

Improved visual sensitivity during smooth pursuit eye movements: Temporal and spatial characteristics

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| Parameters equal for fixation and pursuit | | None | A | W | D | A&W | A&D | W&D | A&W&D |
|---|----------|--------|--------|--------|--------|--------|--------|--------|--------|
| Number of free paramters | | 6 | 5 | 5 | 5 | 4 | 4 | 4 | 3 |
| Subject ACS | | | | | | | | | |
| A | Fixation | 0.73 | 0.91 | 0.81 | 0.73 | 0.91 | 0.91 | 0.79 | 0.88 |
| | Pursuit | 1 | | 0.99 | 1 | | | 0.98 | |
| W | Fixation | 9.14 | 6.63 | 7.88 | 9.16 | 6.75 | 6.62 | 8.09 | 8.17 |
| | Pursuit | 7.78 | 8.98 | | 7.78 | | 8.97 | | |
| D | Fixation | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Pursuit | 1 | 1 | 1 | | 0.75 | | | |
| RMSE | | 6.2 | 6.55 | 6.26 | 6.2 | 6.84 | 6.55 | 6.25 | 8.19 |
| AIC | | 156.44 | 157.55 | 154.07 | 153.41 | 158.01 | 154.71 | 151.17 | 169.02 |
| rAIC | | 0.04 | 0.02 | 0.13 | 0.17 | 0.02 | 0.09 | 0.53 | 0 |
| BIC | | 164.16 | 164.66 | 161.19 | 160.52 | 164.32 | 161.03 | 157.49 | 174.36 |
| rBIC | | 0.02 | 0.02 | 0.1 | 0.13 | 0.02 | 0.1 | 0.61 | 0 |
| Subject HO | | | | | | | | | |
| A | Fixation | 0.63 | 0.77 | 0.65 | 0.62 | 0.77 | 0.78 | 0.68 | 0.76 |
| | Pursuit | 0.88 | | 0.88 | 0.9 | | | 0.84 | |
| W | Fixation | 8.69 | 7.45 | 6.28 | 7.57 | 6.23 | 5.3 | 6.26 | 6.37 |
| | Pursuit | 5.66 | 5.94 | | 5.88 | | 6.88 | | |
| D | Fixation | 0.81 | 0.94 | 0.6 | 0.68 | 0.78 | 0.65 | 0.65 | 0.66 |
| | Pursuit | 0.63 | 0.53 | 0.7 | | 0.56 | | | |
| RMSE | | 5.99 | 6.57 | 6.14 | 6.03 | 6.61 | 6.78 | 6.19 | 7.92 |
| AIC | | 153.72 | 157.75 | 152.63 | 151.2 | 155.39 | 157.38 | 150.36 | 166.5 |
| rAIC | | 0.08 | 0.01 | 0.14 | 0.29 | 0.04 | 0.01 | 0.43 | 0 |
| BIC | | 161.45 | 164.87 | 159.75 | 158.32 | 161.7 | 163.69 | 156.67 | 171.83 |
| rBIC | | 0.02 | 0.02 | 0.1 | 0.13 | 0.02 | 0.1 | 0.61 | 0 |

Table S1. Experiment 1: Overview of fitted models. Each model name contains the parameters that are fixed to equal values during fixation and pursuit. A is the response gain, W the natural temporal frequency and D the damping ratio.

