

SPORTS VISION

○ **MORE THAN JUST 20/20 AND
CONTACT LENSES**

NZAO CONFERENCE 2017

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OPTOMETRISTS

Vision Coach



Sports Vision



- Background
 - Passion for sports – played high level netball, rowing, cricket, tennis
 - Enjoy watching all sports and now coaching netball
 - Combine work and passion

Sports Vision



- Sports more dynamic than normal routine eye examination (VDU biggest demand)
- More than just contact lenses & tints
- Have to deal at times with high speed objects or take in lots of peripheral detail
- Need to be quick to make decisions

Sports Vision Tints



- Amber – blocks blue light to enhance CS & VA (baseball, cricket, water sports, skiing)
- Green – mildly heightens CS but preserves colour balance – great in bright outdoor light
- Blue – brightens yellow (tennis, daytime baseball/cricket)
- Grey/green – best for golf
- Yellow – best in hazy low light conditions or under fluro lights

Sports Vision



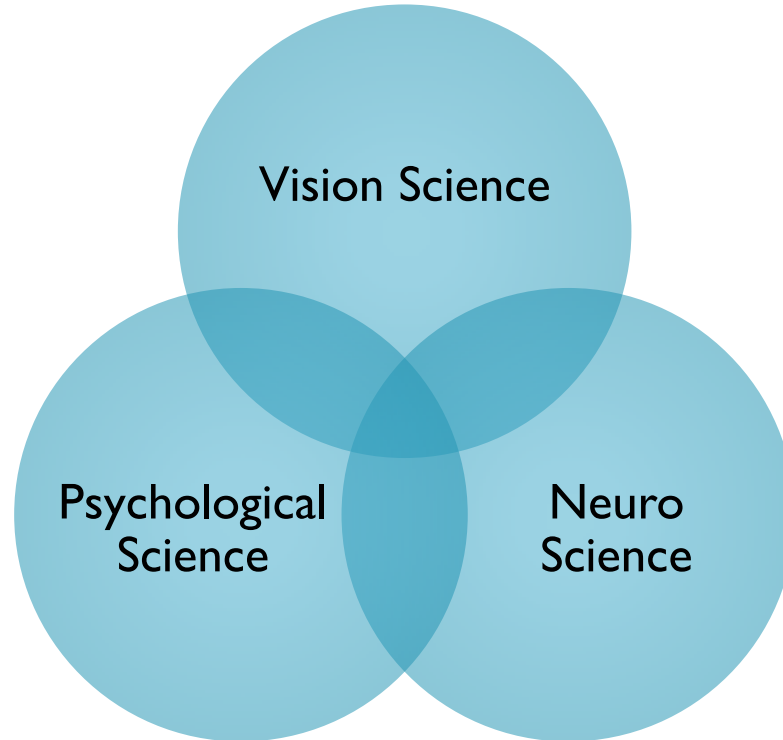
- Why?
 - Professional sports always trying to get the extra performance edge
 - Gym, mental skills, pilates/yoga
 - 70-80% brain activity generated by vision
 - Processing
 - Reacting
 - Accuracy

Sports Vision



- Purpose?
 - Accurate target location
 - Binocularity
 - Central peripheral awareness
 - Increased reaction speed
 - Eye-Hand co-ordination
 - Eye control
 - Quiet Eye

Sports & Performance Vision



Sports Vision



- Vision Science
 - The Visual System
 - Tear-air interface
 - Cornea
 - Lens
 - Retina
 - Optic Nerve & Chiasm
 - Optic Radiations
 - Lateral Geniculate Nucleus (LGN)
 - Visual Cortex

Sports Vision



- Neuro Science
 - The Neurology of Vision
 - Frontal Lobe directs eye movements
 - Superior colliculus – gaze shifts
 - Superior temporal sulcus – motion
 - Fusiform Gyrus/Supplemental Motor Area: Go/No-Go Decisions
 - Parietal Lobe – Dorsal visual stream
 - Temporal lobe – Ventral visual stream

Sports Vision



- Psychological Science
 - Psychological Aspects of Visual Function
 - Visually based decisions
 - Effect of previous experience
 - Effect of expectations
 - Expert athletes are 35% faster and 31% more accurate in decision making than non-athletes (meta analysis, Mann et al 2007)

