Fitting Field Enhancement Devices Workshop

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The Normal Visual Field

• Visual Field of View definition
  • Extent of area person can see with their eyes in a fixed position
  • Expressed as a visual angle in degrees

The Normal Visual Field. Scottish Sensory Centre. 
The Normal Visual Field in Degrees

• Monocular Norm\textsuperscript{1}

• Binocular Norm
Abnormal Field Examples

Rehabilitating Visual Field: **Challenges**

Central Defects

Magnification Applied to Peripheral Defects
Rehabilitating Peripheral Visual Field: **Approach**

Traditionally, **Field Shifting** for Hemianopic and Quadrantanopic Defects

Now, **Field Expansion**

**Minification** for Constricted Visual Fields
PART 1: Hemianopia and Quadranopia

- Visual field manipulated using **prism**
- Prism creates perceived shift of visual world
- Shift happens from “base” towards “apex”

- Amount of shift is approximately equal to half the power of the prism
  - 20 prism dioptres = 10 degree shift
Hemianopia and Quadrantanopia

- Prism placed on lens of glasses, base faces direction of loss

Figure 3. A prism used base-right shifts the visual world to the left. The first word on this card is "game."
Hemianopia and Quadrantanopia...

- 3M Press-On™ Fresnel

**PROS**
- Thin
- Light
- Easy in-office trial (quick and cheap)
- Available up to 40pd power

**CONS**
- Blurrier as powers increase (affect acuity and contrast; aberrations)
- Fall off
- Hard to keep clean (yellow with time)
Hemianopia and Quadrantanopia: **Options**

1. **Sector Prism**
2. **Peli Prism**

**Sector Prism:**
- Prism placed in half of lens
- Base faces direction of loss
- Patient scans into prism
- Idea is to decrease amount of scanning otherwise required to view objects in the missing field
- Tolerated amount ~20pd²

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Peli E. Fitting Peripheral Prisms for Patients with Hemianopia. 2011 (±)
Field Substitution vs Field Expansion with Sector Prism

• Apical Scotoma
  • “Blind spot” created at the apex of a prism when it is brought into view
    • Jack-in-the-Box sensation
    • Lose as much view at prism apex as gained at the base (gap in the visual scene)
  • Field substitution, not expansion

Field Substitution vs Field Expansion with Sector Prism

• Fit sector prism monocularly

• Prism is fit on side of lens matching side of vision loss
  • e.g. fit on right side of lens of R-sided hemianope

• Allows eye without the prism to continue viewing what is lost in the apical scotoma of the eye with the prism = **TRUE FIELD EXPANSION**

• Creates “confusion” centrally, and potentially diplopia
  • When central, these effects not always well tolerated
Field Expansion with Peli Prism

• Also known as EP Prism

• 2 Prism segments fit monocularly
  • On eye same side as field loss (OS for L-hemianopia)
  • Base still faces direction of loss
  • Shift field laterally above and below pupil centre

• Fitting above line of sight:
  • Confusion, diplopia, scotomas are relegated to peripheral retina
  • Blur of Fresnel more tolerated peripherally, so 40pd and 57pd can be used
  • Bifoveal fusion maintained

• Provides 20-30 degree TRUE FIELD EXPANSION WHILE STILL IN PRIMARY GAZE

• Standardized fitting procedure after controlled trials

• Available from Chadwick Optical Inc, Harleysville, PA


Peli E. Fitting Peripheral Prisms for Patients with Hemianopia. 2011.
Peli Prism: Simulation of Patient’s View

https://www.youtube.com/watch?v=juXqG4WiVqE
Sector Prism: **Visual Field Awareness System**

- Also known as the Gottlieb or Button lens
  - 18.5pd button
  - Reduced weight and thickness revolutionary for high power prism

- Fit at pupil height, leading edge of prism at limbus

- Available from
  - REKINDLE Vision, Johns Creek, GA
  - Chadwick Optical, Harleysville, PA
Fitting Peli\textsuperscript{4} and Sector Prism
Peli Prism: **Fitting Tools**

Press-On™ 40pd Prism Segments.

Pointed end indicates Base Direction (Base Right here)

Peli Prism: **Fitting.**

**FITTING**

1. **Preparing for Fitting**
   Observe patient’s normal head posture and walking stance when greeting patient.

2. **Placing Template**
   Clean patient’s glasses. Put glasses on patient and apply template on front side of the lens on HH side. Center template dot (shown in red) over patient’s pupil. If black patches on template overlap frame rim, re-adjust frame and re-apply template to eliminate overlap as much as possible.

