運動和視覺

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常見的誤解

- 精英運動員不需要視覺檢查?
- 視力20/20便足夠?
- 運動視覺訓練有用麼？

事實

- 80% 我們在體育運動中收到的信息, 來自我們的眼球
  - ❖稍微模糊的視力降低運動的表現
- 研究指出僅有少數 (25%) 的運動員接受有規律的視覺檢查和視覺訓練
- 即使在精英運動員中，40% 的視覺問題也有改進的空間
- 視覺的問題，可能會影響運動表現！

我們的視覺系統

視覺訊息處理

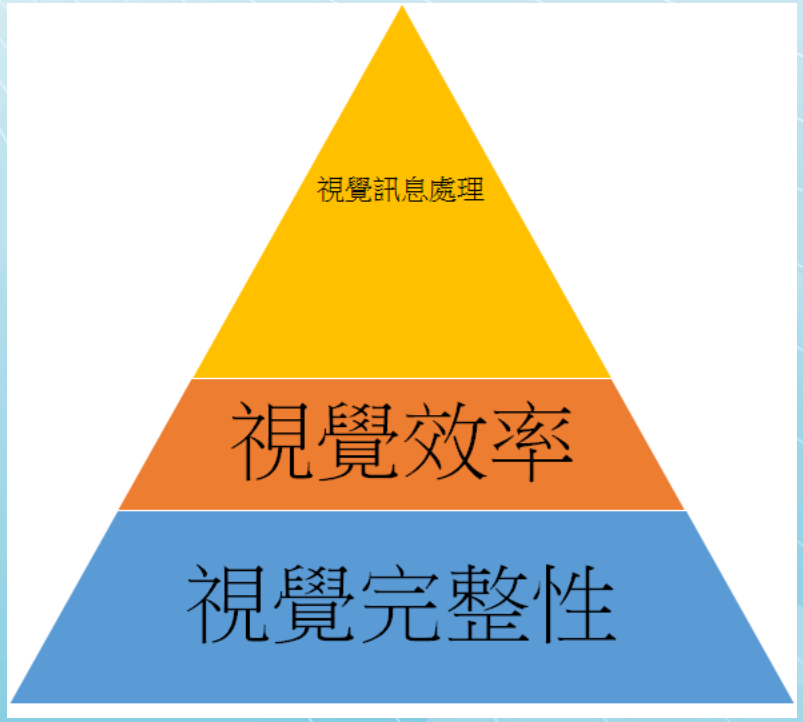
視覺空間技巧,視覺分析技巧,視覺運動功能協調技巧,速度及眼球移動和控制能力

視覺效率

雙眼視覺,調節能力,聚合能力,立體視覺,眼睛轉動能力等

視覺完整性

屈光不正及眼睛健康



常見的視覺問題

- 屈光不正
  - Ø近視, 遠視, 散光

視覺完整性

- 弱視 (懶惰眼)
- 斜視
- 雙眼協調及對焦問題

視覺效率

- 注視及眼球追蹤能力
- 視覺感知問題

視覺訊息處理

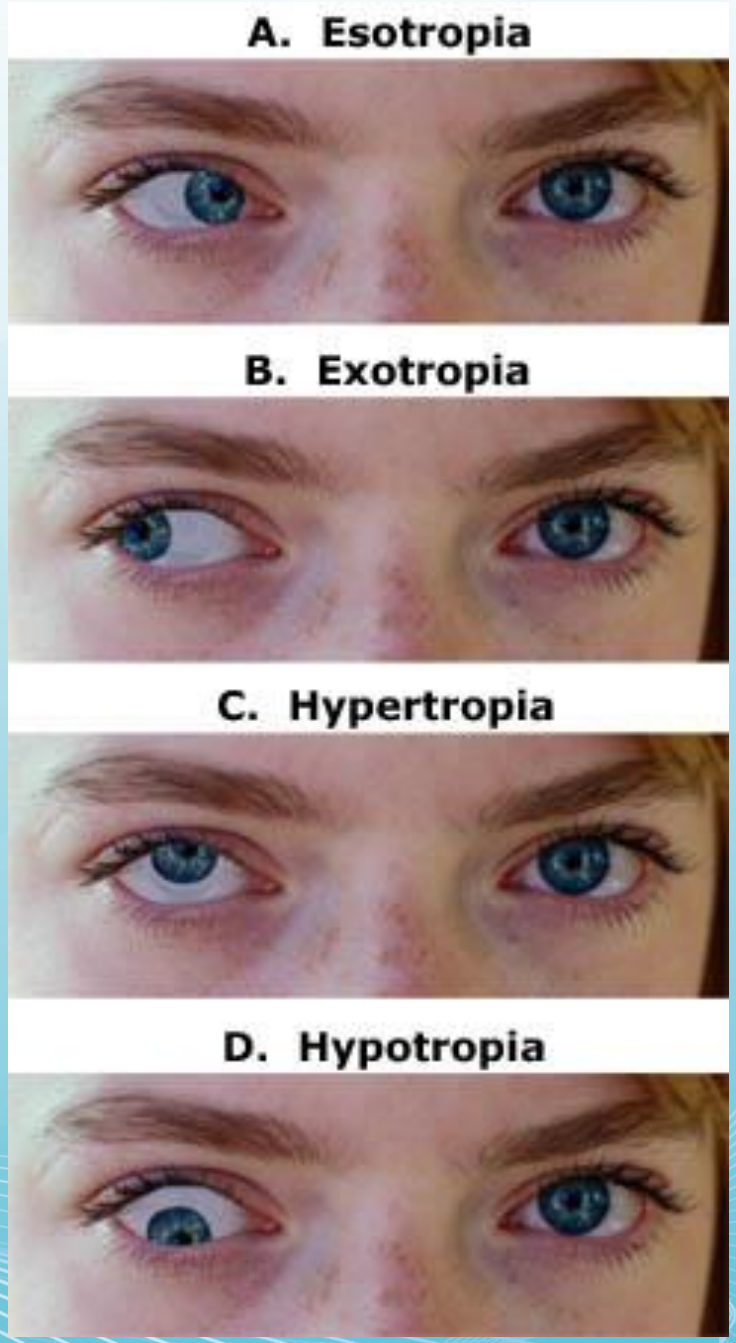
運動員常見的視覺問題

- 屈光
  - 近視
  - 遠視
  - 散光
- 雙眼協調問題
  - 斜視
  - 調節, 會聚力不足
- 視覺感知問題
- 眼睛健康問題

屈光糾正

Refractive status	Consider prescribing at
Myopia 近視	>-0.25 D
Hyperopia 遠視	>+1.00 D
Astigmatism 散光	>-0.50 D
Anisometropia	>0.50 D

斜視



斜視

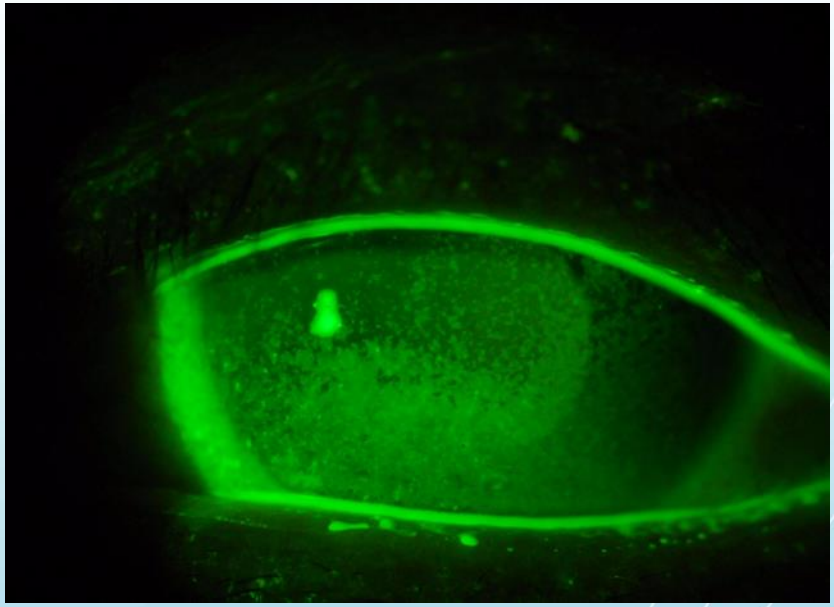
成因:

