My Approach to … Transferring from Pharmaceutical to Neuro-optometric Rehabilitative Management of Anisometropic Amblyopia

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Disclosures

- No Financial Interest in tools/ techniques used.

Abstract

Anisometropic amblyopia is benefiting from recent studies highlighting the **value and long-term success of "perceptual learning."**

Parents wishing to do more for their child with amblyopia have often been involved in **traditional and/or pharmaceutical management** prior to seeking rehabilitative care.

Abstract

A case is presented in which a patient was **successfully transitioned** into **rehabilitative management** while **tapering** pre-existing use of **atropine**.

Challenges in parent discussion are presented as a key factor in gaining parent confidence while changing management strategy from a pharmaceutical to a rehabilitative treatment model.

Purpose

- Demonstrate the impact of active, visually-directed engagement on visual performance.
- Demonstrate that fixation and ocular motility training are not splinter skills, but rather *foundation* skills which potentiate greater binocular performance.
- Discuss management challenges *and opportunities* when engaging a parent who has been content with the medical model, *while still upholding respect for the traditional eye care professional.*

Outline

- Entering profile
- Interim profile
- Post-therapy profile
- Therapy provided
- Conversations & Management
- Case update: Ongoing Developmental Visual Guidance


- erin
- er OM
- H/o Amblyopia OD, variable E(T)
- Patchi 4.5m
  - incr nsuc
- Atropi 4.5m
  - Was direct
    beca t's re
- Histor rting
  - Repeatedly: Progress during Tx/ Regressions after.


Entering Profile: JB

- 5.4 yo girl
- Currently under OMD mx
- H/o Amblyopia OD, variable E(T)
- Patching age 3.10m thru 4.5m:
  - increased 3 to 8 hrs/day: unsuccessful.
- Atropine instituted at age 4.5m, daily.
  - Was using atropine QOD (directed to use QD, but became QOD due to patient's resistance).
- History of stopping/ restarting atropine Tx
  - Repeatedly: Progress during Tx/ Regressions after.

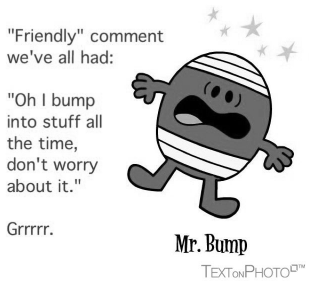
Entering Profile: JB

- Parent conference 4 days prior to exam: "Had a cycloplegic refraction yesterday"
  - OMD record showed "Large LET"
  - All prior records showed small accommodative ET.
- *I requested patient switch to QOHS prior to optometric exam.*

"Is there anything to be done for rehabilitation for amblyopia?"

Parent has functional concerns…

- Bumps
- Troub
- Very c
- Has a
  - Gets
- Challe
- Extren verbal skills a



Parent has functional concerns…

- Bumps into things
- Trouble walking downstairs
- Very cautious
- Has a bad sense of orientation
  - Gets lost in large areas
- Challenges with drawing skills
- Extremely bright when it comes to verbal skills and auditory learning & music

Entering Profile: JB (age 5.6m)

	Distance	Near
OD +2.75 sph	20/40	20/32
OS +0.25 sph	20/30-	20/25
OU	20/30	20/32

Leans in/ chin down for near

- **VO Star:** hypo-projects OU; high eso; poor grasp OU, OS < OD; ***Profuse tearing***
- **Stereo:** 100" Wirt, (-) RDS
- **EOM:** Cannot fixate or follow beyond central 10°
- **Nearpoint ret:** balanced accn w/ **+4.00 OD/ +1.25 OS**
- Added Yoked Prism: **1^BD OU:** righted posture
  - Rxed this
- *Continue Atropine 1% 1gtt OS QOHS*

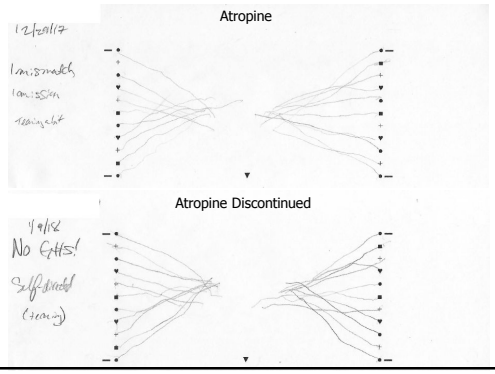
Entering VO Star

Interim Profile after 3 mos VT, Age 5.9m

- Assessment performed while still on atropine QOHS
  - Last dose 16 hrs earlier
- Ocular motility ↑
- Stereo: (+) weak RDS (presence/absence of shapes, but not identification)
  - **40" Wirt circles**
- Near VA… OS limited due to atropine
- Fusion: Negative BI recovery at distance