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- So you can see if final fit has had negative impact.
- Placed on one lens only (matching side of field loss). For quadranopia, fit only one segment.
- If hard to see template vs. pupil, dot pupil on lens first.
Peli Prism: Fitting...

3. Placing Occluder
Add occluder to the other lens. If necessary, use small tabs of scotch tape to temporarily secure template to lenses.

4. Positioning Template
Have patient walk naturally back and forth in front of you. Observe head posture while comparing to earlier stance and position observation. Ask patient if black template portions are obstructing vision at the top or the bottom. Re-adjust template if necessary and repeat observation, making adjustments as needed.

"You can probably see them but are they blocking your view?"

e.g. if tipping head back when wasn’t before, superior prism may need to be moved up slightly. Aim to maintain 12mm separation.
5. Placing Prisms

- On rear surface of lens, place one clean Peli press-on prism, pointed-end toward temporal, directly over one of the black portions of the template.
- Repeat with second Peli press-on and press both firmly in place. Verify separation of 12 mm and base direction (out)
- If prisms overlap the edge of the frame, the excess should be trimmed

6. Verifying Placement
Put the glasses on the patient to re-verify placement. Remove occluder, template, and markings while leaving the prisms in place.

Use 3M Press-On prism technique to adhere segments to lens

Note the following parameters (in case prisms fall off!)
Peli Prism: **Fitting...Training portion**

- **5 points:**
  1. Demonstrate field expansion
     - Confrontation field or hand in line with prism brought in from blind side
  2. Teach need for head turn to localize object accurately
  3. Teach Reach and Touch to help with subconscious localization
  4. Training Walk, asking for constant observations
  5. Teach NOT to look through prisms

- **Patient returns in 4 weeks for follow-up**
  - Ideal would be continued training in that time (O&M, OT, VRT)
Peli Prism: Options

- Leave Press-Ons in place
- Permanent Peli Lens™ 40pd horizontal or 57pd horizontal
  - In dress-wear full-time or part-time as fitover or clip-on
  - 57pd is recommended

- Option of 57pd Oblique

- Rx selection? (SVD vs ST vs PAL)


Sector Prism **Fitting: Press-On Fresnel**

1. Patient views distance
2. Focus is on eye ipsilateral to field loss (e.g. OD for right hemianopia)
3. Demonstrate idea with loose 20pd Fresnel prism trial lens, base towards loss (i.e. Base Out in example above)
4. Identify edge of seeing field
   - *Bring post-it note in from non-seeing field; dot lens where patient first notices it*
5. Proposed initial placement of prism edge (choose from):
   - 1.5mm-6mm away from seeing field (most common ~2mm)
   - “At pupil margin”
   - “Between pupil margin and limbus”

Mark this position

6. Cut out sector of Press-On Fresnel to match shape of lens sector
   - Watch base direction
   - Ideal if can pop lens out of frame
   - Razor blade = smoother cuts

7. Place on back surface of lens using 3M Press-On fitting instructions
8. Scan into prism.
   - Move prism edge depending on patient response/comfort.
   - If decision is made to fit binocularly, counsel/train on blind spot

9. Practice scanning
   - patient looks into prism
   - back to optical centre of carrier
   - follow-up head turn to localize object

10. Stand and walk, scanning in and out of prism

11. Trial at home x 4 weeks and follow-up.
   - Ideal is to have continued training in that time (O&M, OT, VRT)
PART 2: Constricted Visual Fields

• Tough group to rehabilitate\(^6\)
  • Little field left to work with
  • Compensatory scanning
    • Patient’s dynamic field > static field
    • Devices can negatively interfere with this

• Patients start to notice loss at \(\sim 40^\circ\)\(^5\)
• Complaints intensify at \(\sim \leq 20^\circ\)
• Difficulty reported at 5-10°\(^6\)

HVF 10-2 Fields of 21yo patient with h/o occipital lobe infarct
Constricted Visual Fields: Clinical Options

1. Reverse Telescopes
2. Concave (Minus) Lenses

- **PROS**
  - Cheap
  - Quick demonstration and “fit”

- **CONS**
  - Loss of central acuity with minification
  - Barrel distortion
  - Spotting tool, not really ambulatory
    - Can interfere with scanning

Field of View using 2.2xFDTS in reverse
Reverse Telescopes: Fitting

1. Place patient in front of doorway such that they can’t see both sides of the doorjamb\(^7\) OR have patient look at target (e.g. clock) straight ahead and describe extent of what they see around it without moving eyes.

