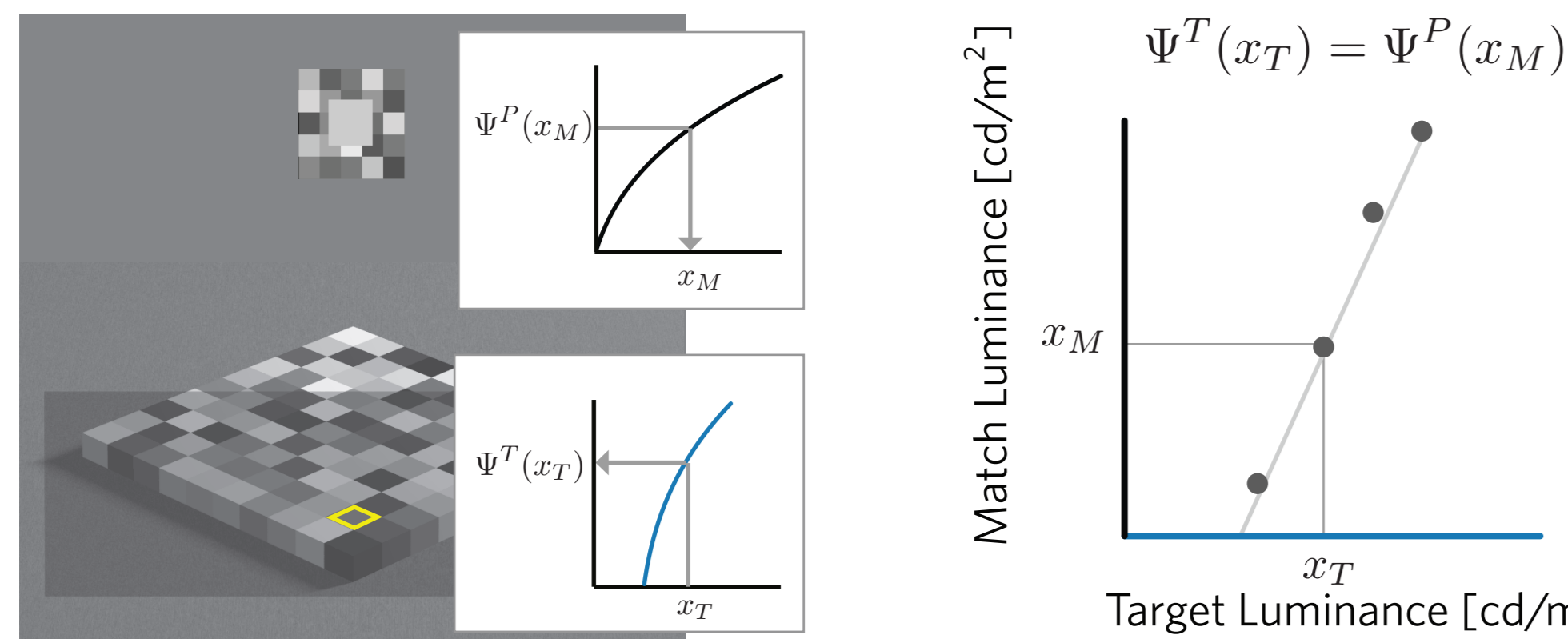


### Contact

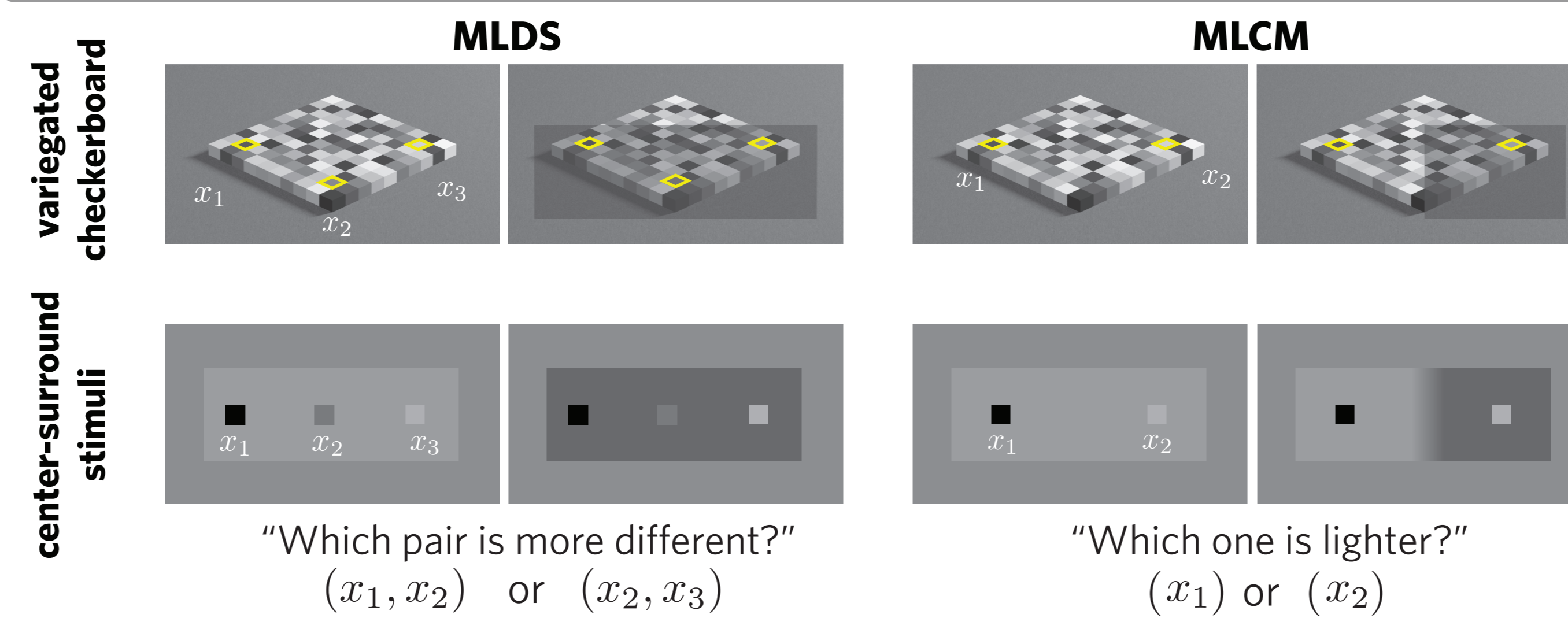
guillermo.aguilar@mail.tu-berlin.de  
marianne.maertens@tu-berlin.de