Sports Vision



- ‘Prediction’
 - Vision, along with other senses, provides information to the CNS to allow a predictions of what is coming next
 - Time is the only dimension we cannot control
 - Prediction is our best effort at controlling the time variable
 - Any disorder that effects our visual ability will make it more difficult to predict an event in the time domain

Sports Vision



- A cricket batsman must predict where the ball will bounce – for successful batting
- A golfer must predict where the ball will roll as it approaches the hole
- A rugby player must predict the flight of the kicked ball - for successful catching

Sports Vision



- Important to understand the sport and the visual skills needed
 - Not all sports are created equal

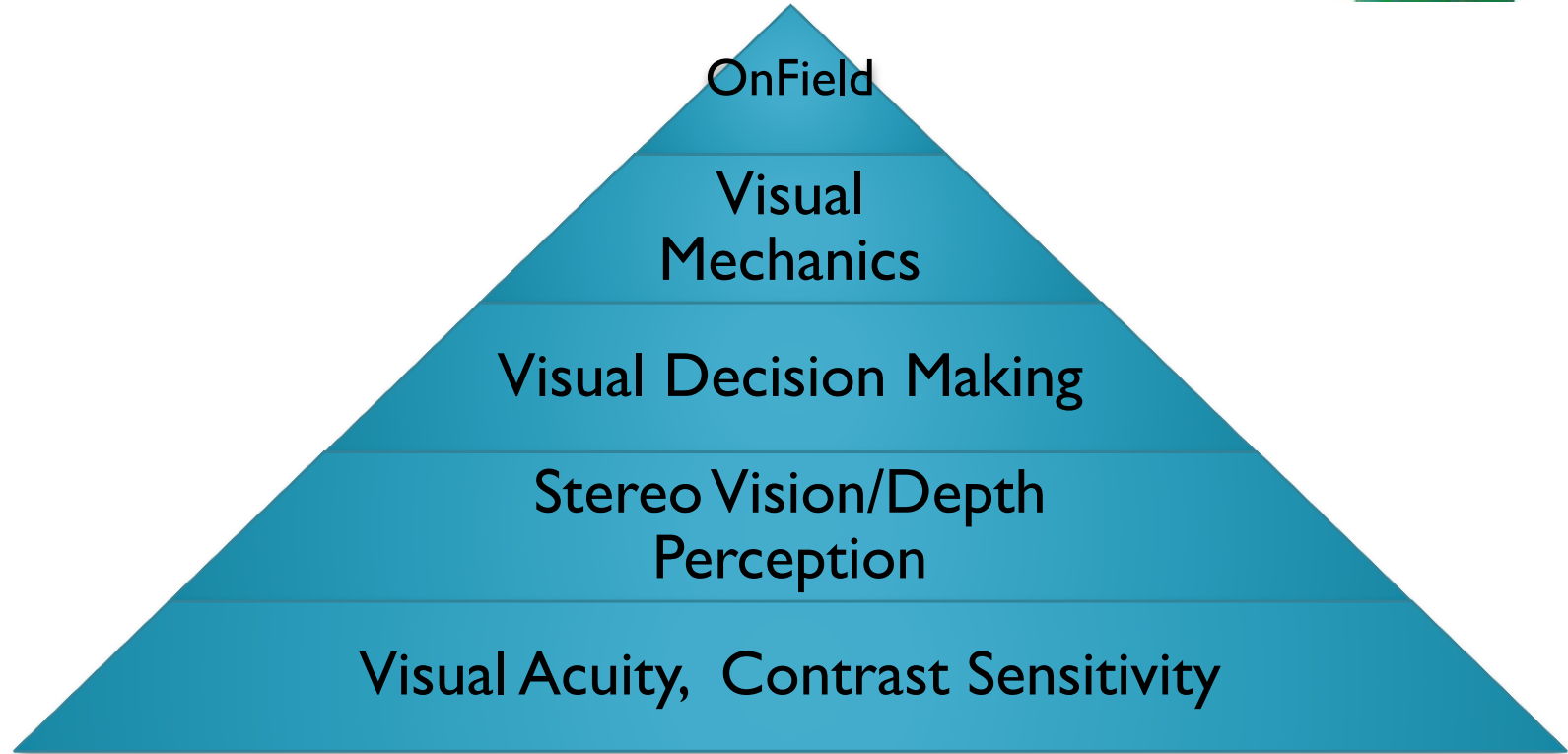
Golf – smooth eye movements

Netball – full peripheral vision

Cricket – high speed small detail

Rugby – up gaze high ball & accurate goal location

Sports Vision



Sports Vision



- Assessment

- BCVA – good refraction and prescription
- Dynamic VA – moving head
- Binocular Assessment – incl. different positions of gaze
- Contrast Sensitivity
- Eye Movements
 - Accurate?