- *Requested follow-up exam after 10 day atropine washout.*

After first 3 mos VT, on & off A

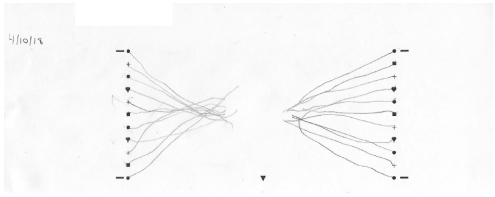


Interim Profile, Age 5.9m, 6.0m

Interim Profile, Age 5.9m, 6.0m

- **Temper tantrums!** new emergence on D/C atropine:
  More willful (and more effective at exercising will with functioning accn!)
- Monitor after 3 mos w/o atropine, **no VT** (age 6.0):
  - ↑ in stereo: (+) RDS 250" and 20" Wirt.
  - Closing OS to engage processing OD
  - Crowding OD; BC DVA 20/30 OD
  - Poor fusion at D and N, negative or no recoveries.
  - AHP, tilt to right

After 3 mos w/o Atropine, no VT



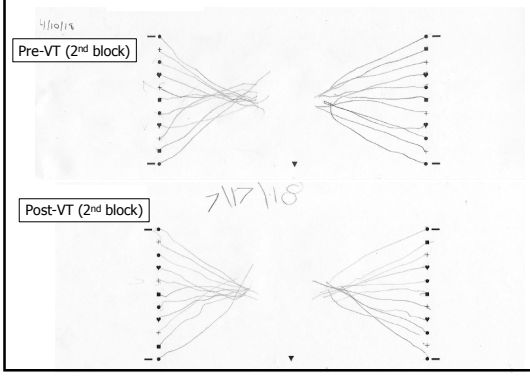
Interim Profile, Age 5.9m, 6.0m

- *Recommended additional 3 mos VT*
  - Develop Binocular recoveries
  - Develop Accn OD, OS OU
  - Develop Fixation, esp. 2^ gaze

Post-Therapy Profile, Age 6.4m

- Immediately post-therapy:
- Greatest progress areas:
  - ↑ Ocular motility
  - Sustained ranges; positive recoveries D&N
  - ↓ EP thru near add
  - ↓ AHP
- *Recommended some maintenance activities:*
  - Continue to build MAR (accn) and fixation
  - Work with Marsden Ball (real space fusion/localzn)
  - Saccadic/ Body organization
    - visual-motor-speech planning (Slap Tap Reading series)

After 2nd VT block (3 mos)



Therapy Provided, 1st block

- **Visually-guided motor activities** integrated with a metronome and both **saccadic** and **smooth pursuit** eye movements
  - **Fine motor control** at Near
  - **Visual biofeedback** w/ light at Distance
- **Visual information processing skills** over a broad retinal area:
  - **Visual-spatial memory**
  - **Visual-sequential memory**

Therapy Provided, 1st block

- **Visually-guided motor activities** integrated with a metronome and saccadic eye movements
  - **Organized** either:
    - Central-peripheral
    - Left-to-right and top-to-bottom
  - At near-point, **fine motor control** was engaged with touching or manipulating small objects with pincer grasp for visually-guided motor control and feedback for accuracy.
    - Pegs, Blocks,"Birthday Cake" rings around sticks
    - VMF series
  - At **longer distances**, feedback was supported with aiming a flashlight and observing accuracy of motor control within a visual target.
    - Central-peripheral patterns
    - 4-Corner Saccades

Therapy Provided, 1st block

- **Visual information processing skills** over a broad retinal area were presented, including:
  - **Visual-spatial memory** exercises, encouraging viewing over an area with **tachistoscopic** ("fast look") exposure;
  - **Visual-sequential memory** exercises, encouraging ability to track a moving target over a stable area and to reproduce the pattern.
- **Smooth pursuit exercises** were conducted with:
  - Peg insertion into a rotating pegboard
  - Marsden Ball smooth pursuits (Greenwald series)
    - Cognitive tasks were added to improve automaticity of eye movements without conscious control.

