

## Supplementary Material

We fit the ePTM (equation 5) to the trial-by-trial response data from the two eyes to derive the parameters of the model for each participant using a maximum likelihood procedure (Watson 1979). A  $\chi^2$  test was used to determine the goodness of fit (Watson 1979). A p-value  $> 0.05$  means the model is statistically equivalent to the null hypothesis, i.e., a model in which the parameters are the trial responses themselves, thus indicates a good fit. The goodness of fit for each participant is listed in Table S1.

To better illustrate the goodness of fit of the model, the raw psychometric functions in all the masking conditions as well as the model predictions for two representative observers (Y5 and O5) are shown in the Figure S1. In each masking condition, the 300 trials were binned by dividing the log stimuli contrast range into six equal parts, and the raw psychometric function was constructed as the percentage correct in the six bins (Hou, Huang et al. 2010). Please note that the binned psychometric functions are shown purely for illustration purposes. The model fit used trial-by-trial data.

Table S1. Goodness of fit of the model for all observers

Observer		$\chi^2$	$p$
Young group	Y1	600.4	1.000
	Y2	633.8	1.000
	Y3	641.6	1.000
	Y4	677.7	0.995
	Y5	630.4	1.000
	Y6	637.0	1.000
	Y7	587.0	1.000
	Y8	628.4	1.000

	Y9	667.2	0.999
	Y10	599.9	1.000
	Y11	653.8	0.999
	Y12	714.4	0.882
<b>Older group</b>	O1	647.4	0.999
	O2	606.9	1.000
	O3	700.8	0.956
	O4	698.3	0.964
	O5	662.0	0.999
	O6	666.4	0.999
	O7	708.6	0.920
	O8	653.7	1.000
	O9	641.8	1.000
	O10	660.0	0.999
	O11	682.9	0.992
	O12	674.3	0.997

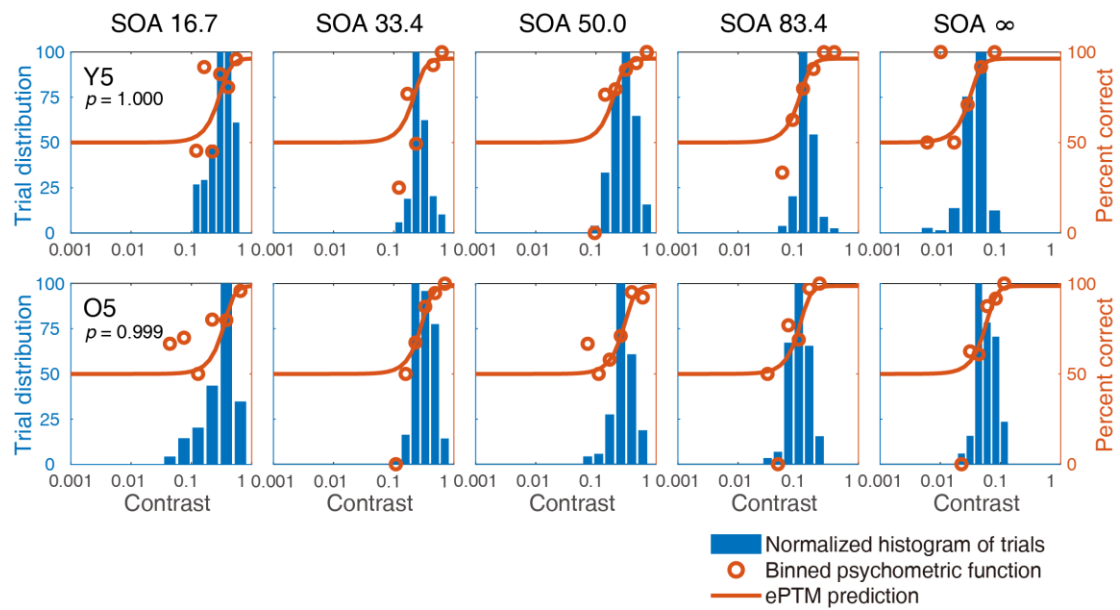


Figure S1. Raw psychometric functions (circles) in the target-mask SOA 16.7, 33.4, 50.0, 83.4 and  $\infty$  conditions are shown for observers Y5 and O5. The ePTM predictions are shown as continuous curves with the goodness of fit ( $p$ -value). The normalized distributions of trials in six contrast ranges in each condition are also plotted.

## Reference

- Hou, F., C. B. Huang, L. Lesmes, L. X. Feng, L. Tao, Y. F. Zhou and Z. L. Lu (2010). "qCSF in clinical application: efficient characterization and classification of contrast sensitivity functions in amblyopia." *Invest Ophthalmol Vis Sci* **51**(10): 5365-5377.
- Watson, A. B. (1979). "Probability summation over time." *Vision Research* **19**(5): 515-522.