## PandAcuity in pediatrics – a novel clinical measure of visual function based on the panda illusion

Carina Kelbsch<sup>1</sup>, Bettina Spieth<sup>1</sup>, Eberhart Zrenner<sup>2,3</sup>, Dorothea Besch<sup>1</sup>, Torsten Straßer<sup>1,2</sup>

- 1 University Eye Hospital Tuebingen, Center for Ophthalmology, University of Tuebingen, 72076 Tuebingen, Germany
- 2 Institute for Ophthalmic Research, Center for Ophthalmology, University of Tuebingen, 72076 Tuebingen, Germany
- Werner Reichardt Centre for Integrative Neuroscience (CIN), 72076 Tuebingen, Germany

## Corresponding author:

Torsten Strasser

Institute for Ophthalmic Research, Centre for Ophthalmology

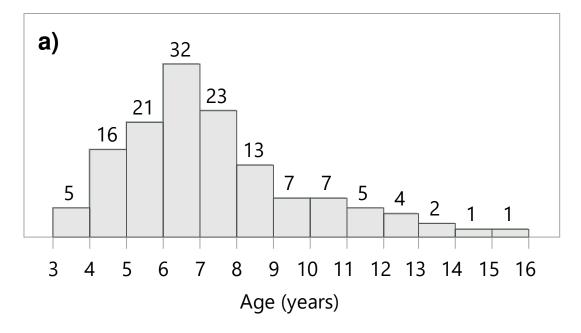
University of Tuebingen

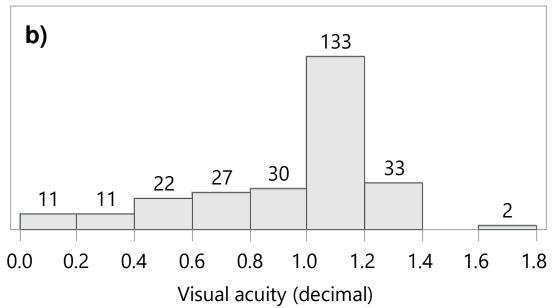
Elfriede-Aulhorn-Str. 7, 72076 Tuebingen, Germany

torsten.strasser@uni-tuebingen.de

**Supplemental File 1.** Classification of visual impairment according to the visual standards report of the 29th Congress of International Council of Ophthalmology<sup>9</sup>

VA (decimal)	VA (logMAR)	Snellen equivalent	Vision impairment
> 0.8	< 0.1	> 20/25	None
0.5 - 0.8	0.1 - 0.3	20/25 - 20/40	Minimal
0.32 - 0.5	0.3 - 0.5	20/40 - 20/63	Mild
0.125 - 0.32	0.5 - 0.9	20/63 - 20/160	Moderate
0.05 - 0.125	0.9 - 1.3	20/160 - 20/400	Severe
< 0.05	> 1.3	< 20/400	Profound





**Supplemental File 2.** Distribution of the included 137 children a) age and b) visual acuity of the 269 eyes

**Supplemental File 3.** Confusion matrix of the binary logistic regression predicting a visual impairment based on the averaged PandAcuity score

Visual impairment		Visual impairment predicted from PandAcuity		
observed	Actual	yes	No	
yes	71	48	23	
no	198	24	174	

Visual impairment: VA < 0.8 (decimal)

**Supplemental File 4.** Results of nine children with nystagmus. The PandAcuity score was calculated as the average of the first and second threshold determinations of the test and the prediction was determined according to the workflow depicted in Figure 2. The agreement between the classifications is based on the difference of the classification (1 step = almost equal, 2 steps = similar, 3 steps different, 4 steps very different)

		PandAcuity	VA		Visual imp	_	
Participar	nt	(decimal)	(decimal)	Prediction	PandAcuity	VA	Agreement
Pan13	OD	≤ 0.6*	1.0	incorrect	minimal	none	almost equal
	OS	≤ 0.4†	1.0	incorrect	mild	none	similar
Pan30	OD	≤ 0.6†	0.3	correct	minimal	moderate	similar
	OS	≤ 0.6 <del>†</del>	0.03	correct	minimal	profound	very different
Pan43	OD	≤ 0.4†	0.4	correct	mild	mild	equal
	OS	≤ 0.4†	0.4	correct	mild	mild	equal
Pan44	OD	≤ 0.4†	0.4	correct	mild	mild	equal
Pan54	OD	≥ 1.25†	0.8	correct	none	none	equal
	OS	1.12†	0.8	correct	none	none	equal
Pan57	OD	≤ 0.4†	0.16	correct	mild	moderate	almost equal
Pan116	OD	≤ 0.4†	0.3	correct	mild	moderate	almost equal
	OS	≤ 0.4†	0.3	correct	mild	moderate	almost equal
Pan117	OD	≤ 0.4†	0.5	correct	mild	minimal	almost equal
	OS	≤ 0.4†	0.5	correct	mild	minimal	almost equal
Pan126	OD	≤ 0.4†	0.05	correct	mild	profound	different
	OS	≤ 0.4†	0.2	correct	mild	moderate	almost equal

<sup>\*</sup>Test-set high (0.6 - 1.6); †Test-set low (0.4 - 1.25); ‡Classification according to ICO9. VA = visual acuity by conventional tests

**Supplemental File 5.** Results of seven developmentally delayed children or those with intellectual disabilities. The PandAcuity score was calculated as the average of the first and second measurements of the test and the prediction was determined according to the workflow depicted in Figure 2. The agreement between the classifications is based on the difference of the classification (1 step = almost equal, 2 steps = similar, 3 steps different, 4 steps very different)

					Visual impairment‡		
Participant		PandAcuity (decimal)	VA (decimal)	Prediction	PandAcuity	VA	- Agreement
Pan34	OD	(decimal) ≤ 0.6*	0.5		minimal	minimal	
	_			correct			equal
Joubert-	os	≤ 0.6*	0.5	correct	minimal	minimal	equal
Syndrome				00001			
Pan40	OD	≤ 0.6*	0.5	correct	minimal	minimal	equal
Trisomy 21	OS	≤ 0.6*	0.4	correct	minimal	mild	almost equal
Pan49	OD	≤ 0.4†	0.16	correct	mild	moderate	almost equal
Williams-	OS	≤ 0.4†	0.1	correct	mild	severe	similar
Beuren-		•					
Syndrome							
Pan79	OD	≤ 0.6*	0.63	correct	minimal	minimal	equal
Cerebral	OS	= 0.6* ≤ 0.6*	0.63	correct	minimal	minimal	equal
paresis	00	= 0.0	0.00	COLLECT	minima	minima	cquai
Pan 105	OD	≤ 0.6*	0.3	correct	minimal	moderate	similar
							•
Microdeletion	OS	≤ 0.6*	0.25	correct	minimal	moderate	similar
syndrome	0.0	. 4.04	4.0				•
Pan141	OD	≥ 1.6*	1.0	correct	none	none	equal
Beckwith-	OS	1.13*	1.0	correct	none	none	equal
Wiedemann							
Syndrome							
Pan149	OD	≥ 1.6*	1.0	correct	none	none	equal
Intellectually	os	≥ 1.6*	1.0	_	none	none	equal
disabled		=0		correct			

<sup>\*</sup>Test-set high (0.6-1.6); †Test-set low (0.4-1.25); ‡Classification according to ICO $^9$ . VA = visual acuity by conventional tests