Therapy Provided, 2nd block

- **Accn-** MAR at D, N; Bi-ocular AR
- **Stereo-** relative depth; jump ductions
- **Marsden Ball-** looming, VMI series, bunt ball, ball/loop; smooth pursuit (Greenwald)
- **Visual-vestibular activities-** Infinity Walk; "Slotnick Scramble"
- **VMI-** bisecting; spatial planning ("line patterns" horizontal & vertical); Chalkboard Circles

Conversations & Management

- **Challenges to overcome:**
  - Mother presented to OMD that she was considering VT.
  - OMD Notes…

Conversations & Management

Considering VT-Slotnick.
Not sure what her goal is to have eval.

OMD writes in A/P:
Do not rec VT- no indication

Along with:
Large LET
Mixed amblyopia OD, improving.
Continue Atropine QOD OS
Update Rx to +3.25 / +1.00
Check in 3 mos

Conversations & Management

- Extended discussion w/ parent:
  Why change atropine to HS rather than AM?
  1. Atropine enables MFBF, but *disables feeling of control* over vision
  2. Longer wear-off period: More opportunities for control by daytime (esp. 2nd day, QOHS).
  3. Active therapy is enhancing JB's control over each eye…which is more effective than simply handicapping the preferred eye!

Conversations & Management

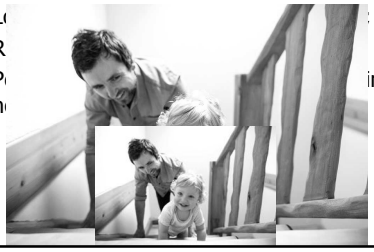
- Interim discussion:
  Some immature behavior,
  "temper tantrums" once she was taken off atropine:
  - More willful (and more effective at exercising will!)…
  - *Appropriate for development!*

Conversations & Management

- **Parent fear of D/C'ing atropine**…
  "Won't she need this for life?"
- Multiple occasions requiring education on
  - purpose of atropine and
  - effect of atropine on focusing control.

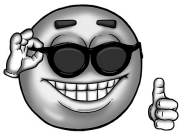
Conversations & Management

- Ongoing reinforcement of concept of "**Developmental visual guidance**"
  - L
  - R
  - P ing
    h



Conversations & Management

- **Pleasant Surprise:**
  - Conversation with mom following a re-eval with JB's original OMD:
  - Doc was double checking records to see that it was the same child. *"What did you do??"*
- Mom tells OMD:
  <u>We did VT with Dr. Slotnick…</u>
- "Tell Dr. Slotnick I say, 'hi!'"



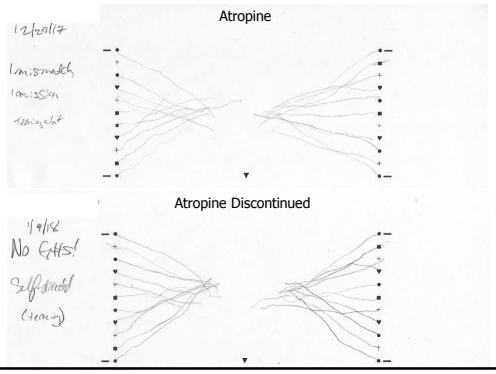
Case Update, Ongoing Developmental Visual Guidance

Post-Therapy Profile, Age 6.7m

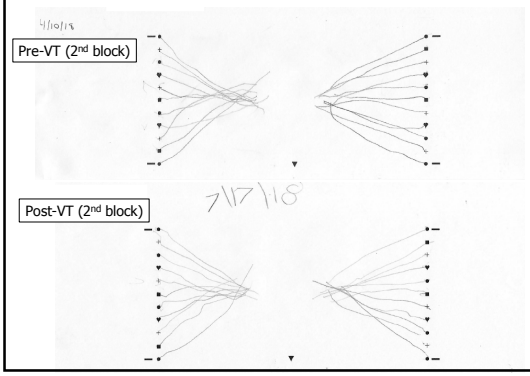
- 3 mos post-therapy:
  - Continues to get (+)RDS stereo and 20" Wirt.
  - <u>Regression</u> in ocular motility performance
  - <u>Regression</u> in binocular recoveries at distance, near.
  - Demonstrated <u>2^RET at DV only</u>.
    → Increased Rx (+) power: stabilized turn.
  - *Modified Rx, increased plus at DV, maintained unequal adds*
    - OD +4.75 sph /+1.25 ADD
      OS +3.00 -0.50 x 180 /+0.75 ADD