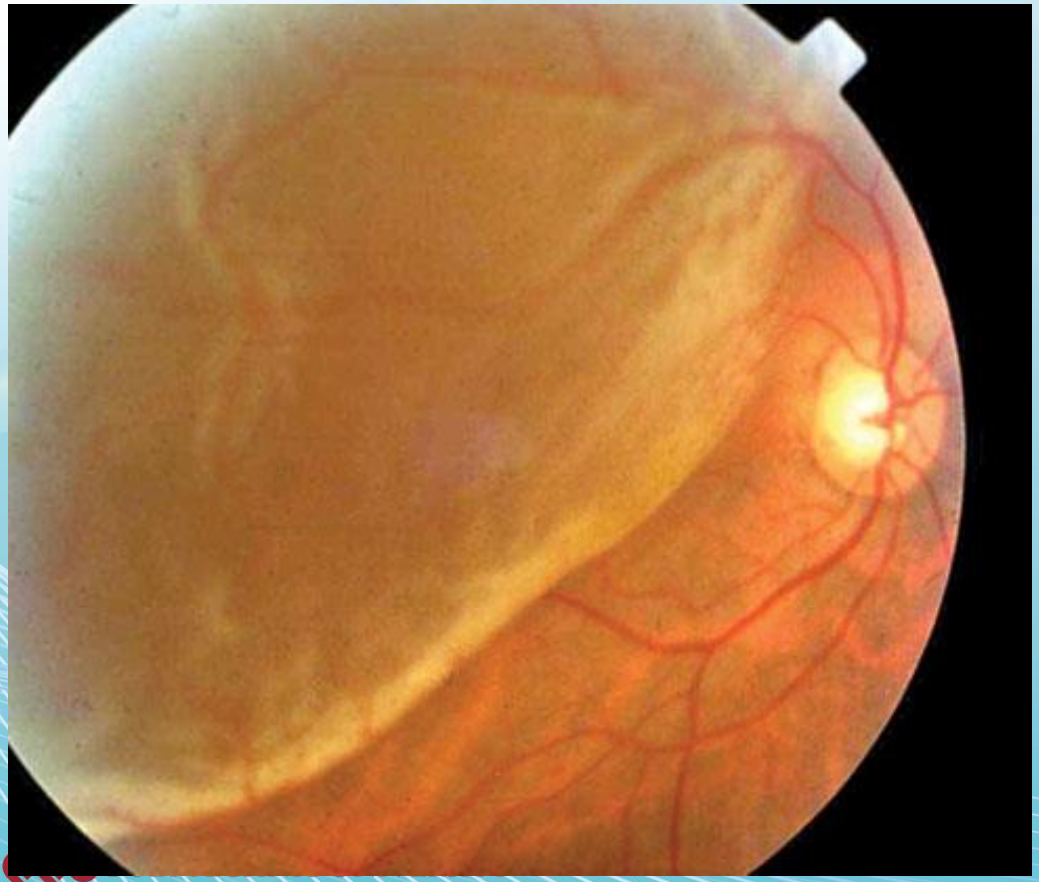
- 眼肌失調
- 患上深度數屈光不正 (如深遠視可引起內斜)
- 雙眼出現屈光差異
- 頭部創傷
- 視神經或腦神經出現問題

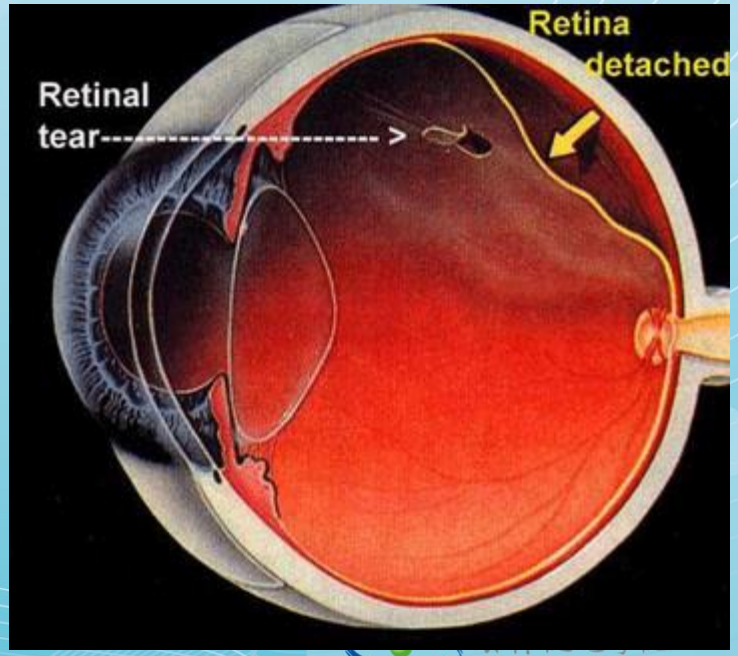
影響:

1. 立體感(因為兩隻眼睛的影像不能合二為一)
2. 視力發展/弱視
3. 手眼協調
4. 眼肌靈活度及協調性
5. 外觀或整體姿態
6. 易感疲倦，頭痛或看到重影

眼睛健康問題







視光師的角色

- 糾正視覺問題
- 加強視覺訓練
- 眼外傷的防護
- 評估及處理任何運動相關的眼部創傷及復原訓練

甚麼是運動視覺?

運動視覺服務包括：

- 全面視功能檢查，包括屈光檢查，雙眼協調能力及眼睛健康檢查
- 檢查及分析各項運動視覺功能，例如：動態視力，週邊視覺敏感度，手/腳/身體和眼睛協調能力
- 為運動員提供針對性的視覺訓練以加強運動視覺功能
- 關注運動創傷及為運動員提供眼睛保護的意見，提供適合運動的視力矯正方法，包括隱形眼鏡驗配

運動視覺功能

靜/動態視力

深度知覺

對比敏感度

眼-手協調

眼睛轉動功能

調節能力/會聚能力

視覺的感知

週邊視覺敏感度

視覺反應的速度

眼-身體協調

全面視功能檢查

- 屈光檢查: 近視, 遠視, 散光

全面視功能檢查

- 雙眼協調能力: 斜視, 眼睛協調
- 眼睛健康檢查: 白內障, 青光眼,視網膜疾病

運動視覺功能檢查

- 靜/動態視力測試
- 對比敏感度測試
- 調節能力/會聚能力測試
- 眼睛轉動功能
- 眼-手協調測試
- 眼-身體協調測試
- 週邊視覺敏感度
- 預測反應速度
- 色覺普查
- 立體感測試

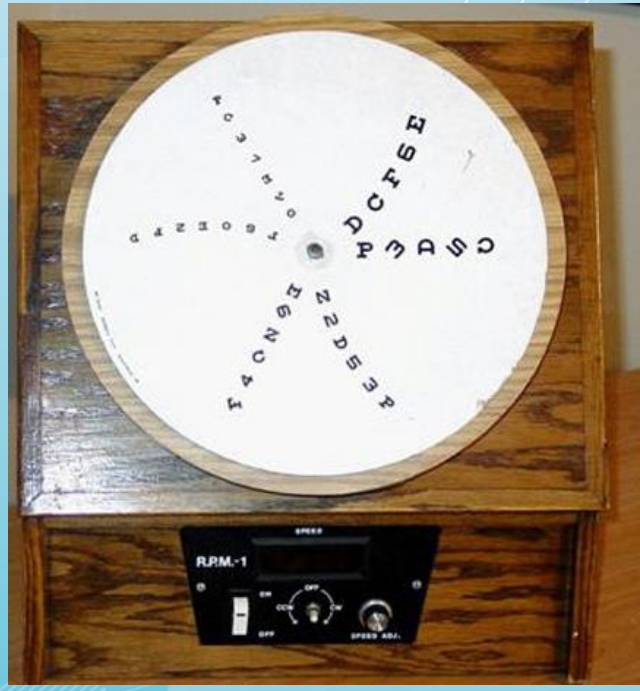
靜/動態視力測試

靜態視力測試

- 視力的需求因不同的運動而有異,但最理想是最少也有20/15 (6/4.5)

