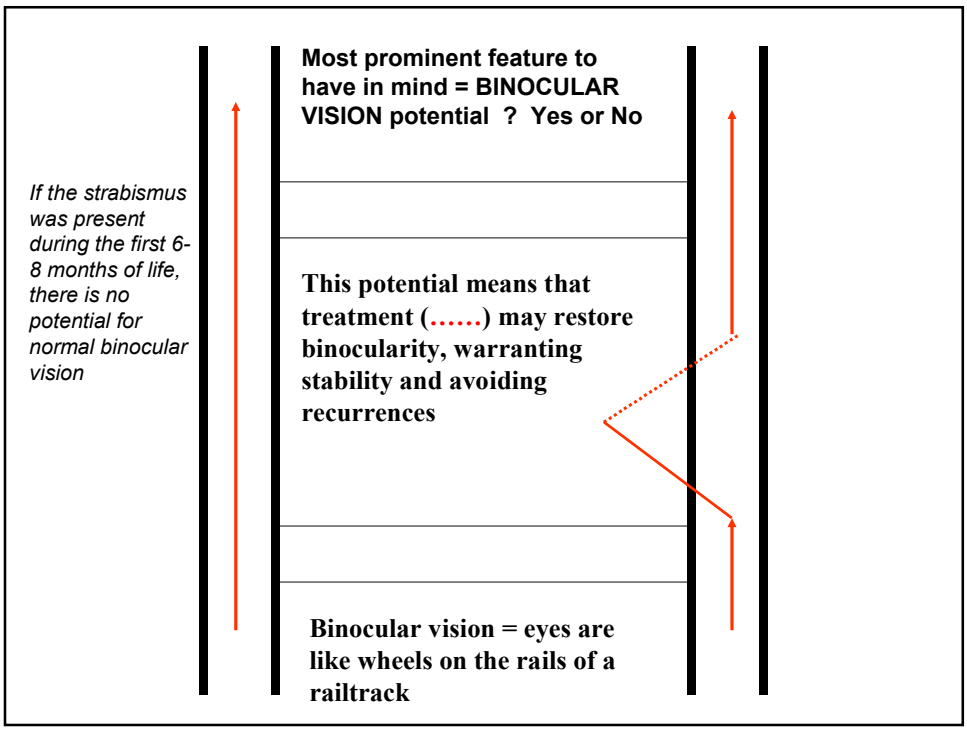
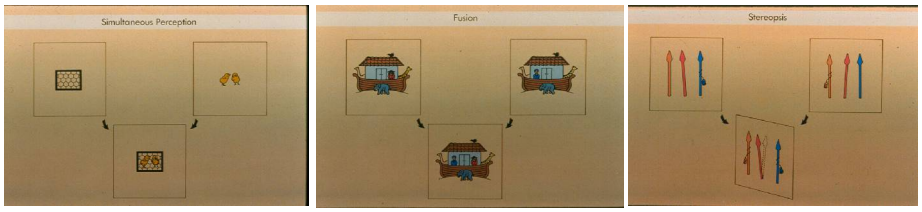


What is BINOCULAR VISION ?

1. Normal - Bifoveolar fixation with normal visual acuity in each eye, no strabismus, no diplopia, normal retinal correspondence, normal fusional vergence amplitudes, normal stereopsis.

2. Subnormal (abnormal) – 1 or more of the following; anomalous retinal correspondence, suppression, deficient to no stereopsis, amblyopia, decreased fusional vergence amplitudes.

3. Absence of Binocular Vision - no simultaneous perception, no fusion, no stereopsis



Besides, the classification of strabismus is based on a number of features including :

- The **relative position** of the eyes
- The **time of onset** (=clue for binocular vision potential),
- Whether the deviation is **intermittent** (=clue for binocular vision potential) or **constant**
- Whether the deviation is **comitant** (supranuclear cause) or **incomitant** (nuclear or infranuclear cause, clue for binocular vision potential if the eyes are straight in one position)
- According to the associated **refractive error** (accommodative strabismus)

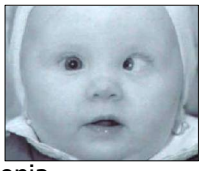
Most common types of strabismus in children

Supranuclear causes (generally comitant)	**Paralytic, muscular or orbital causes** (generally incomitant)
Infantile esotropia (before 6-8 months, prevalence 1%)	Congenital superior oblique paresis
Accommodative esotropia (between 2-3 year, prevalence 2.5%)	Congenital cranial dysinnervation disorders (Brown, Duane, congenital fibrosis)
Sensory esotropia (rare)	Myopathies (myasthenia, chronic progressive ophthalmoplegia) rare
Acquired late esotropia (rare)	III, IV, VI
Intermittent exotropia (+/- 3 times less frequent and 6 times less amblyogenic than esotropia)	Orbital pattern strabismus
Pattern strabismus	Orbital fractures rare
Monofixation syndrome	Craniostenosis rare

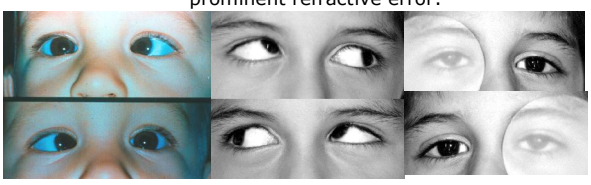
Most common types of strabismus in children

Supranuclear causes

- **Infantile esotropia**
- Accommodative esotropia
- Sensory esotropia
- Acquired late esotropia
- Intermittent exotropia
- Pattern strabismus
- Monofixation syndrome



Esodeviation present before the age of 6-8 months, variably associated with other clinical features including dissociated vertical deviation, over-elevation in adduction, pseudoparesis of abduction, latent nystagmus, crossed fixation, asymmetrical monocular optokinetic responses (OKN) and, usually, no prominent refractive error.