Entering VO Star

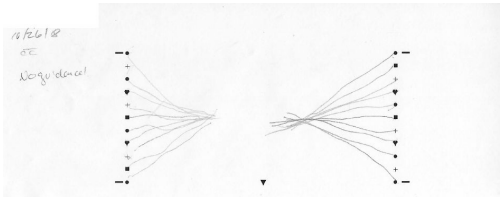
After first 3 mos VT, on & off A



After 2nd VT block (3 mos)



After 3 mos post-VT



Post-Therapy Profile, Age 6.9m

- Additional 8 weeks, following Rx update:
  - No ET at distance
  - ↑ DVA OD, ↑ NVA OD (20/16!)
  - ↑ ocular motility performance
  - Stable binocular ranges and recoveries in phoropter.
  - Improving accom amplitudes
  - Small right hyperphoria identified in phoropter only, increases on prolonged dissociation in phoropter.
- Plan: Monitor quarterly
- *Educate mother: There may be opportunities for future VT as demands change.*

Take Home Lessons

- Transitioning a **parent** from medical/pharmaceutical Mx of Amblyopia to Rehabilitative Mx presents challenges in *parent education.*
- While gaining parent confidence in the effectiveness of an active VT Rehab program (esp. when OMD warns against it), it may be worth **continuing existing atropine penalization**, short term.

Take Home Lessons

- **Pauses between VT blocks** give both parent and doctor the opportunity to monitor stability of vision gains.
- **Pulsed VT blocks** also
  - help parent to appreciate objectives of treatment, and
  - builds confidence in management plan when gains are maintained.

Take Home Lessons

- Fixation accuracy and oculomotor control are foundational skills which facilitate:
  - better acuity, which in turn facilitates
    - better appreciation of accommodative control,
  - visual information processing over a retinal area (saccades), which in turn facilitates
    - better binocularity
- Fixation and oculomotor skills may be developed in the presence of atropine Tx.

Detailed exam findings presented over following slides, for reference/ review:

A1

Age	5.6 years.mos	5.9 years.mos	5.9 years.mos
Atropine?	Atropine OS, 40 hrs ago	Atropine OS, 16 hrs ago	**no** atropine x 10 days
VT?		post 12 sessions VT	post 12 sessions VT
Wearing Rx OD	+2.75 sph	+4.00 sph = 1^BD	+4.00 sph = 1^BD
OS	+0.25 sph	+1.25 sph = 1^BD	+1.25 sph = 1^BD
DVA			
OD	20/50, 40	20/50, 30^{-2}	20/40-, 30^{-2}
OS	20/40, 30-	20/40, 30+	20/30, 25^{-2}
OU	20/30, --	20/40, 25	20/30, 25^{-}
NVA			
OD	20/32, 25	20/20	20/50, 20
OS	20/25	20/32	20/25+
OU	20/32, 25	20/25	20/25, -, 16
Cover Testing			
Dist	UCT: Φ	4^EP	UCT:4^RET
	ACT: 6-8 EP		ACT: 6^eso
Near	UCT: Φ'	8-12^ EP' w/ inc attn recovers quickly	Φ'
	ACT: 8^EP'		
RDS stereo	(-)	Entering: (+) absence/ presence depth After eval, with +1.75 OS: (+)500"	(-); at end, c +5.50/+3.00 (+) 250"RDS
Wirt stereo	100"	140", 40"	70"; repeat c TF: 40"
			At end of exam, thru TF: +5.50 OD/ +3.00 OS:

A2

6.0 years.mos	6.4 years.mos	6.7 years.mos	6.9 years.mos
no atropine	no atropine	no atropine	no atropine
after new Rx/ pause VT	after 12 sessions VT	Assess stability/ no VT	after new Rx, no VT
Unequal ADDS: +4.25 sph/ +1.25	Unequal ADDS: +4.25 sph/ +1.25	Unequal ADDS: +4.25 sph/ +1.25	Unequal ADDS: +4.75 sph/ +1.25
+2.25 sph/ +0.75	+2.25 sph/ +0.75	+2.25 sph/ +0.75	+3.00-0.50x180/ +0.75
20/50, $40^{-2\ crowd}$,WL:40"	20/40, 30^{-2}	20/50, 30^{-1+}	20/40, 25^{-3}
$20/25^{-2}$, 20^{-3}	$20/25^{-1,+2}$	$20/25^{-2}$, 20^{-2}	$20/25^{-}$, 20^{-3}
25, --	$30,25^{-,++}$	20/20-	20/25, 20^{-2}
20/32,-,20	20/40, 25	20/32,+	20/20, 16
20/25,-,16	20/20,+	20/25,-,16	20/25, 20
20/25,-16	20/50, 25, 16	20/32,-,20	20/25
	UCT:2^RE(T)	UCT:2^RET	UCT: Φ
Φ	ACT: 3-4^eso	ACT: 4^eso	2-3^EP
	DV: 6-8^EP'	UCT: Φ'	UCT: Φ'
4-6^EP'	ADD: 3-4^EP	ACT: 6->4^EP'	4^EP'
(+)250"	(+)250"	(+)250"	(+)250"
70",20"	100",40",20"	70",30",20"	50", 20"
4 - 3+ - 4+	5 - 5 - 4	3 - 2+ - 3+	5 - 3 - 4+