動態視力測試

- 當觀察的對象有相對運動時, 辨別細節的能力



高需要動態視力包括乒乓球，網球

中等需求包括籃球，足球

較低的需求高爾夫球

對比敏感度測試

- Vector Vision (CSV-1000HGT)

- 隱形眼鏡的配戴有機會降低對比敏感度

- 調整光度，以模擬其他強光條件測試運動員抱怨眩光

- 高爾夫球運動員觀看不同照明條件的綠色

視覺的動力

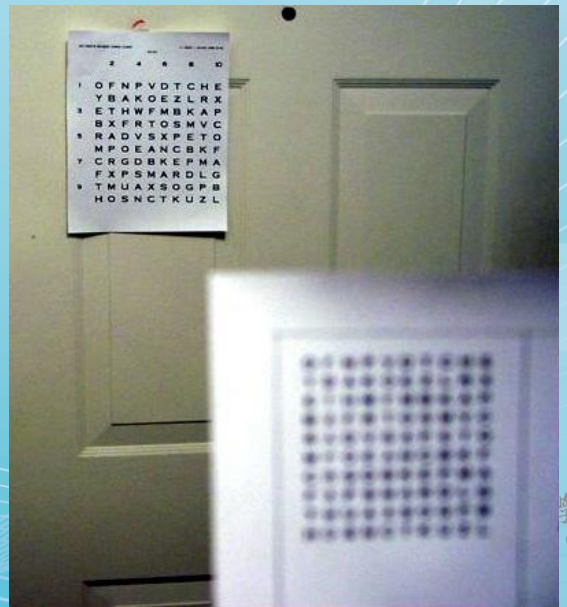
- 視覺的動力
  - 會聚能力
  - 調節能力
  - 轉動功能
- 視覺的感知
  - 視覺的記憶
  - 視覺識別
  - 視覺方向