Crossed fixation | Over-elevation in adduction | Dissociated vertical deviation

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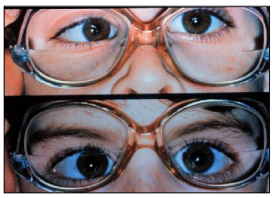
Accommodative esotropia, or refractive esotropia, refers to eye crossing that is caused by the focusing efforts of the eyes as they try to see clearly (= around 2 to 3 y-o). Patients with refractive esotropia are typically hyperopic. Full optical correction of hyperopia may cure the esotropia totally (= **fully accommodative esotropia**) or partially (= **partially** accommodative esotropia).

Both conditions may be associated with innnervational convergence excess, necessitating bifocals (= **accommodative non refractive esotropia**)

Fully accommodative esotropia



Accommodative non refractive esotropia, near fixation in upper and lower segments of bifocals

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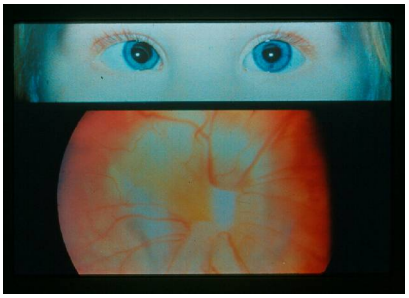

Severe optic disc anomaly on the RE, leading to very low vision and right esotropia.

Unilateral low vision from organic cause ⇒ squint (esotropia in children, exotropia in adults).

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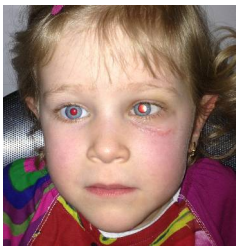
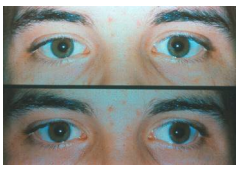
- After 3-4 years of age, diplopia often present.
- Swann type : after a transient interruption of fusion (monocular occlusion for instance)
- Franceschetti type : no peculiar history, banal refraction, sometimes related to psychic trauma, severe illness, or neurological disease (posterior fossa tumor, hydrocephaly, Arnold-Chiari)



Chloe, 4 y-o, no previous strabismus, esotropia after 10 days of occlusion

Most common types of strabismus in children

Supranuclear causes



- Infantile esotropia
- Accommodative esotropia
- Sensory esotropia
- Acquired late esotropia
- **Intermittent exotropia**
- Pattern strabismus
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Often after 2 years, less amblyogenic if intermittent.

Asymptomatic, or photophobia, closure of one eye, asthenopia, and reading difficulties.

Most prominent for far (near compensation by accommodative vergences), and when the child is tired or dreaming.

May become constant with loss of stereopsis.

Necessitates the use of +3 for near measurements (suppression of accommodative vergences) in order to distinguish divergence excess from convergence insufficiency and basic exodeviation (important for surgical plan)

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- Infantile esotropia
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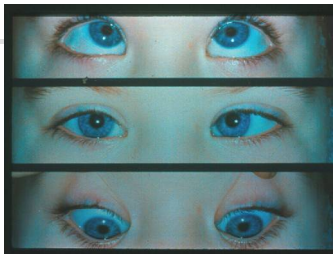
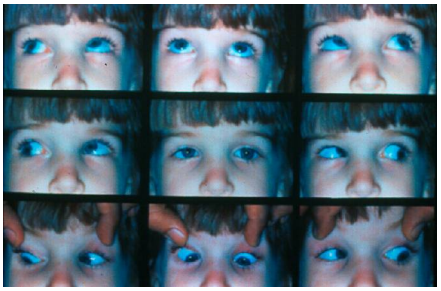
- Sensory esotropia
- Acquired late esotropia
- Intermittent exotropia
- **Pattern strabismus :**
  concerns either exo- or esotropia, relates to the difference of horizontal deviation in up and down gaze, designing the letter A or V

Pattern A

>10D between up and down gaze

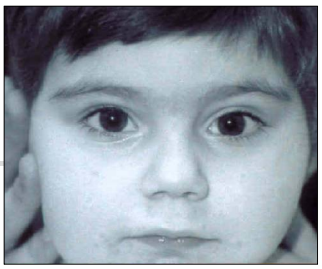




Pattern V >15 D between up and down gaze, over-elevation and under-depression in adduction

MONOFIXATION SYNDROME

Worse than normal binocular vision but much better than no binocular vision



= Small eso/exotropia angle (<8D horizontal and <4D vertical), in binocular condition, extramacular fusion and macular scotoma on the non-fixing eye (beautifully highlighted with the Gracis Biprism test)

Common Associated Findings : can be primary, genetic or acquired after surgical treatment of infantile strabismus, can be associated with anisometropia, amblyopia often present, stereopsis present but poor, alternate cover test may reveal larger deviation than simultaneous cover test. Good fusional vergence amplitudes.

