Critical Visual Acuity (Cva): A Novel Clinical Parameter For Enhanced Visual Capacity Assessment

Minas Bakirtzis[1], Eirini-Kanella Panagiotopoulou[1], Christina Mitsi[1], Christos Giazitzis[1], Panagiota Ntonti[1], Doukas Dardabounis[1], Tryfon Rotsos[1], Georgios Labiris[1]

[1]Department of Ophthalmology, University Hospital of Alexandroupolis, Alexandroupolis, Greece

Financial disclosure 2026

No financial support was received for this presentation

None of the authors has any proprietary interests or conflicts of interest related to this presentation

Purpose - Methods

Purpose

- To develop and validate a novel clinical parameter for assessing distance visual capacity by incorporating reading speed:
  ☞ **Critical Visual Acuity (CVA)**

Methods

- Study Design
  - Prospective **comparative control-based** study
- Participants
  - Control Group (CG)
  - Study Group (SG)
- **Subjective assessment:** NEI-VFQ-25 questionnaire
  - Participants subdivided according to **NEI-VFQ-25 "distance activities" score**
  - **< 87.5** → Impaired visual capacity (**Study Group**)
  - **≥ 87.5** → Non-impaired visual capacity (**Control Group**)
- **Analysis:** ROC curves used to compare diagnostic ability of CVA vs VA

Methods - Measurements

- **Measurements:**
  - Binocular BSCDVA
  - CVA at 300 cm
  - All using the **Democritus Digital Acuity & Reading Test (DDART)**
- **CVA Calculation**
  - **Algorithm-based calculation** through the **DDART**
  - **Patented method** – Hellenic Industrial Property Organisation (OBI), Greece
  - Combines **distance visual acuity, reading speed,** and patient's **errors** into a single index

Democritus University of Thrace – Department of Ophthalmology

DDART 82038

Exam ID:	4621
Date (GMT):	2025-07-18 11:06:35
Test Type:	Test 1 (Letters)
Patient's Name:	CRISOVALANTIS GIALAMAS
Patient's ID:	28037600773
Patient's Year of Birth:	1976
Patient's Eye:	OD
Distance from screen (cm):	300

logMAR	Slide	Reading Duration (sec)	Errors	Distance (cm)	Letters	LogMAR
1	Slide 1	19.607	0	0	35	1.00
0.9	Slide 2	4.936	0	0	40	0.90
0.8	Slide 3	5.192	0	0	45	0.80
0.7	Slide 4	7.400	0	0	50	0.70
0.6	Slide 5	18.912	0	0	55	0.60
0.5	Slide 6	28.705	0	0	60	0.50
0.4	Slide 7	15.119	5	0	65	0.40

Total Slides	Number of Letters	Visual Acuity Score	Total Errors	logMAR	Snellen Fraction	Decimal
7	60	75	5	1	6/18.97	0.32

Critical VA 1.96SD

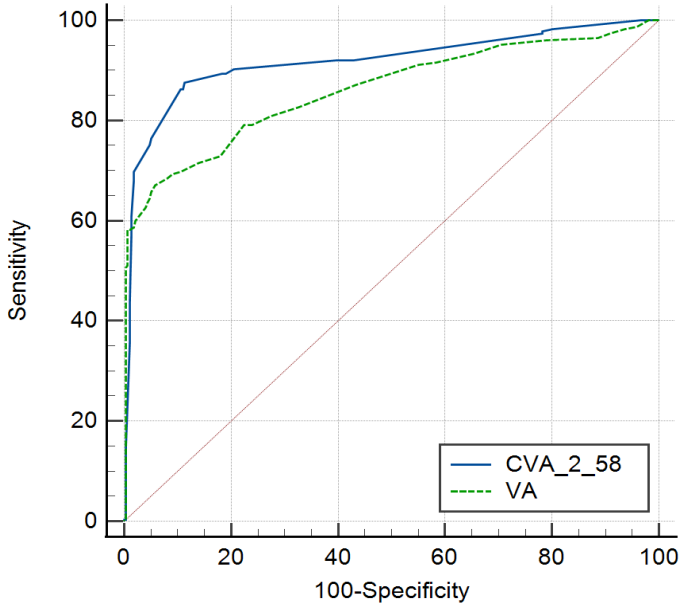
Total Slides	Number of Letters	Visual Acuity Score	Total Errors	logMAR	Snellen Fraction	Decimal
5	55	70	0	0.6	6/23.89	0.25

Critical VA 2.58SD

Total Slides	Number of Letters	Visual Acuity Score	Total Errors	logMAR	Snellen Fraction	Decimal
6	60	75	0	0.5	6/18.97	0.32

Results

Demographics	
Participants	Total: 497 CG: 272 SG: 225
Age (Mean ± SD)	54.36 ± 21.09
Gender	Males: 242 Females: 255



ROC analysis indicates **higher diagnostic accuracy CVA** vs VA

	VA	CVA	Difference
AUC [95% CI]	0.859 [0.826, 0.889]	0.917 [0.889, 0.940]	0.0575 [0.0260, 0.0891]
Sensitivity	67.11	87.56	p = 0.0003
Specificity	94.12	88.60	

Discussion - Conclusions

Discussion

- Visual capacity is multidimensional—**standard VA fails to capture real-life performance**.
- Incorporating **reading speed + errors** into CVA makes it a **more realistic measure of functional vision**.
- CVA demonstrated **higher diagnostic accuracy** compared to VA.
- CVA may be a **superior tool for both clinical trials and daily ophthalmic practice**.

Conclusion

- **Critical Visual Acuity (CVA)** provides a **novel, validated, algorithm-based index** of functional vision.
- CVA **outperforms standard VA** in identifying impaired visual capacity.
- **Clinical potential:** Can guide treatment evaluation and patient counseling.
- **Next steps:** Multicenter studies to validate and standardize CVA in broader populations.