Sports Vision



- Visual Mechanics and Decision Making testing
 - Spatial Perception (Space Board & Brock String)
 - Hand Eye Co-ordination
 - Quiet Eye
 - Visual Memory

Sports Vision

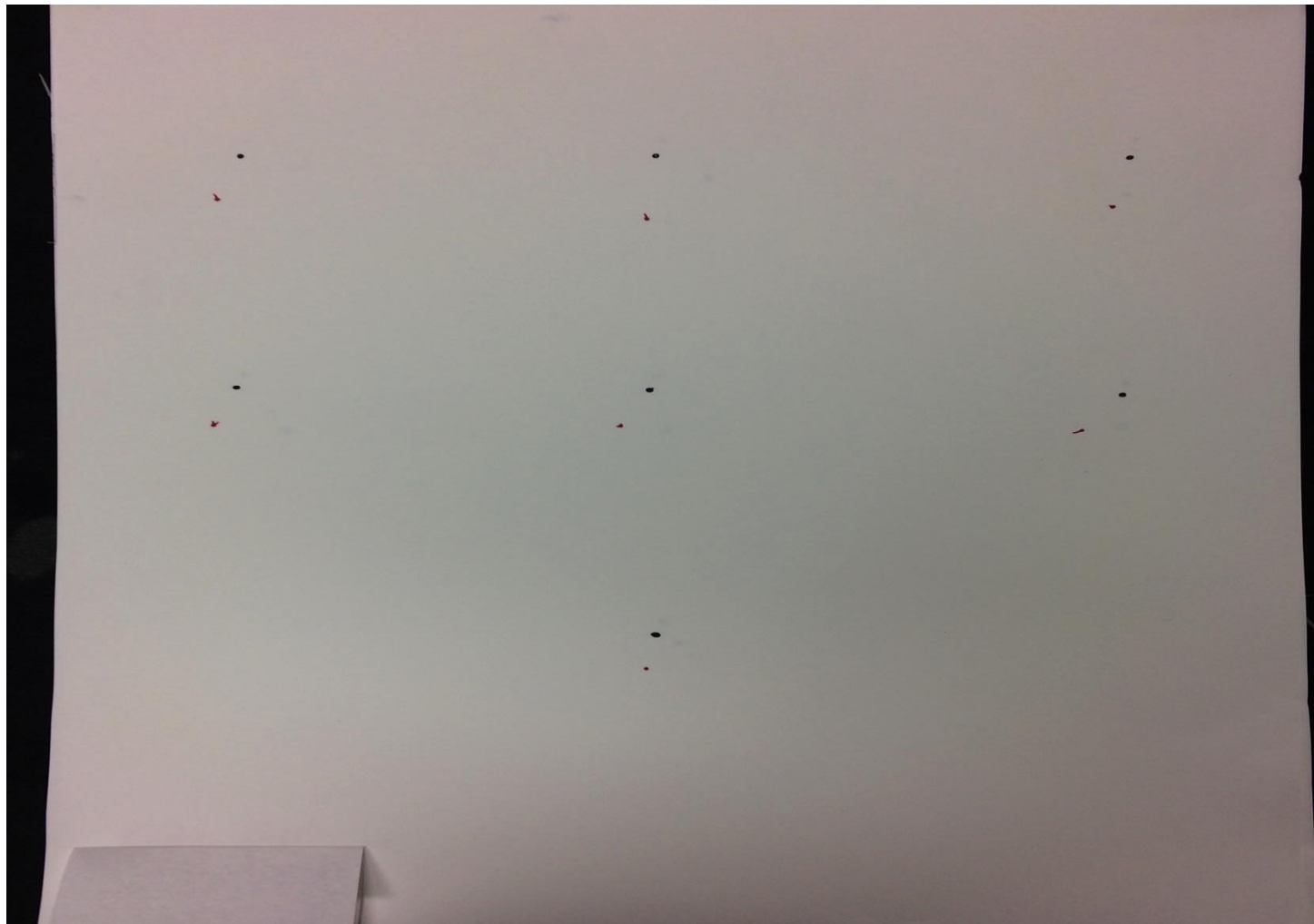


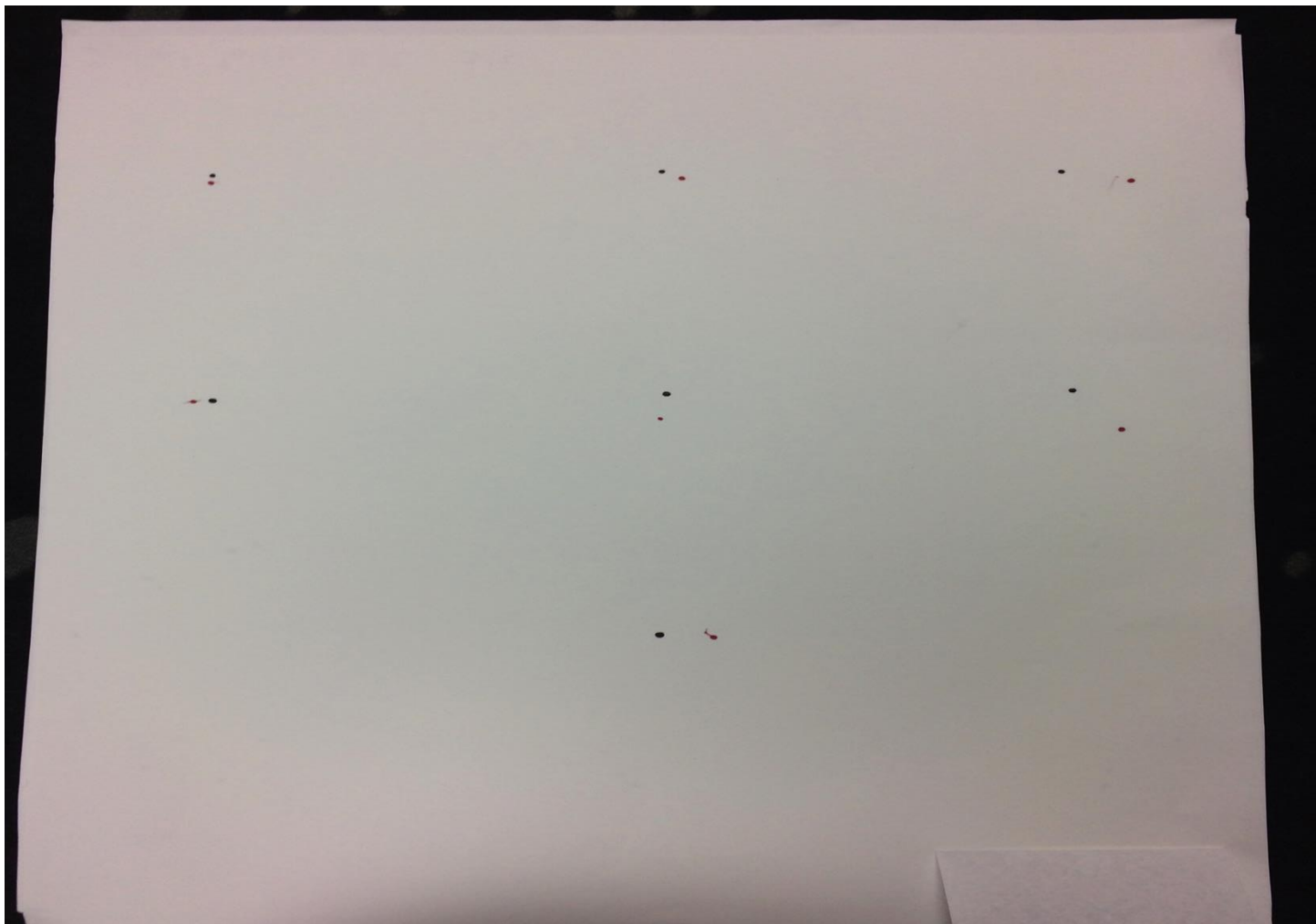
- Space Board
 - Similar results to Brock String but without any other clues to guide fixation
 - Often backs up an under or over focus



anGrimmer
OMETRISTS









Sports Vision



- Brock String
 - Primary Gaze
 - Different positions of gaze
 - Postures used during sport

cClellanGrimmer
OPTOMETRISTS



Sports Vision



- Vision Builder
 - Measures Hand-Eye Co-ordination
 - Saccades
 - Peripheral Vision
 - Measures Visual Memory
 - Visual Memory
 - Tachistoscope