2. Focus lowest-powered telescope (e.g. 2x) at infinity for patient.

3. Hand to patient in reverse.

4. Instruct patient to keep looking at target, and while looking at target, hold telescope to eye.
   - *I usually don’t instruct which eye, and want to see which the patient chooses.*
Reverse Telescopes: **Fitting**..

5. Point out to patient that they can see all of the doorjamb (or more of it with less head or eye turn) OR have them describe the extent of their visual scene and point out new areas they are seeing

6. Positive patient response = trial higher powers

7. Trial scanning room/area for landmarks or safety issues
   - *head/body + telescope have to move as one system*

8. Decide on how to prescribe
Reverse Telescopes: Options

• Standard monocular Galilean or Keplerians

• Ocutech Image Minifier or Field Expander
  - 0.5x field expansion each (Field Expander smaller and lighter)
  - No barrel distortion, wide lens permits scanning
  - Prescribe handheld OR spectacle-mounted in primary position OR bioptic position OR magnetic clip-on OR in Sightscope Compact Flip system
  - Fitting guide available on Ocutech website
    - Minimal measurements required

Concave (Minus) Lenses

• Minus lens held at a distance from the eye
• Creates a telescope with accommodation/add as the ocular, minus lens as the objective
• i.e.

\[
\text{Ang Mag} = \frac{\text{Ocu (D)}}{\text{Obj (D)}} = \frac{1.67}{5} = 0.33x
\]
(same as 3x TS in reverse)

• Best minification with large diameter, moderate power (-4D to -10D) held farther from the eye
1. Similar initial set-up to Reverse Telescope Fitting
2. Start with power between -4D to -10D\(^6\), held at arm’s length
3. Have patient “trombone” to demonstrate changes in magnification, and find comfortable holding position\(^8\)
4. Demonstrate alternative powers as necessary
   - *e.g* if holding lens significantly closer to eye, try higher power
5. If positive response, practice scanning for landmarks and safety concerns (head/body have to move with lens as one system)
Concave (Minus) Lenses: Options

- Ocutech Field Viewer
  - 48mm -4D lens held at arm’s length from the eye (~0.25x mag)
    - Arm’s length definition?
  - Available with neck strap
    - Straps can help control eye-lens distance
- Lens blank from dispensary
- Minus lens with handle

Constricted Visual Fields: **Alternative Therapies**

• Similar to Reverse Telescopes:
  • Amorphic Lenses (discontinued)

• Prism
  • Inwave (Channel Lenses)
  • Still available from Chadwick Optical
    • Channel width and prism to practitioner’s specification
  • Apfelbaum and Peli 2015:
    • Inconsequential field extension, literature reports of improvement using prism in this way are improbable
The Ideal Patient?

- Complains!
  - “Drifting” / “Bumping into things” / “Missing things”
  - Motivated to travel independently

- Objective signs
  - Excessive scanning
  - Posture shifts

- No balance/orientation issues

- Cognitive ability

- Willingness to train
ADP Coverage

• “Low Tech Visual Aid”: Field Enhancement Vision Aid
  • Non ODSP/OW/ACSD Max Monocular $1000 vs Binocular $1728.00
  • ODSP/OW/ACSD Max Monocular $1333.33 vs Binocular $2400.00

<table>
<thead>
<tr>
<th>Device</th>
<th>Practitioner Cost</th>
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<tbody>
<tr>
<td>Fresnel Press-On Prism 3M</td>
<td>~$30 + shipping</td>
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<tr>
<td>Peli Prism Single Pack (Fit guide + 1 pair of prism)</td>
<td>USD 37.50 + shipping</td>
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<tr>
<td>Peli Prism Bulk Pack (4 pair of prism)</td>
<td>USD 80 + shipping</td>
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<tr>
<td>Peli Prism Ground-in on SVD vs PAL (40 and 57pd horz)</td>
<td>USD 360 vs USD 460 (add $100 for 57 obliques)</td>
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<tr>
<td>Gottlieb Prism 20pd SVD Standard Rx</td>
<td>~USD 300</td>
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<tr>
<td>Loose Minus Lens Blank</td>
<td>$12-50</td>
</tr>
<tr>
<td>Ocutech Field Expander -4D (0.25x) lens</td>
<td>USD 70 + shipping and handling</td>
</tr>
<tr>
<td>Monocular Telescope (to use in reverse)</td>
<td>~$125</td>
</tr>
<tr>
<td>Ocutech Image Minifier Loose vs Bioptic Mount OU</td>
<td>USD 70 vs ~USD 500 + shipping and handling</td>
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<tr>
<td>Ocutech Field Expander Loose vs Clip-on Mount OU</td>
<td>~USD230 vs USD 465 + shipping and handling</td>
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References