| Function name | DoG | EmG | HmG | HPmG | HmH | HPmH | MS | YQM | LP | |
|--------------------------|----------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| Number of free paramters | 4 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 4 | |
| Subject ACS | | | | | | | | | | |
| A | Fixation | 24.75 | 34.41 | 26.29 | 19.69 | 26.44 | 39.02 | 51.32 | 54.51 | 23.52 |
| | Pursuit | 20.3 | 23.5 | 20.54 | 17.88 | 20.58 | 23.28 | 10.62 | 27.36 | 20.11 |
| f0 | Fixation | 6.2 | 4.87 | 3.61 | 5.17 | 3.6 | 1.77 | 0.63 | 3.81 | 1.08 |
| | Pursuit | 10.26 | 12.21 | 6.68 | 7.73 | 6.66 | 5.39 | 0.03 | 9.94 | 1.26 |
| b | Fixation | 0.48 | 0.57 | 0.5 | 2.15 | 0.55 | 0.65 | 0.91 | 8.79 | 3.87 |
| | Pursuit | 0.37 | 0.4 | 0.36 | 1.99 | 0.43 | 0.44 | 0.24 | 4.5 | 23.86 |
| f1 | Fixation | 0.65 | 0.82 | 0.74 | 0 | 0.4 | 0.52 | | 0.1 | 1.29 |
| | Pursuit | 0.53 | 0.74 | 0.57 | 0.03 | 0.29 | 0.41 | | 0.06 | 1.8 |
| p | Fixation | | | | 1.54 | | 0.58 | 0.61 | | |
| | Pursuit | | | | 1.73 | | 0.59 | 0.3 | | |
| RMSE | | 1.28 | 1.04 | 1.13 | 2.78 | 1.09 | 0.96 | 0.99 | 1.01 | 1.24 |
| AIC | | 34.19 | 29.36 | 31.28 | 61.67 | 30.46 | 36.23 | 28.05 | 28.58 | 33.44 |
| rAIC | | 0.02 | 0.18 | 0.07 | 0 | 0.1 | 0.01 | 0.34 | 0.26 | 0.02 |
| BIC | | 26.62 | 21.78 | 23.71 | 47.78 | 22.89 | 22.34 | 20.48 | 21 | 25.86 |
| rBIC | | 0.01 | 0.16 | 0.06 | 0 | 0.09 | 0.12 | 0.3 | 0.23 | 0.02 |
| Subject HO | | | | | | | | | | |
| A | Fixation | 25.48 | 32.55 | 26.16 | 19.38 | 27.1 | 25.78 | 58.45 | 67.17 | 24.15 |
| | Pursuit | 23.75 | 29.87 | 24.3 | 18.23 | 25.66 | 27.1 | 48.47 | 163.07 | 20.93 |
| f0 | Fixation | 6.9 | 6.22 | 4.26 | 5.96 | 4.11 | 4.47 | 1.04 | 3.92 | 1.31 |
| | Pursuit | 8.58 | 8.38 | 5.44 | 7.09 | 5.09 | 4.68 | 2.72 | 3.82 | 1.5 |
| b | Fixation | 0.6 | 0.64 | 0.61 | 2.11 | 0.65 | 0.64 | 0.93 | 14.55 | 1.98 |
| | Pursuit | 0.44 | 0.52 | 0.45 | 2.04 | 0.49 | 0.51 | 0.78 | 14.23 | 0.17 |
| f1 | Fixation | 0.63 | 0.75 | 0.66 | 0.01 | 0.41 | 0.38 | | 0.1 | 1.26 |
| | Pursuit | 1.01 | 1.14 | 1.06 | 0 | 0.72 | 0.76 | | 0.63 | 1.67 |
| p | Fixation | | | | 2.42 | | 1.18 | 0.69 | | |
| | Pursuit | | | | 2.7 | | 0.88 | 0.94 | | |
| RMSE | | 0.81 | 1.06 | 0.85 | 3.4 | 0.8 | 0.79 | 0.87 | 0.87 | 1.63 |
| AIC | | 23.19 | 29.79 | 24.51 | 66.46 | 23.11 | 31.37 | 24.99 | 24.89 | 40.09 |
| rAIC | | 0.29 | 0.01 | 0.15 | 0 | 0.3 | 0 | 0.12 | 0.12 | 0 |
| BIC | | 15.61 | 22.22 | 16.94 | 52.57 | 15.53 | 17.48 | 17.41 | 17.32 | 32.52 |
| rBIC | | 0.26 | 0.01 | 0.14 | 0 | 0.27 | 0.1 | 0.11 | 0.11 | 0 |

Table S2. Experiment 2, fixed size Gabor: Overview of fitted functions. A is the response gain, f0 the high-frequency cut-off, f1 the low-frequency cut-off, b the gain of the low-frequency attenuation and p the exponent.