Sports Vision



- Quiet Eye
 - Joan Vickers University of Calgary
 - Period of time just before and just after a visually based event
 - Position of ocular fixation during period of time most critical to task
 - Video of Cristiano Ronaldo if time at end

Sports Vision

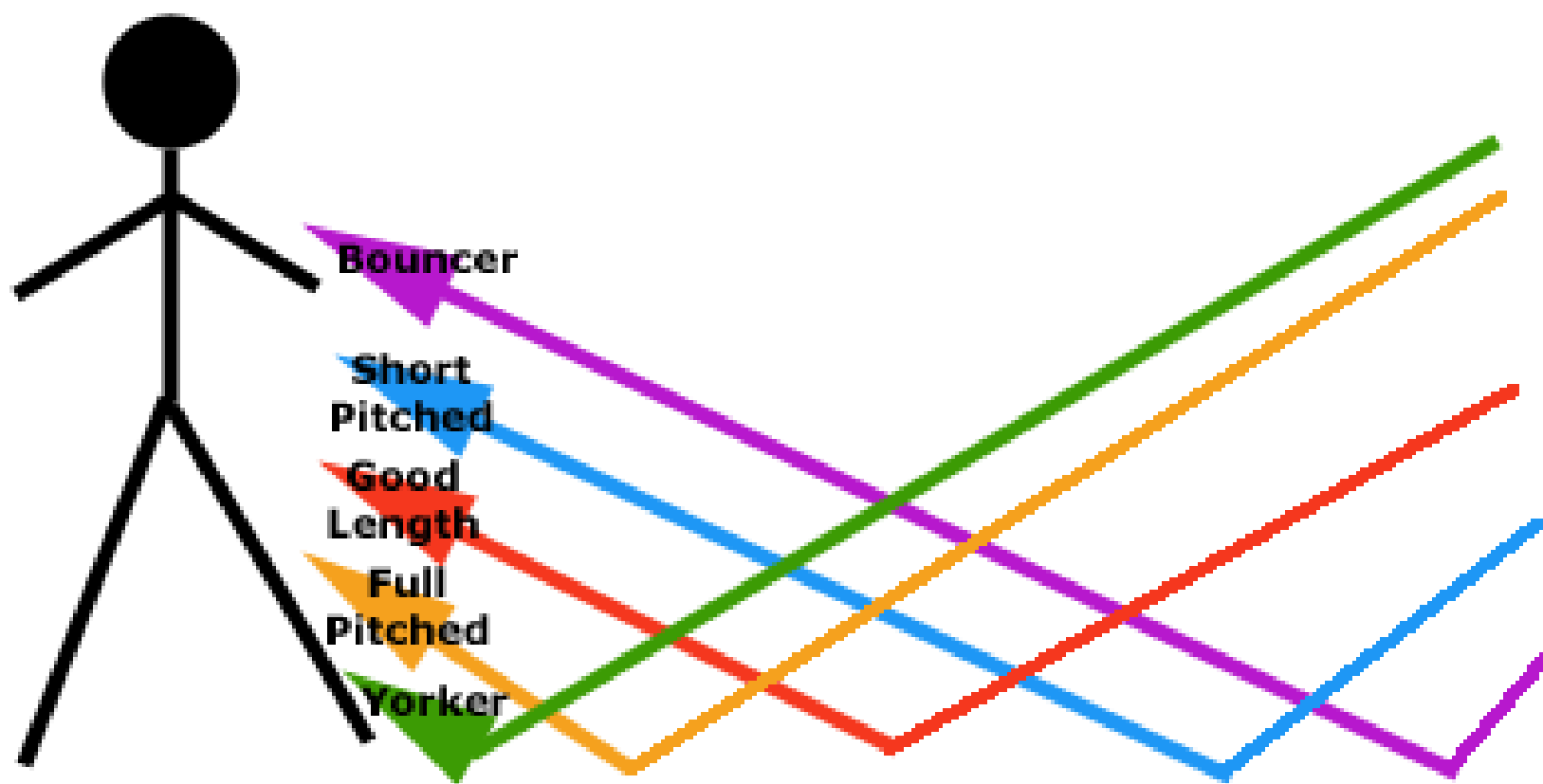


- Cricketers – told to watch the ball...but how?
 - As the speed of ball being delivered is quicker it is impossible to track the ball the whole way onto the bat