會聚能力

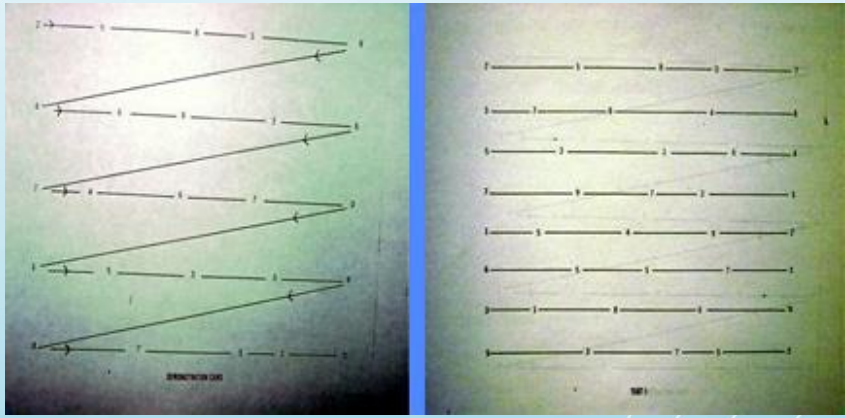
- 鬥雞眼

調節能力

- 視物的力量和靈活性，可提供更好的穩定的視覺信息-運動員必須處理過分疲勞和心理壓力
- 迅速集中和視覺判斷
- 調節的幅度
- 調節的靈巧



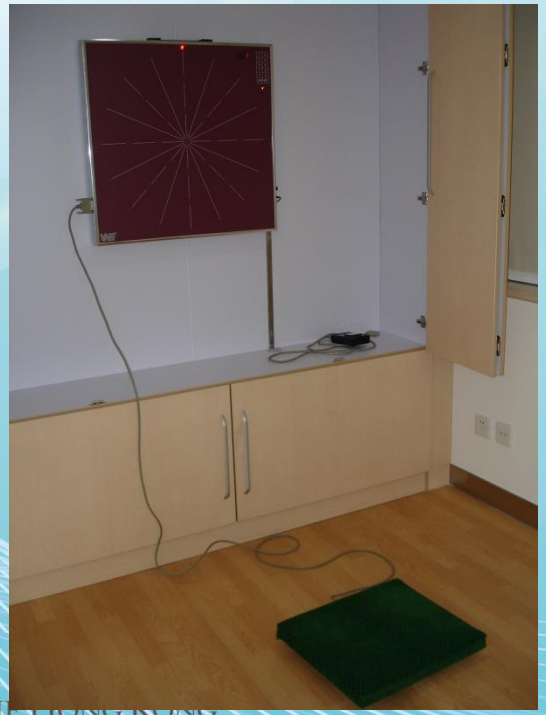
眼睛轉動功能

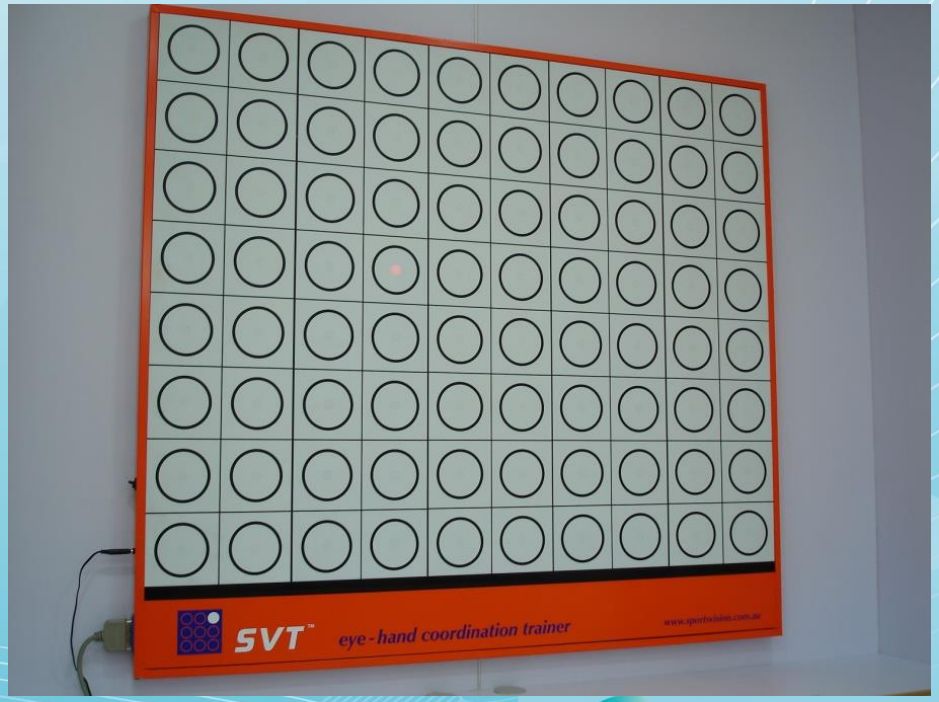


- 追視/掃視
- 穩定的注定

眼-手協調測試

對許多運動是非常重要的，例如：排球，棒球，網球，乒乓球，羽毛球



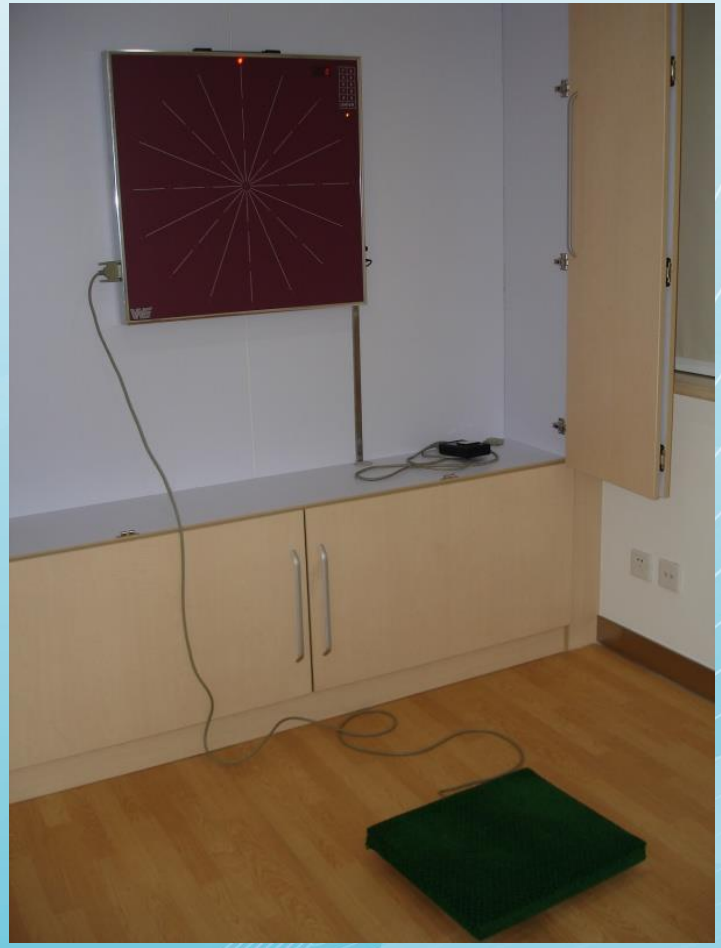


眼-手協調測試

1. Proaction:本試驗模擬運動員可控制所做的行動（例如，一個球手投擲球或網球運動員發球)
2. Reaction:這技能模擬運動員沒有控制權的行動和作出反應，只有發揮的領域（例如，在球場等待一個高飛球）

眼-身體協調測試

- Wayne Saccadic fixator with electronic balance board



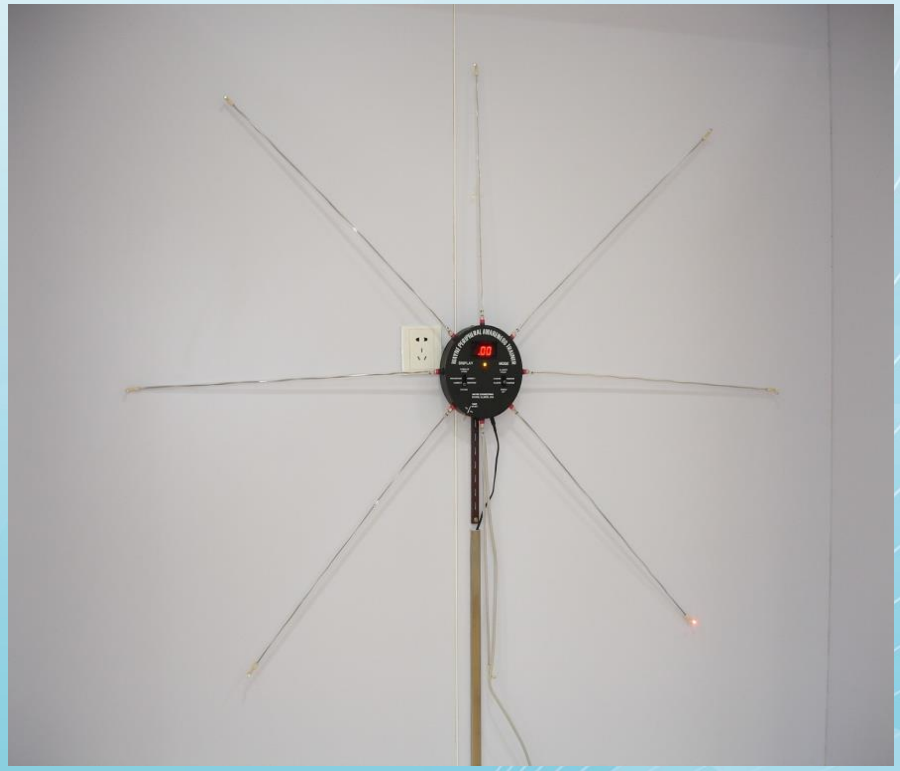
預測反應速度

- The Bassin anticipation timer
  訓練加強對視覺反應的速度和視覺集中能力

週邊視覺敏感度

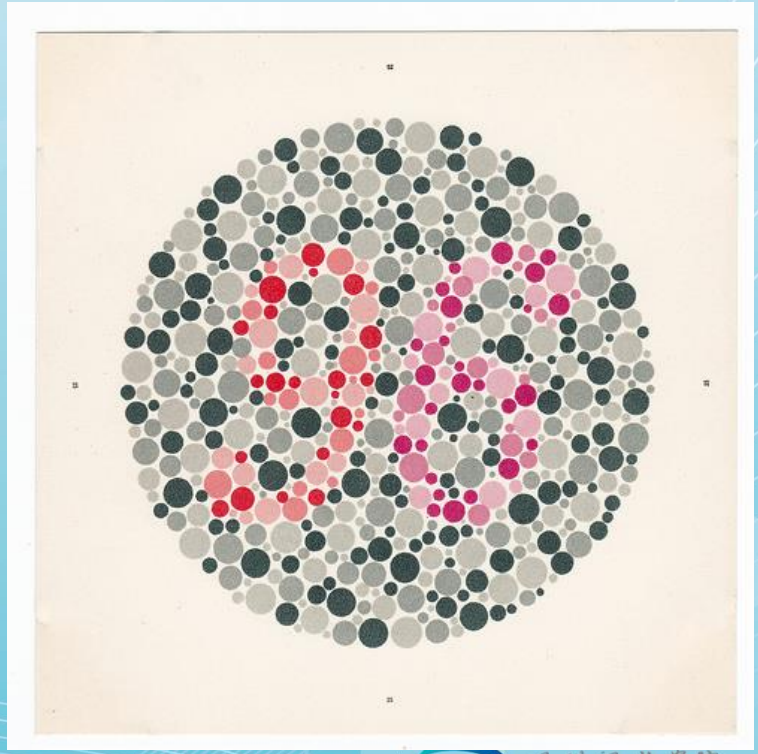
- Wayne Peripheral Awareness Trainer

  識別在他們周圍視覺的物體



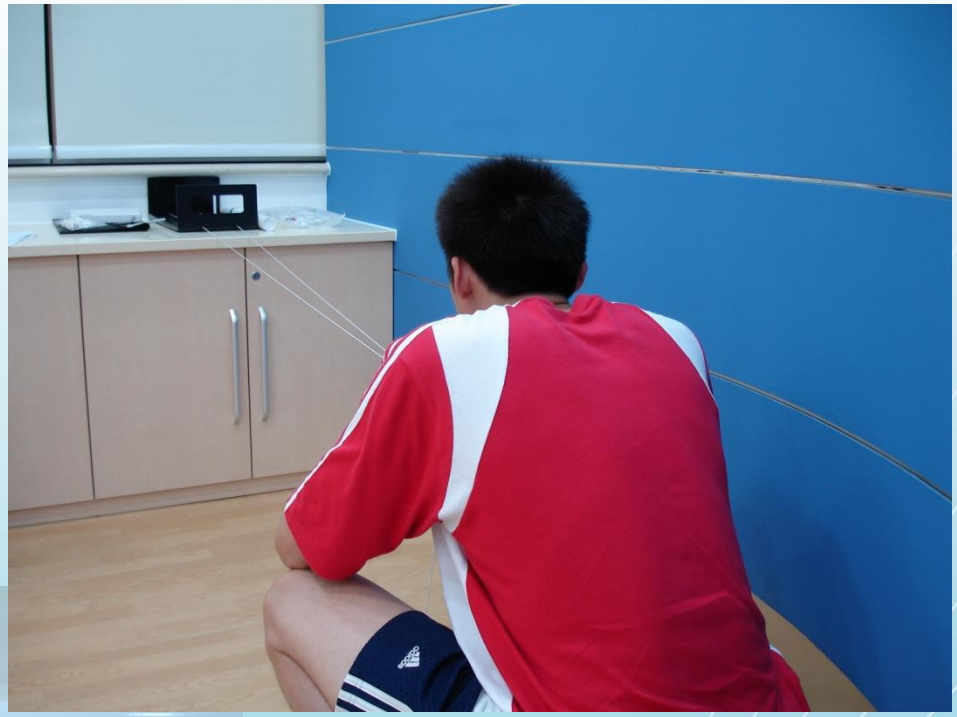
色覺普查