| Function name | DoG | EmG | HmG | HPmG | HmH | HPmH | MS | YQM | LP | |
|--------------------------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Number of free paramters | 4 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 4 | |
| Subject ACS | | | | | | | | | | |
| A | Fixation | 50.79 | 71.16 | 53.84 | 57.59 | 53.84 | 57.59 | 87.95 | 76.27 | 52.24 |
| | Pursuit | 46.72 | 62.85 | 49.86 | 57.57 | 49.86 | 57.57 | 0.83 | 62.84 | 81.18 |
| f0 | Fixation | 3.74 | 2.74 | 2.11 | 1.82 | 2.11 | 1.82 | 0.12 | 2.65 | 0.69 |
| | Pursuit | 4.37 | 3.33 | 2.43 | 1.75 | 2.43 | 1.75 | 0 | 3.33 | 0.1 |
| b | Fixation | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 100 | 24.02 |
| | Pursuit | 1 | 1 | 1 | 2 | 1 | 2 | 0.86 | 100 | 4.7 |
| f1 | Fixation | 0.09 | 0.39 | 0.05 | 0 | 0 | 0 | | 0 | 1.07 |
| | Pursuit | 0.12 | 0 | 0.12 | 0 | 0.02 | 0 | | 0 | 2 |
| p | Fixation | | | | 0.83 | | 0.83 | 0.47 | | |
| | Pursuit | | | | 0.7 | | 0.7 | 0.17 | | |
| RMSE | | 3.98 | 1.89 | 3.02 | 1.97 | 3.02 | 1.97 | 1.14 | 1.93 | 1.17 |
| AIC | | 69.53 | 39.82 | 58.48 | 45.66 | 58.48 | 45.66 | 19.55 | 40.66 | 20.44 |
| rAIC | | 0 | 0 | 0 | 0 | 0 | 0 | 0.61 | 0 | 0.39 |
| BIC | | 70.22 | 40.52 | 59.18 | 45.17 | 59.18 | 45.17 | 20.24 | 41.35 | 21.13 |
| rBIC | | 0 | 0 | 0 | 0 | 0 | 0 | 0.61 | 0 | 0.39 |
| Subject AE | | | | | | | | | | |
| A | Fixation | 54.35 | 76.7 | 58.85 | 65.12 | 58.85 | 65.12 | 1.02 | 76.68 | 65.21 |
| | Pursuit | 48.8 | 66.45 | 52.21 | 61.96 | 52.21 | 61.96 | 12.35 | 66.44 | 60.26 |
| f0 | Fixation | 3.47 | 2.5 | 1.9 | 1.54 | 1.9 | 1.54 | 0 | 2.5 | 0.39 |
| | Pursuit | 4.05 | 3.03 | 2.24 | 1.51 | 2.24 | 1.51 | 0 | 3.03 | 0.35 |
| b | Fixation | 1 | 1 | 1 | 1.99 | 1 | 1.99 | 1.02 | 100 | 29.39 |
| | Pursuit | 1 | 1 | 1 | 2.02 | 1 | 2.02 | 0.99 | 100 | 24.58 |
| f1 | Fixation | 0.12 | 0.12 | 0.12 | 0 | 0.02 | 0 | | 0 | 1.29 |
| | Pursuit | 0.01 | 0 | 0.09 | 0 | 0.02 | 0 | | 0 | 1.45 |
| p | Fixation | | | | 0.77 | | 0.77 | 0.17 | | |
| | Pursuit | | | | 0.68 | | 0.68 | 0.24 | | |
| RMSE | | 4.65 | 2.23 | 3.48 | 2.34 | 3.48 | 2.34 | 2.04 | 2.25 | 1.84 |
| AIC | | 75.76 | 46.28 | 64.13 | 52.4 | 64.13 | 52.4 | 42.72 | 46.69 | 38.7 |
| rAIC | | 0 | 0.02 | 0 | 0 | 0 | 0 | 0.11 | 0.02 | 0.85 |
| BIC | | 76.46 | 46.97 | 64.82 | 51.91 | 64.82 | 51.91 | 43.42 | 47.38 | 39.4 |
| rBIC | | 0 | 0.02 | 0 | 0 | 0 | 0 | 0.11 | 0.02 | 0.85 |

Table S3. Experiment 2, fixed cycles Gabor: Overview of fitted functions.

Conventions are the same as in Table S2.