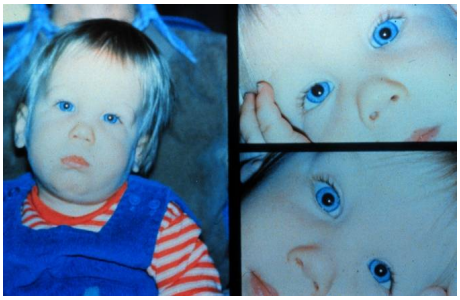
General Comments : promotes stable ocular alignment and sensory status. Can deteriorate into constant, larger angle esotropia, requiring surgical treatment.

Most common types of strabismus in children

Paralytic, muscular or orbital causes

- **Congenital superior oblique paresis**
- Congenital cranial dysinnervation disorders (Brown, Duane, congenital fibrosis)
- Myopathies (myasthenia, chronic progressive ophthalmoplegia)
- III, IV, VI
- Orbital pattern strabismus
- Orbital fractures
- Craniostenosis

Congenital right superior oblique palsy: left head tilt, positive Bielschowsky test (right hypertropia) with head tilted on right shoulder



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- **Congenital cranial dysinnervation disorders (Brown, Duane, congenital fibrosis) - There is always an associated muscular restriction leading to positivity of the forced duction test**
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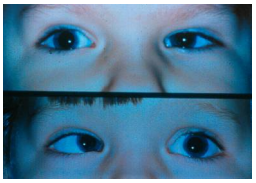
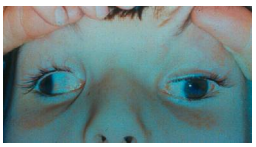
Left Brown syndrome



Left Duane type I syndrome



Congenital ocular fibrosis

Most common types of strabismus in children

Paralytic, muscular or orbital causes

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- Congenital cranial dysinnervation disorders (Brown, Duane, congenital fibrosis)
- **Myopathies (myasthenia, chronic progressive ophthalmoplegia)**
- III, IV, VI
- Orbital pattern strabismus
- Orbital fractures
- Craniostenosis

Myasthenia : before and after steroids

Most common types of strabismus in children

Bilateral IVth nerves palsy due to hydrocephaly

Paralytic, muscular or orbital causes

- Congenital superior oblique paresis
- Congenital cranial dysinnervation disorders (Brown, Duane, congenital fibrosis)
- Myopathies (myasthenia, chronic progressive ophthalmoplegia)
- **III, IV, VI -** Clinical pictures similar for children and adults, but different causes. Must be investigated if not traumatic or congenital.
- Orbital pattern strabismus
- Orbital fractures
- Craniostenosis

Left traumatic IIIrd paresis

Right traumatic VIth paresis

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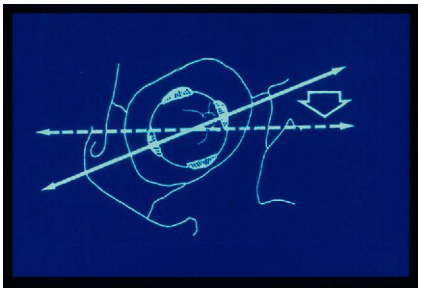

Slanted mongoloïd or antimongoloïd orbits changes the direction of muscle vector forces, leading to pattern strabismus (V in antimongoloïd, A in mongoloïd orbits)

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- **Orbital fractures**
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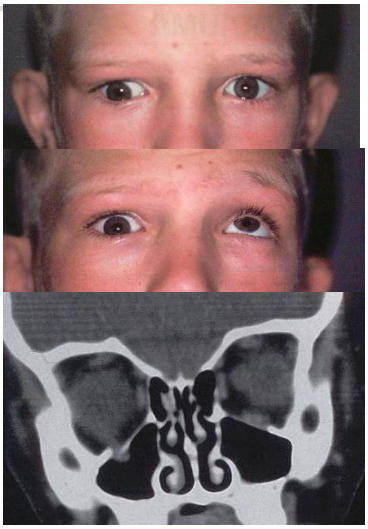

Right floor fracture leading to restricted elevation

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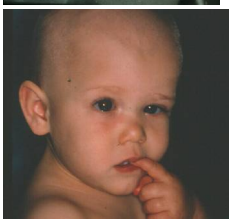
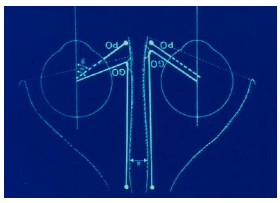
- Orbital pattern strabismus
- Orbital fractures
- **Craniostenosis**

Plagiocephaly (early fusion of coronal suture), picture similar to IVth nerve paresis





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