- Ishihara
- D15



立體感測試

深度知覺的測試



運動護目鏡

- 鏡片一般較厚,緊貼面形,主要用於游泳,賽車及高速運動,防止碎片沙塵入眼

- 防止眼部創傷和紫外線照射

Filters and Performance Sun Eyewear 彩色濾光片

Tinted Lens	Possible be preferred in Sports
Neutral Gray	Golf, Skiing
Yellow-Brown Range	Shooting, Snow sports, Tennis, Baseball, Soccer
Green - Range	Golf, Tennis, Woodland Shooting
Red-Range	Trap and Skeet Shooting, Skiing
Polarized Filters (Gray, Brown and Photochromic)	Fishing, Water Sports, Driving, Cycling

教練的角色

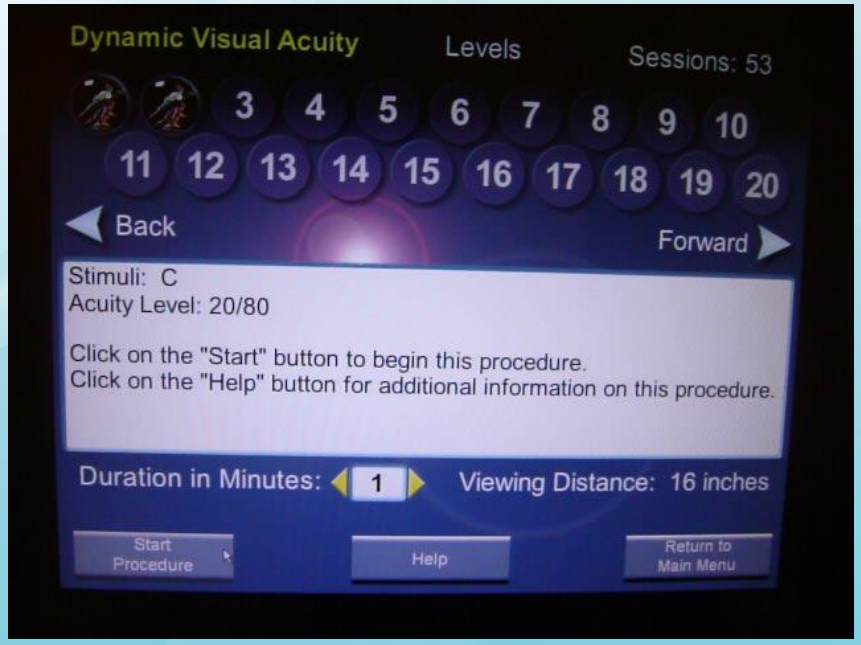
- 平常訓練的留意:
  - ❖皺眉頭看東西
  - ❖容易疲勞
  - ❖精神不夠集中
  - ❖比賽跟練習表現有很大出入
  - ❖不正常眨眼，用手揉眼睛或不正常流淚，紅腫
  - ❖側頭或單眼看東西
  - ❖有頭痛或重影現像等
  - ❖運動表現欠佳或常常絆倒

增強運動的視覺技能

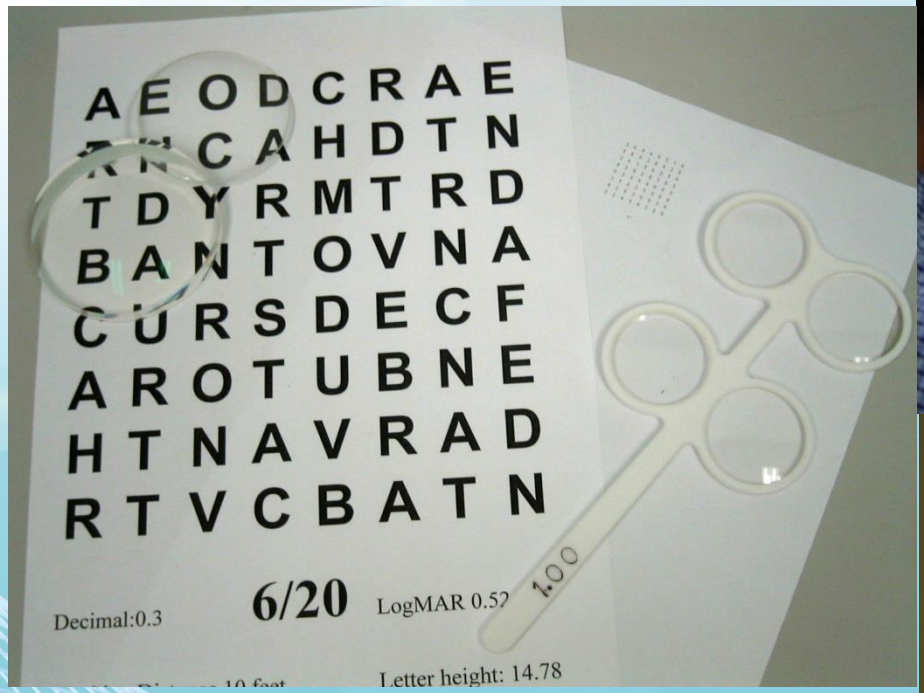
訓練目標

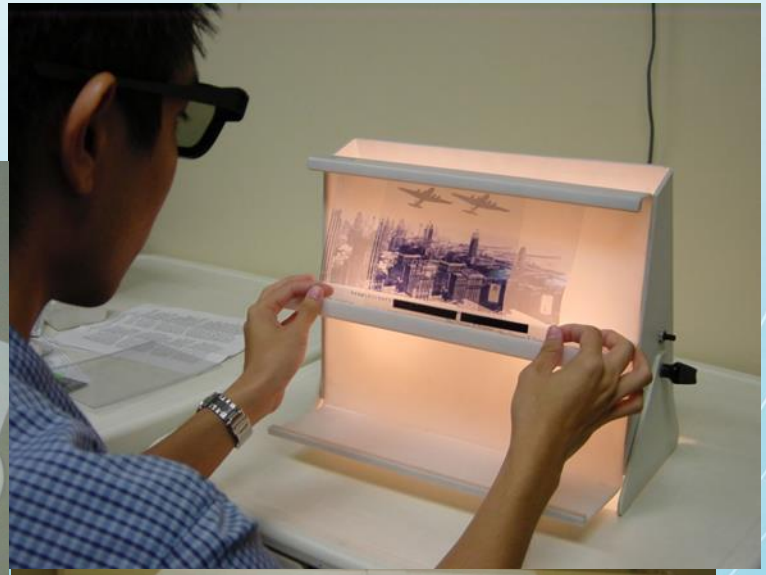
- 矯正視力的問題
- 增強視覺技能
- 增強運動視覺能力
- 增強視覺認知功能