### Asymmetric matching

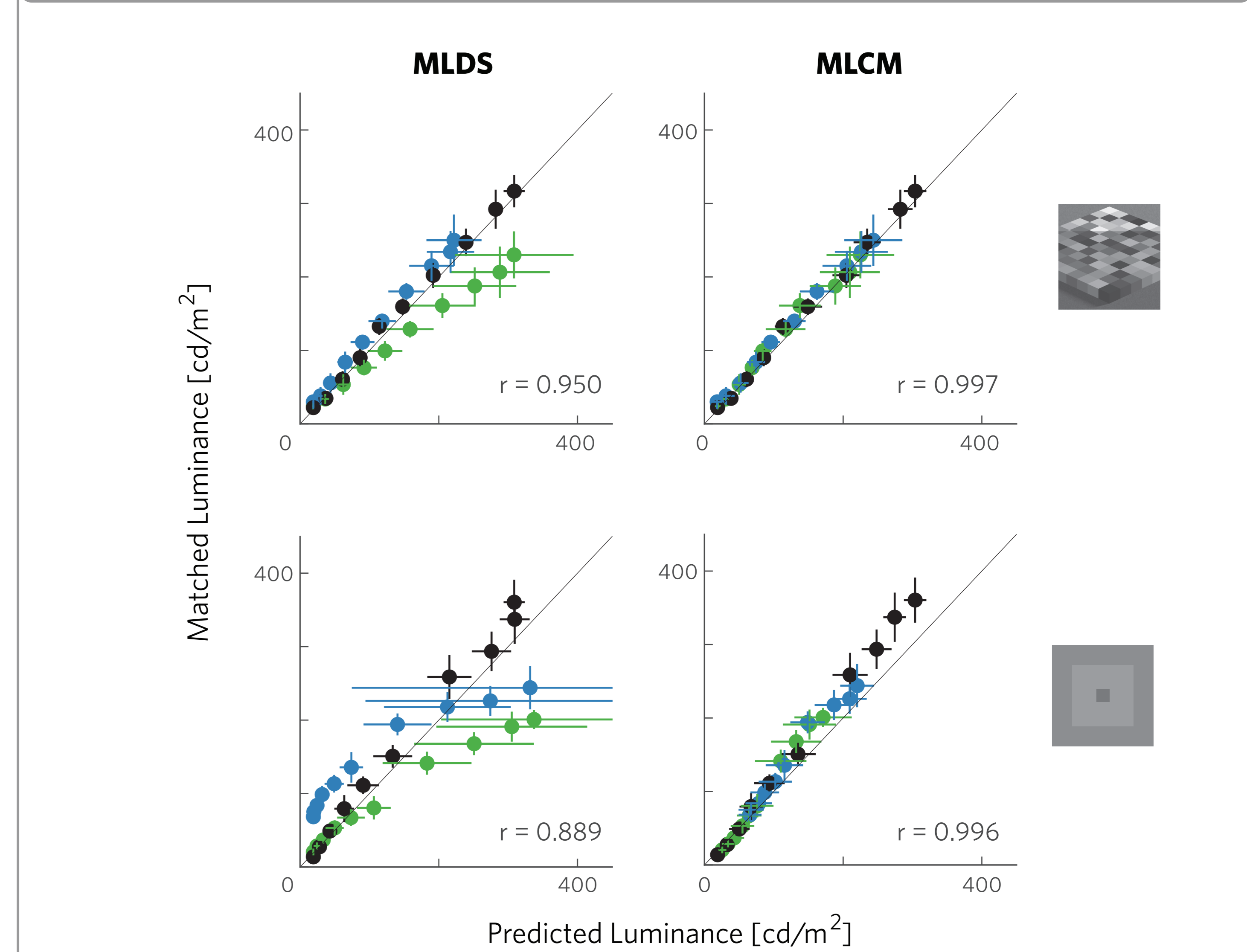
- Widely used method to measure psychological experiences, e.g. lightness perception
- Captures perception in units of physical variables e.g. luminance
- Goal: characterize internal dimensions of perceptual experience