Sports Vision



- Shoaib Akhtar
 - England vs Pakistan 2003 WC South Africa
 - 161.3km/hr
- Wicket to wicket 20.12m
 - Bowler release at crease - batter in opposite crease (122cm each) ~17.68m from ball release to bat
 - Saccadic movement 900°/s or 0.68 km/h
 - Reaction time less than half a second
 - Need to establish quickly where ball will land



Sports Vision



- Prediction
 - Looking - 100ms for sight of target to be sent to brain
 - Thinking – 75ms for brain to process info
 - Deciding – 25ms to decide to hit, further 25ms to pick a swing pattern
 - Acting – 15ms for signals to get to body to start swing action
 - Leaves ~200ms to see the target and swing the bat

Sports Vision Training



- Purpose?
 - Speed up reaction and processing time
 - Encourage accurate prediction
 - Take in more information
 - Develop visual strategies
 - Work on spatial awareness
 - Where you are in space
 - Where target is in space

Sports Vision Training



- Eye Control
 - Perfect full range of eye movements
 - Tracking
 - Peripheral target location with accuracy
 - Movement of head and not eyes

Sports Vision Training



- Hard/Soft Focus
- Hart chart
 - Switch between Hard & Soft
 - How does it feel on eyes?
 - How does it feel on body?

O F N P V D T C H E
Y B A K O E Z L R X
E T H W F M B K A P
B X F R T O S M V C
R A D V S X P E T O
M P O E A N C B K F
C R G D B K E P M A
F X P S M A R D L G
T M U A X S O G P B