視力

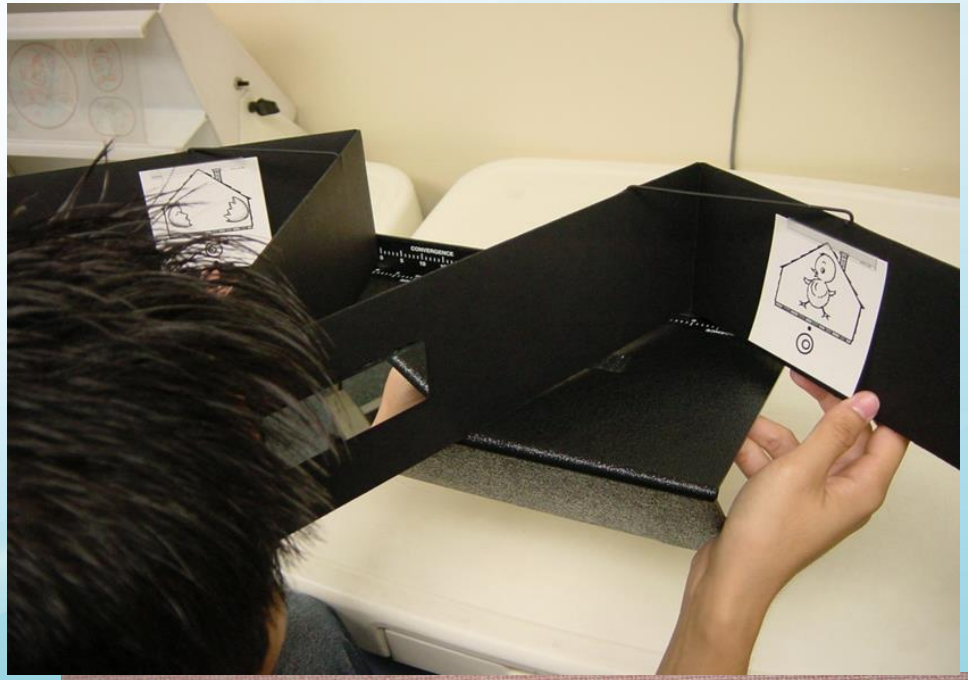

Dynamic Visual Acuity
Levels
Sessions: 53
3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20
Back
Forward
Stimuli: C
Acuity Level: 20/80
Click on the "Start" button to begin this procedure.
Click on the "Help" button for additional information on this procedure.
Duration in Minutes: 1
Viewing Distance: 16 inches
Start Procedure
Help
Return to Main Menu

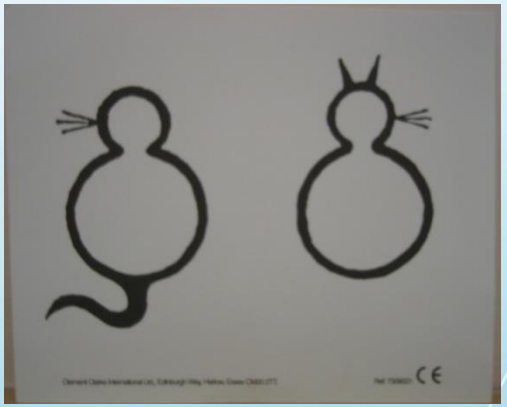
調節能力/會聚能力

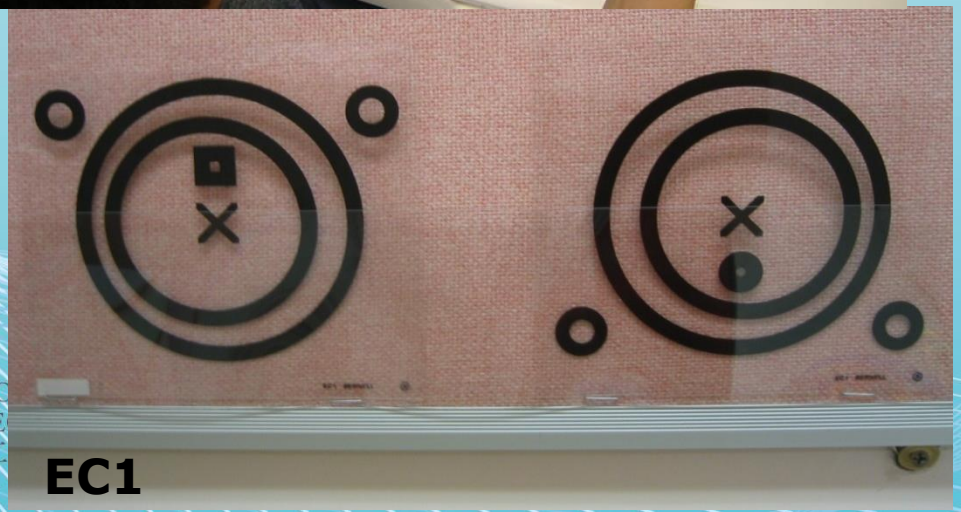

A E O D C R A E
C A H D T N
T D Y R M T R D
B A N T O V N A
C U R S D E C F
A R O T U B N E
H T N A V R A D
R T V C B A T N
Decimal:0.3
6/20
LogMAR 0.52
100
Letter height: 14.78