### Experimental testbed



### Relating scales and matches

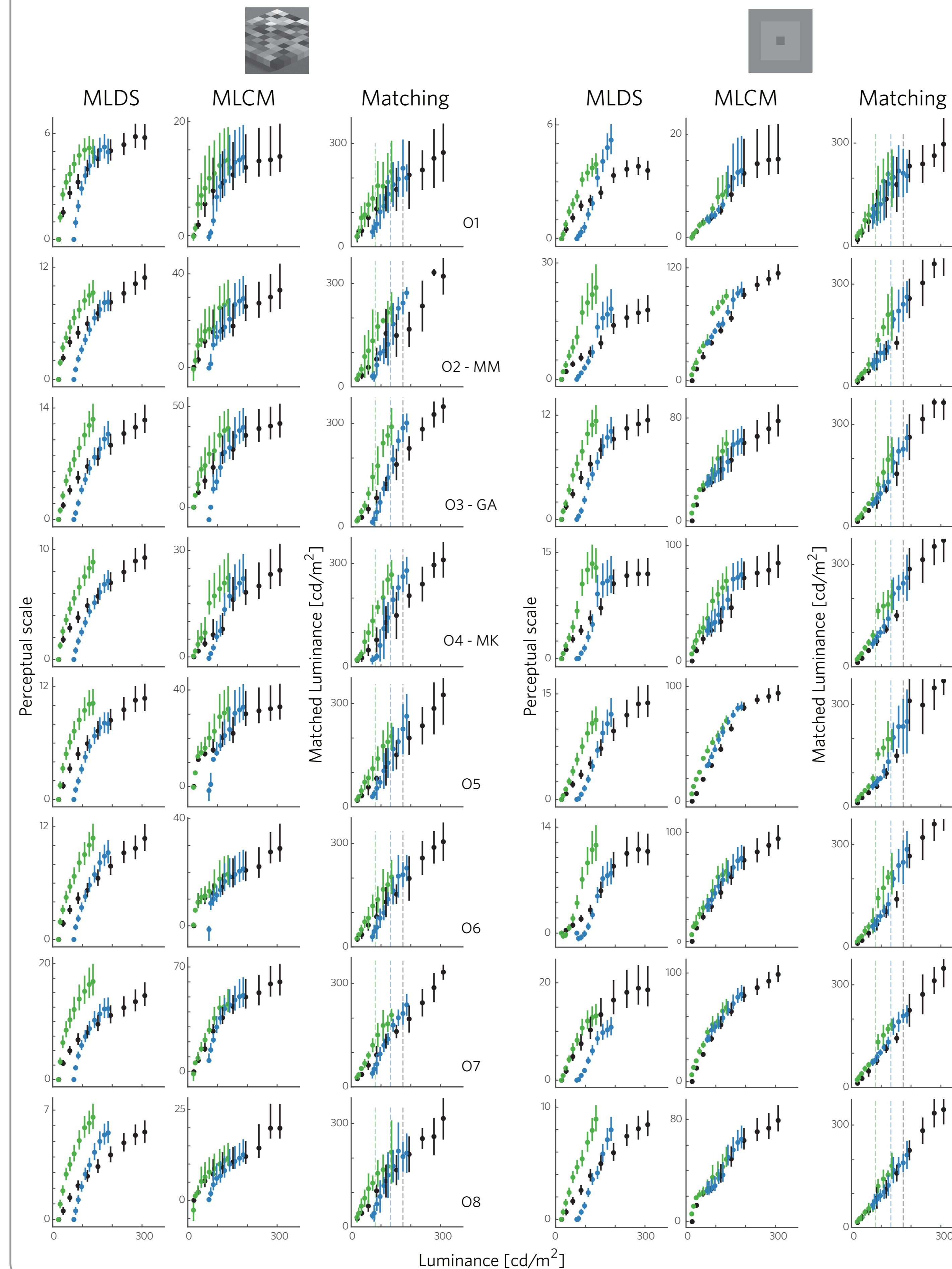


### Perceptual scales

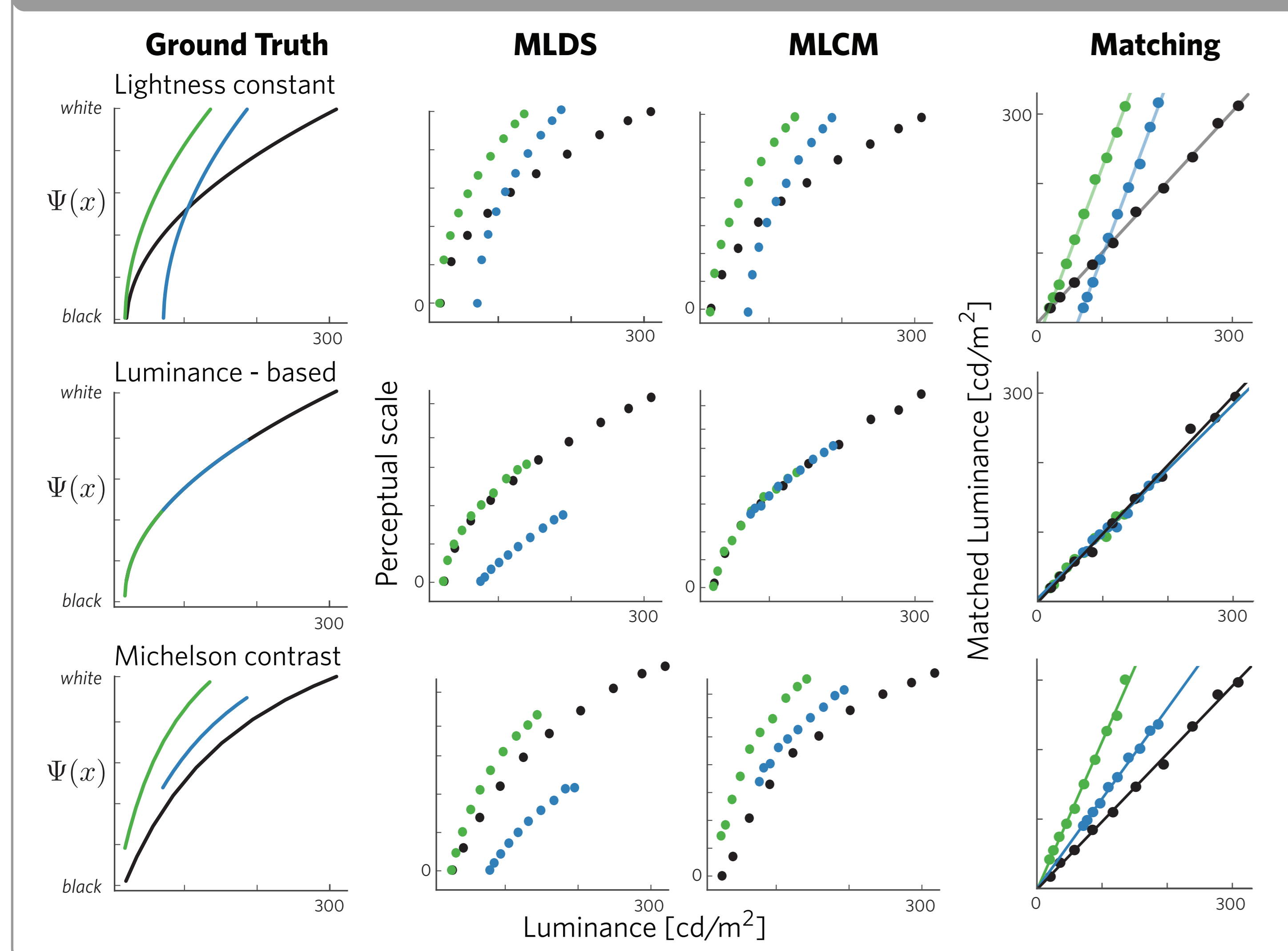
	MLDS Max. Likelihood Difference Scaling [2,3]	MLCM Max. Likelihood Conjoint Measurement [3]
<b>Task</b>	“Which pair is more different?” ( $x_1, x_2$ ) or ( $x_2, x_3$ )	“Which one is lighter?” ( $x_1$ ) or ( $x_2$ )
<b>Decision model</b>	$\Delta_{MLDS} = [\Psi^i(x_3) - \Psi^i(x_2)] - [\Psi^i(x_2) - \Psi^i(x_1)] + \epsilon$ $\epsilon \sim \mathcal{N}(0, \sigma^2)$	$\Delta_{MLCM} = [\Psi^j(x_2) - \Psi^i(x_1)] + \epsilon$ $\epsilon \sim \mathcal{N}(0, \sigma^2)$
<b>Comparisons</b>	within context	within and across-context

**Goal:** Evaluate scaling methods for estimating perceptual scales

### Results - individual examples



### Simulations



### Method comparison

	MLDS	MLCM	Matching
<b>context comparison</b>	within	within and across	across
<b>perceptual judgment</b>	interval difference	simple difference	equality
<b>task</b>	triad comparison	paired comparison	adjust until equal
<b>subjective difficulty</b>	x x	x	x x x
<b>method's outcome</b>	perceptual scales		matches in physical units
<b># trials</b>	3600/obs	3350/obs	300/obs

### Discussion

- MLDS' anchoring policy is problematic when several scales are estimated and need to be compared
- In the present study MLCM seem to provide more valid scales estimates, in simulations and in experiments
- Adequacy of one or the other method needs to be evaluated in each experimental scenario
- Correspondance between MLCM and matches suggest that MLCM based scales provide a more direct estimate of the internal dimension of interest

### Acknowledgements

This work was supported by the German Research Foundation (DFG MA5127/3-1, /4-1 and /5-1 to Marianne Maertens).

### References

- [1] Wiebel, Aguilar, Maertens (2017). JoV, 17(4): 1
- [2] Maloney & Yang (2003). JoV, 3(8): 573:85
- [3] Knoblauch & Maloney (2012).