B1

Age	5.6 years.mos	5.9 years.mos	5.9 years.mos
Wirt stereo	100"	140", 40"	70"; repeat c TF: 40"
			At end of exam, thru TF: +5.50 OD/ +3.00 OS:
NSUCO Pursuits	1 - 1+ - 2	3 - 2 - 4	4 - 3 - 4+
NSUCO Saccades	1 - 1+ - 1	4 - 4+ - 2+, eyes, then head	2+ 3 - 4
Wolff Wand Rotations	~1+	3+, 10 sec fixation	~3+
WW Fixations	~1, OS tropes LET at near	3+	~3+
	Cannot sustain a fixation Can't hold N/F fixation Poor inhibition	trouble c release/ divergence	difficulty c inhibn
Retinoscopy OD	+4.75 sph	+5.00 sph	+5.25 sph
OS	+1.50 sph	+3.25 -0.75 x 180	+3.50 sph
Subjective, c VA OD	+4.75 sph 20/60, 50^{-2}	+5.00 -0.50 x 090, $20/25^{-3}$	+4.25 sph, 20/25+
OS	+1.75 sph 20/30-, 25^{-3}	+3.00 -0.50 x 180, $20/25^{+/-}$	+2.50 sph, $20/20^{-3}$
Binoc Balance OD		+4.50 sph	+4.25 sph
OS		+2.25 sph ; $20/20^{-3}$ (drops cyl)	+2.50 sph, $20/25^{-2}$

B2

6.0 years.mos	6.4 years.mos	6.7 years.mos	6.9 years.mos
(+)250"	(+)250"	(+)250"	(+)250"
70",20"	100",40",20"	70",30",20"	50", 20"
4 - 3+ - 4+	5 - 5 - 4	3 - 2+ - 3+	5 - 3 - 4+
4 - 2+ - 4+	5 - 4+ - 5	3 - 2+ - 3	5 - 4 - 4+
4	5	3+-4	4+
4+	5-	3+	4
saccades: occ'l pause at midline	blinks betn N/F at times	Rotations degrade on obliques, increased fixation loss. Fixations- oriented, good inhibition; OD lags to fuse distal wand; weak stability of fixation >2sec.	Rotns: jaw engages Fixns: trouble with inhibition: early divergence.
+5.50-0.25x180	+5.50 sph	+5.75-0.25x005	+5.75-0.75x175
+2.75 sph	+3.50-0.50x160	+4.00-0.50x160	+3.50-0.75x175
+4.50sph; closing OS, 20/30	+4.75, 20/30-	+5.00sph, $20/30^{-2}$	+5.00 sph, $20/25^{-2+}$(WL)
+2.50sph, 20/25-,20^{-3}	+2.75-0.50x160, $20/20^{-3}$	+3.00-0.75x145, $20/20^{-2}$	+3.00-0.75x180, $20/20^{-2}$
+4.50 sph	+5.00 sph	+4.75sph	+4.75sph
+2.25 sph, 20/25,20^{-2}	+2.50-0.50x160, 20/20"	+3.00-0.50x145, $20/20^{-2}$	+3.00-0.50x180, $20/20^{-2}$