調節能力/會聚能力

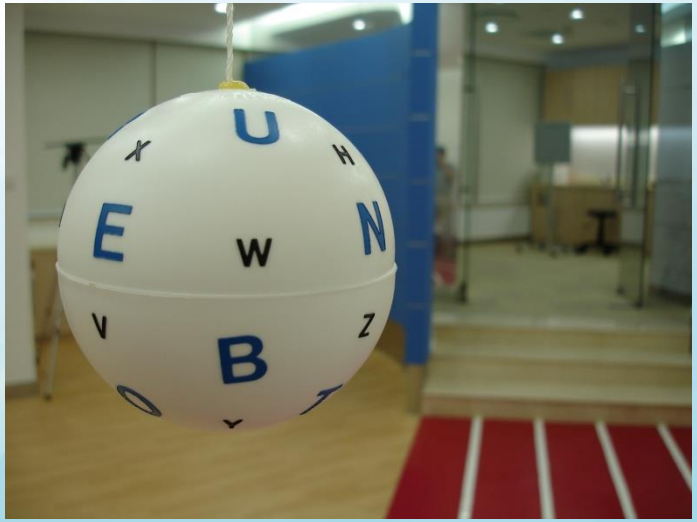


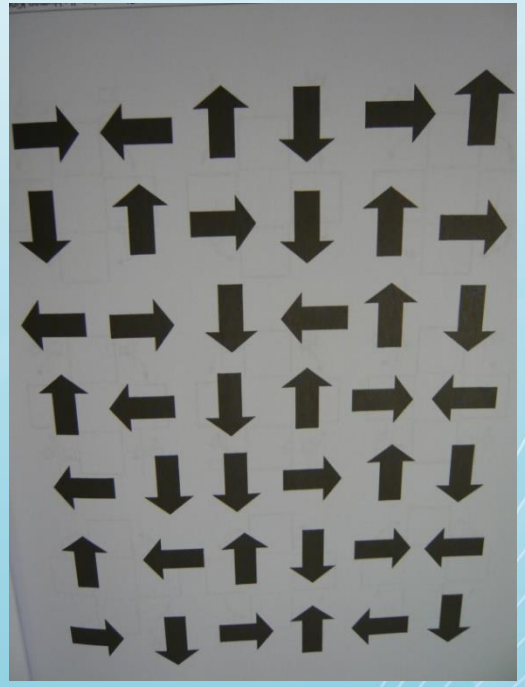




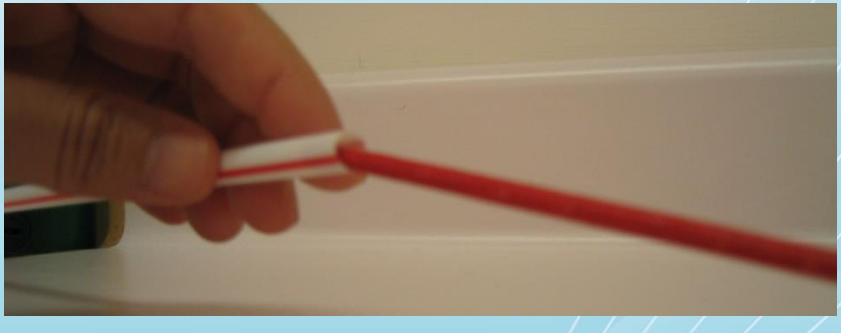
EC1

眼睛轉動功能



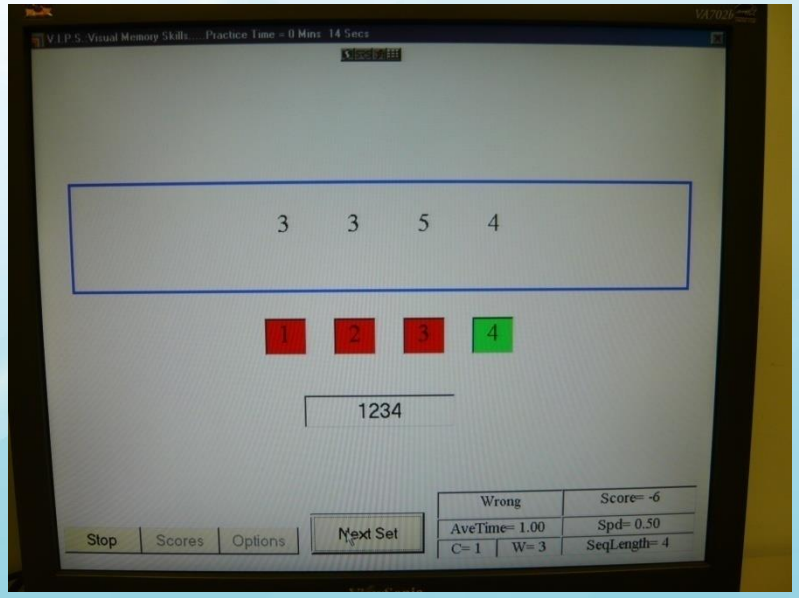


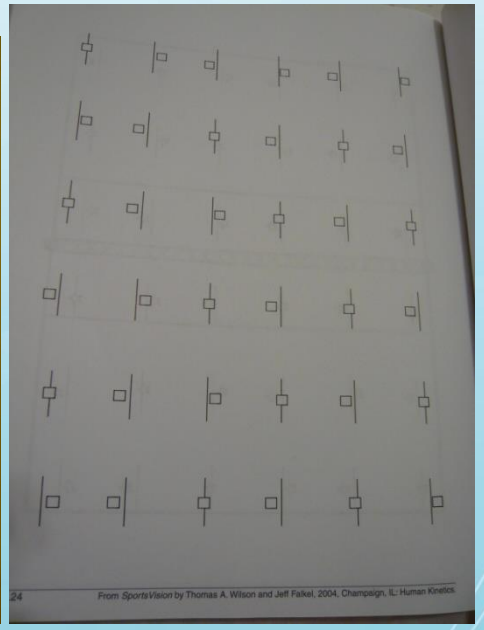
眼-手協調測試



眼-身體協調

視覺的感知


V.I.P.S. Visual Memory Skills.....Practice Time = 0 Mins 14 Secs
3 3 5 4
1 2 3 4
1234
Stop
Scores
Options
Next Set
Wrong
Score= -6
AveTime= 1.00
Spd= 0.50
C= 1
W= 3
SeqLength= 4


From SportsVision by Thomas A. Wilson and Jeff Falkel, 2004, Champaign, IL: Human Kinetics.

Lightboard-type Technologies

Senaptec Sensory Station

Sanet Vision Integrator

Dynavision

Senaptec Strobe Training Goggles

案例分享

Case 1: Simple myopia

History:

Gymnastic coach suspected one teammate has visual problem

Findings:

UVA OD: 6/60-

OS: 6/60-

Binocular vision: Poor due to poor vision

OH: Unremarkable

Management:

CL prescribed

Awards Gained:

4 Gold medals in Olympic game

Case 2: Cases on depth perception

Background :

- Four athletes without history of optical correction
- All have different unaided visual acuity (VA) between 2 eyes due to refractive errors
- Normal ocular health and best corrected VA ≥1.0 each eye
- Depth perception was measured with Howard-Dolman Apparatus at 3m in unaided and aided conditions (corrected with spectacle lenses in trial frame) using method of adjustment

Figure 1. Clinical setting of the Howard-Dolmann apparatus

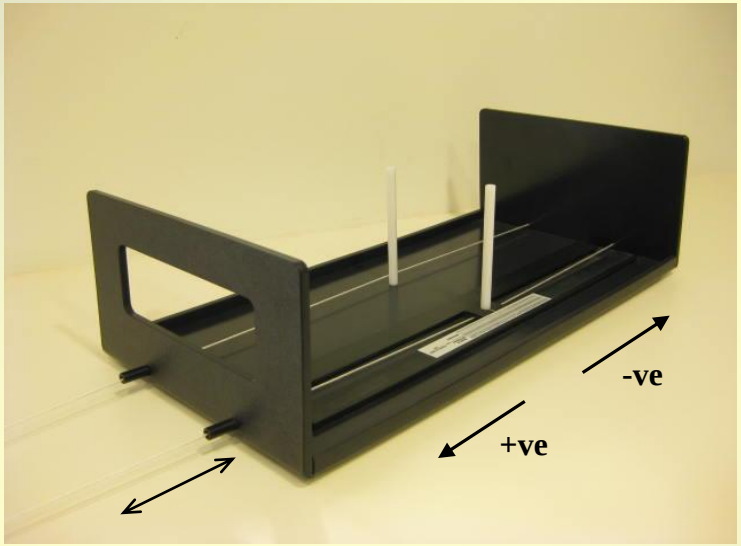


Figure 2. Alignment of the rods in Howard-Dolmann apparatus

Howard-Dolmann Apparatus

It consists a fixed rod and a moveable rod. The athlete aligns the two rods by pulling the strings attached to them at 3 meters (Figure 1).
Stereoacuity is either expressed in mm or seconds of arc.
Positive disparity is recorded when the moveable rod is nearer to the athlete in relative to the reference rod.

Summary of visual function

	Case 1	Case 2	Case 3
Age/Sex	20/M	29/F	26/F
Team	Diving	Softball	Basketball
Unaided VA	OD: 0.9+ OS: 0.6+	OD: 0.5- OS: 0.7+	OD: <0.1 OS: 1.0
Rx	OD: pl/-0.25 x 005 OS: +0.50/-1.00 x 175	OD: -0.75/-1.25 x 165 OS: +0.25/-1.25 x 175	OD: -3.25/-0.50 x 030 OS: pl
Average depth Perception (sec of arc) (Repeated measures)	Unaided: +8.8 **Aided: *-73.49***	Unaided: -2.93 **Aided: *-67.61***	Unaided: +12 **Aided: *+24***

Discussion:

- Most sports require good depth perception
- Uncorrected refractive errors, especially anisometropia, would adversely affect the depth perception performance (Graham Erickson,2007 ; Wood IC, 1983)
- Optometrist: maximize athletes' vision
- An *immediate* deterioration of depth perception performance with a balanced visual acuity after refractive correction
- Some visual compensation maybe developed in their everyday training or lives
- Refractive correction may break down the perceived visual compensation

Conclusion:

- Refractive correction allows the athletes playing with best vision
- whereas it may affect some visual skills which have been well established before our visual intervention
- Cautions should be taken when managing the refractive correction for athletes, preferably during off-season or in a step-by-step basis

Suggestion for improvement:

- Repeat the measurement 1 week after visual correction
- Head movement, pd and viewing time need to take into account
- Subjects may have different far points with respect to their refractive errors
- The test is measuring the offset from alignment instead of stereoacuity (Larson WL 1985)
- The task is discrimination rather than detection of the depth difference (MKH Yap 1996)
- Different results can be derived from method of adjustment, thus not reliable