Sports Vision Training



- Central Peripheral Awareness



Sports Vision Training

- Strobe training – prediction



Sports Vision Training



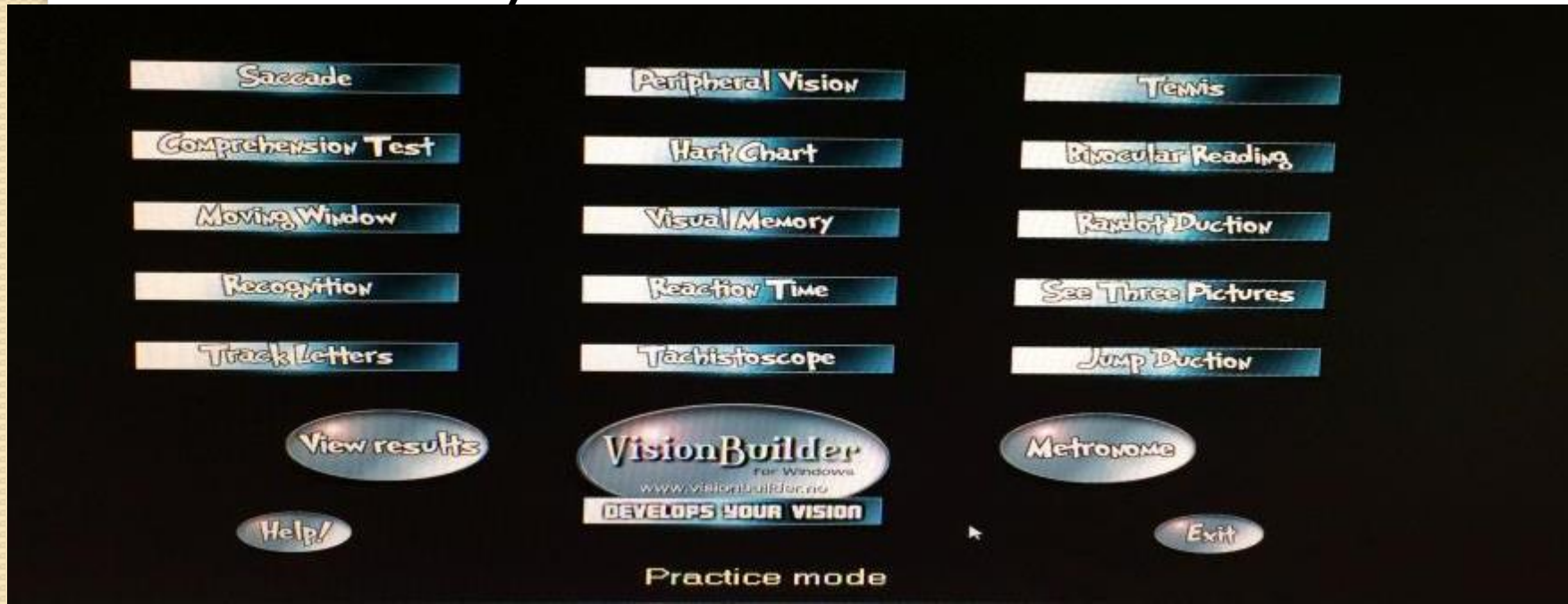
- Ninja Training



Sports Vision Training



- Eye-Hand Co-ordination, Visual Memory & Binocularity



Sports Vision Training



- Walking rail



Sports Vision Training



Sports Vision Training



Sports Vision Training



Sports Vision Training



Sports Vision Training



- Training plan varies dependent on PX's visual deficiencies and individual sporting requirements
 - Spend more time on estimating distances with netball players and umpires
 - Spend more time on eye-hand co-ordination and reaction speed + soft focus for duration for cricket
 - Spend more time on smooth eye movements & quiet eye for golf

Sports Vision Training Cases



- Jess, 25yo Female netball umpire
 - Complains of trouble with mid distances when umpiring on the court
 - Feedback from senior umpires is vision can be let down of overall performance— either misses things or sees things that aren't there
 - Really wants to win the netball umpire medal at national championships

Sports Vision Training Cases



- RX – minimal (-0.25 cyl OU)
- Mixed space board (far objects too close, mid objects too far away)
- Brock string – crosses behind bead
- Great fusional reserves at both distance and near (step and ramp)
- Orthophoric
- Static Binocular testing all within normal limits

Sports Vision Training Cases



- Worked on;
 - Spatial Awareness
 - Brock String
 - Estimating Distances
 - Look hard/soft
 - Loaded all exercises to include movements and speech until skills were innate

Sports Vision Training Cases



- 2016 has been a break out year for Jess after training in 2015 with top ups before big events
- Won the medal at nationals and umpired the final (a goal for 6 years)
- Achieved NZA status

Sports Vision Training Cases



- RM, 64 yo Male, Golfer
- LEE last year, had RX tweaked with multifocal contact lenses and since then has been pulling the ball to the left when putting
- VDU also a challenge

Sports Vision Training Cases



- Wearing Biofinity Multifocal C/L's
 - R -4.50 ADD: +2.50 N
 - L -4.50 ADD: +2.50 D
- Stereo 100''arc with c/l's
- VA OU 6/9.6+ N4

Sports Vision Training Cases



- RX
 - R -4.00/-0.75x20
 - L -4.25/-0.25x165
 - ADD: +2.00
- Tried -4.00 Air Optix Multifocal MED ADD
- Stereo immediately better but needed extra -0.25 for distance

Sports Vision Training Cases



- Worked on Eye Control and smooth eye movements from ball to hole
- Only did a couple of weeks of training
- Putting has improved immensely and bought along a photo of an almost hole in 1 on a Par 3

Sports Vision Training



At the completion of training all athletes get a recommended visual 'warm-up' to do before games

This can include a variety of exercises but visualisation along with brock string and peripheral activities help to prepare the athlete for a good performance

Sports Vision Training



- Take the time to really get to know the PX's visual demands
- Prescribe appropriately
- Thorough binocular assessment incl. spatial perceptions – dynamic if needed
- Can't promise to dramatically improve sporting performance but complements general training
- Anyone can benefit from training if motivated

Wellington Firebirds



- First season – only had an opportunity to ensure appropriate correction
- Second season – completed vision training in office with players
 - Most successful season
- Third season (this year) – more group training sessions to enhance all athletes innate competitive nature

Wellington Firebirds



Quiet Eye



Eye Tracking Cristiano Ronaldo Using the Dikablis Mobile Eye Tracker

Taken from "Ronaldo - Tested to the Limit" - Copyright 2011 Castrol



Sports Vision

- Thank you