Age	5.6 years.mos	5.9 years.mos	5.9 years.mos
Distance: VG phoria			2 exo, 2^BU OS;
			LI 6/3 (BU)
		1 exo, 2^BU OS	LS 2/0 (BD)
BO			BO x / ~40 / 4
BI			BI x / 18 / 0
		BO x / 19 / 4	(delayed reports, OD
		BI x / 7 / -4	suppressing)
Near: VG phoria			2 exo, Θ
BO			
BI		BO x / 19 / 4	BO x / 20 / 4
		BI x / 7 / -4	BI x / 26 / 6
Additional assessments	MEM: OD+4.00 ~+0.50 lag OS+1.75: leads +4.00 +1.25 ~ balances engagemt accepts 1^BD OU, stabilizes gait; NVA: 20/25 OU DVA: 20/50, 25^{-2} OU		FCC +0.50(V) UFCC +5.75 sph +2.25 sph MEM c TF: +4.50 ~+1.00 lag +2.75~+0.50 lag Engages, comfort c: OD +5.50 OS +3.00 "subtract" -0.75 OU, pref to "-1.00" for DV TF DV: + 4.75 OD +2.25 OS: 1-2^RET, 4^eso

C1

C2

6.0 years.mos	6.4 years.mos	6.7 years.mos	6.9 years.mos
12 eso, 2^BU OS		3 eso, 2^BUOS	4 eso, 1.5^BU->3^BU OS
		BO x / 27 / 2	
	PB	BI x / 36 (late report) / 1	
BO x / 24 / NR	BO x / 25 / 16	"I focused on the not real	BO x / 32 / 14
BI (NR) / -12(BO)	BI x / 14 / 10	one"	**BI x / 12 / 3**
3 exo		10 eso, 1.5^BUOS	2 eso, Θ
	PB		
BO x / 40 / NR	BO x / 40 / 25	BO x / 21 / 7	BO x / 24 / 15
BI x / 20 / -12	BI x / 16 / 1	BI x / 35/ 5	BI x / 11 / 5
	free space: TF +5.00 sph +2.50-0.50x160 accepts -0.50 OD; -0.75 OD decreases VA OU cyl x160=x180 OS. MEM, best symmetry +0.75 OU	TF: DV Balance: accepts -0.50 DC x 180, 20/20^{-1} Improved OD fixation, Dist CT: Φ MEM: tried +0.75 OU over bal: reads, slightly dim reflex OD. Changed to +1.25 OD/ +0.75 OS: brighter reflex, engaged with low lag, increased fluency: Easy 20" stereo on Wirt.	UFCC over balance: OD +1.25 OS +0.75(V) Repeat FCC with above: Takes OD +1.50(H) OS +1.00(H)

Age	5.6 years.mos	5.9 years.mos	5.9 years.mos
Additional assessments	MEM: OD+4.00 ~+0.50 lag OS+1.75: leads +4.00 +1.25 ~ balances engagemt accepts 1^BD OU, stabilizes gait; NVA: 20/25 OU DVA: 20/50, 25^{-2} OU		FCC +0.50(V) UFCC +5.75 sph +2.25 sph MEM c TF: +4.50 ~+1.00 lag +2.75~+0.50 lag Engages, comfort c: OD +5.50 OS +3.00 "subtract" -0.75 OU, pref to "-1.00" for DV TF DV: + 4.75 OD +2.25 OS: 1-2^RET, 4^eso Pref +4.25 OD +2.25 OS @DV, 20/25^{+2}
Rx given			
	OD +4.00 sph = 1^BD OS +1.25 sph = 1^BD		Unequal ADDS: OD +4.25 sph/ +1.25 OS +2.25 sph/ +0.75
			RTC 3 mos, no VT

D1

D2

6.0 years.mos	6.4 years.mos	6.7 years.mos	6.9 years.mos
	free space: TF +5.00 sph +2.50-0.50x160 accepts -0.50 OD; -0.75 OD decreases VA OU cyl x160=x180 OS. MEM, best symmetry +0.75 OU	TF: DV Balance: accepts -0.50 DC x 180, 20/20^{-1} Improved OD fixation, Dist CT: Φ MEM: tried +0.75 OU over bal: reads, slightly dim reflex OD. Changed to +1.25 OD/ +0.75 OS: brighter reflex, engaged with low lag, increased fluency: Easy 20" stereo on Wirt.	UFCC over balance: OD +1.25 OS +0.75(V) Repeat FCC with above: Takes OD +1.50(H) OS +1.00(H)
		Update Rx to stabilize Dist E(T):	
Resume VT, develop accn and binoc, and fixation across midline	consider cyl OS, consider +0.75 OU RTC 3 mos	Unequal ADDS: OD +4.75 sph/ +1.25 OS +3.00-0.50x180/ +0.75	continue with Rx
		RTC 6-8wks	RTC: Monitor Qtrly, guide visual development

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Discussion welcome!

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