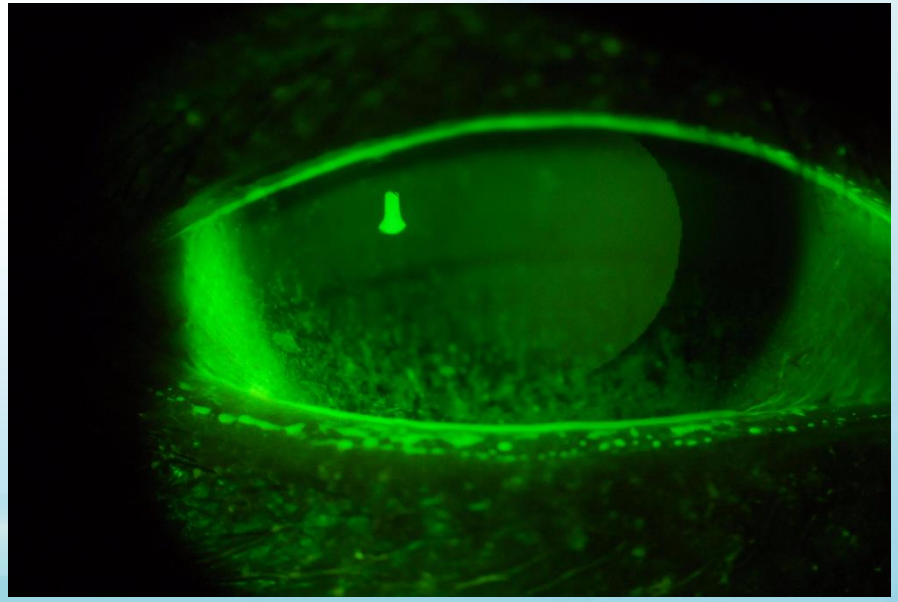
Case 3: Contact Lenses Induced -Cornea Staining

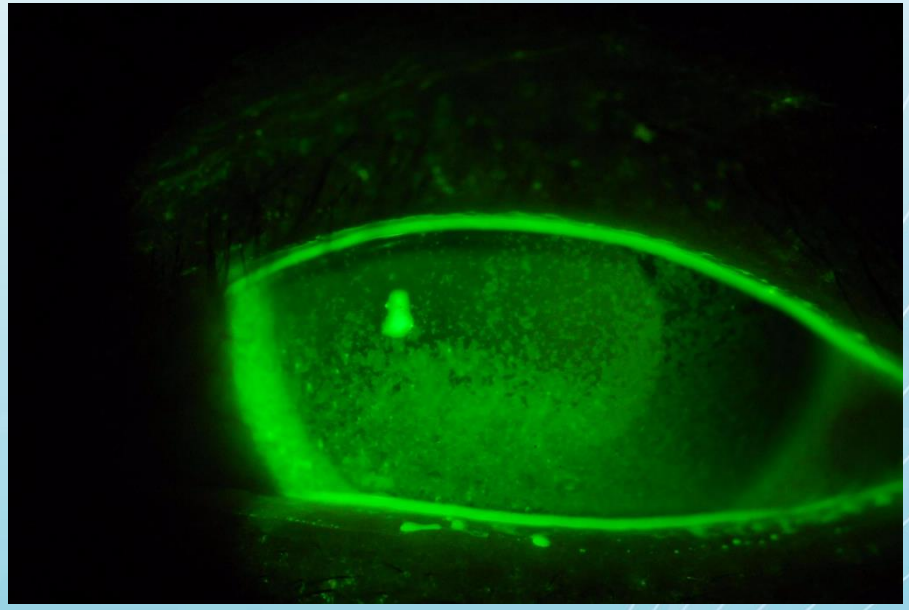
Background :

- One athletes with history of CL wearing
- Complain about blurry vision recently, esp. during training at afternoon

- Clinical finding
  - ❖Aided VA: 6/9.5 OD
    6/12 OS

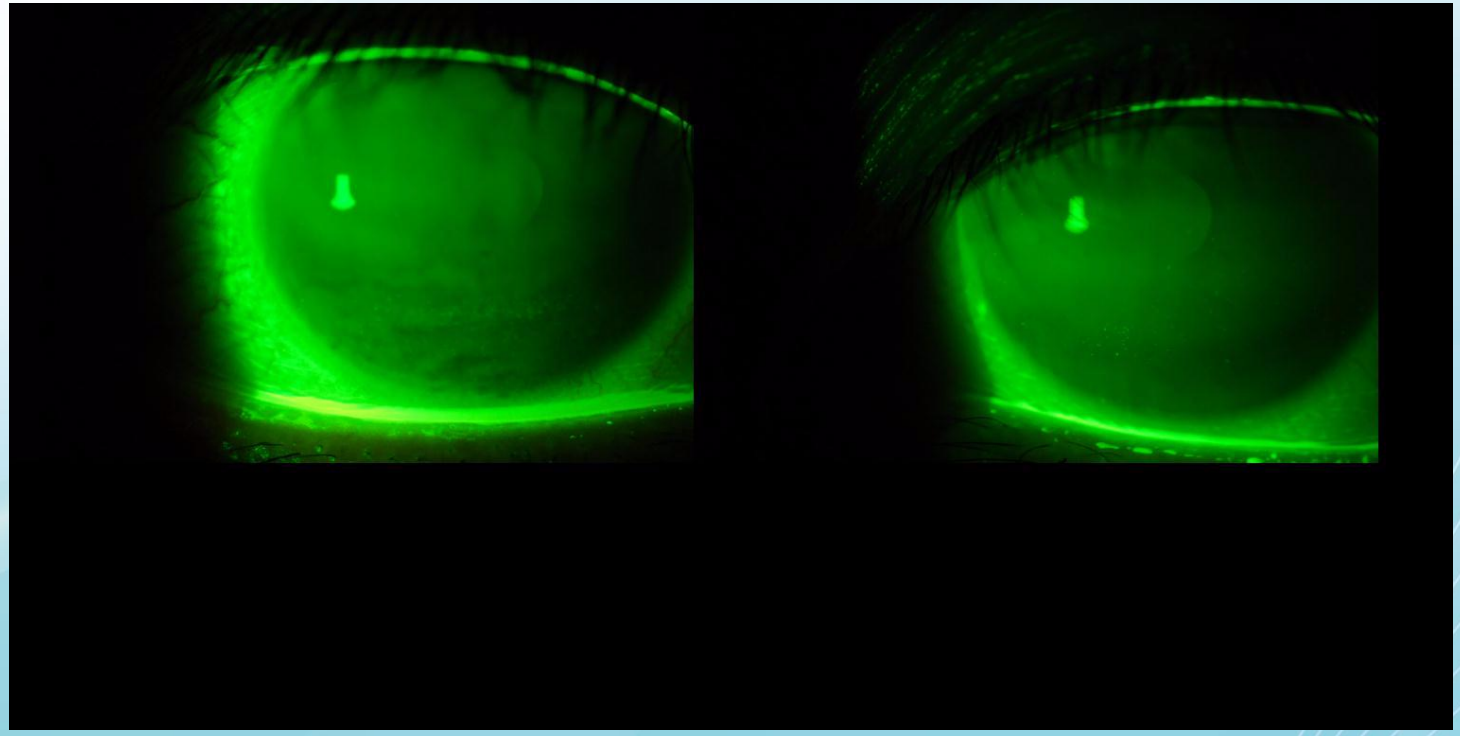
Serious corneal staining OS>OD





Management

- Remove CL during nap
- Artificial tear during CL wearing



Case 4: Visual Training for Hammer Athlete

Background :

- One athletes with good vision, ocular health
- Coach complained about has difficult in releasing the hammer accurately

- Findings
  - ❖Fair coincidence-anticipation skills

Training

Date	Training items
Week 1	Eye-hand/body coordination
Week 2	Anticipation skills
Week 3	Peripheral awareness training
Week 4	Eye-hand/body coordination
Week 5	Peripheral awareness

Self Report Result

- Both coach and athletes reported better performance during training

結論

- 視覺在運動表現中充當著重要的角色
- 即使是精英運動員也需要定期進行眼睛檢查
- 適當的視力矯正有助於運動員在運動比賽有最好的表現
- 有指定的視覺訓練時間表
- 需要不同專家的合作
- 教練的支持

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