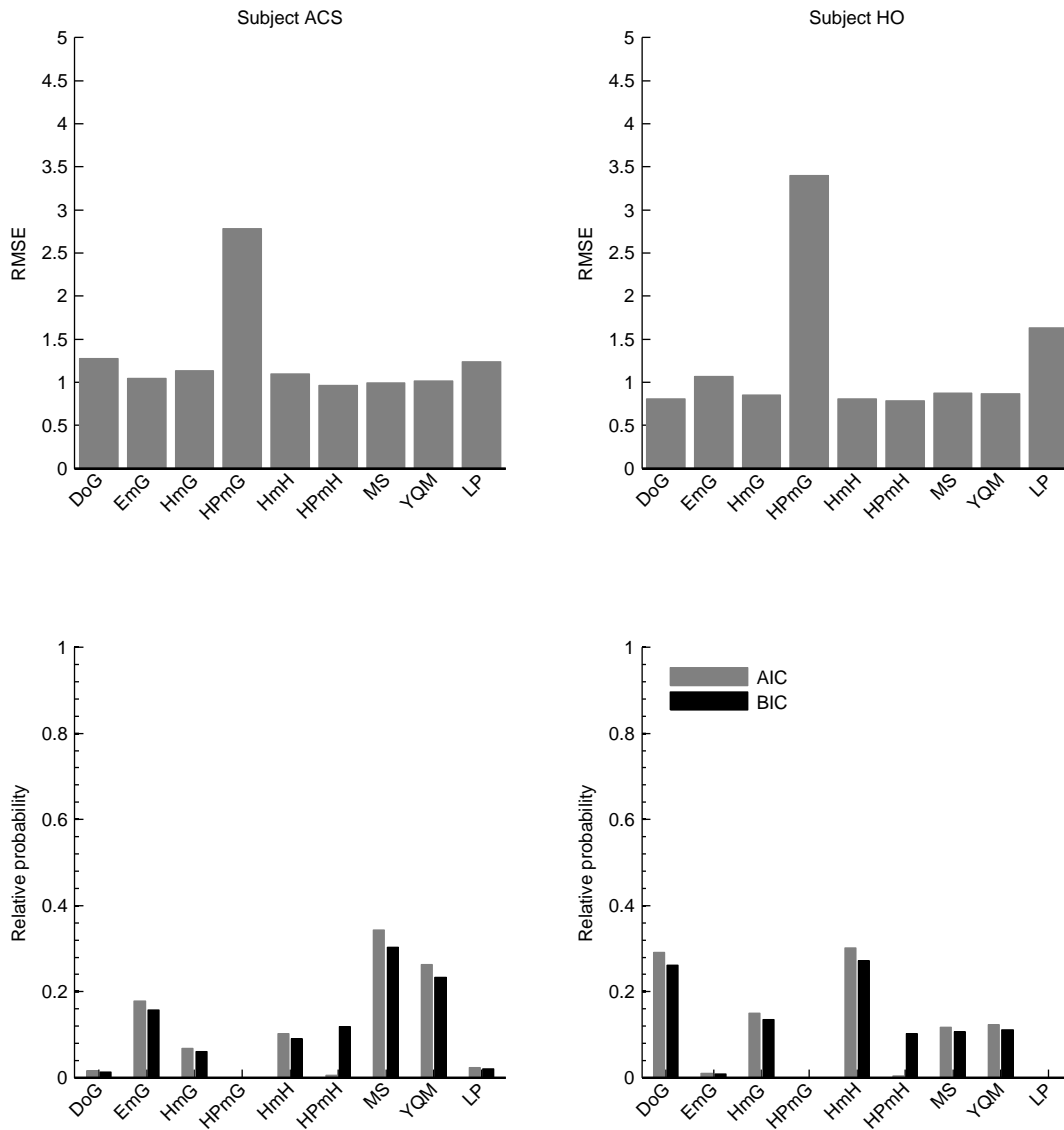


Fig. S1. Experiment 2, fixed size Gabor: Quality of function fit. The two columns show the data for two subjects. The upper row shows the root mean square error (RMSE) for the nine different functions. The lower row shows the relative probability of the Akaike information criterion (AIC) in gray and the Bayesian information criterion (BIC) in black for the different functions. Superior functions are indicated by a lower RMSE and a higher relative probability.

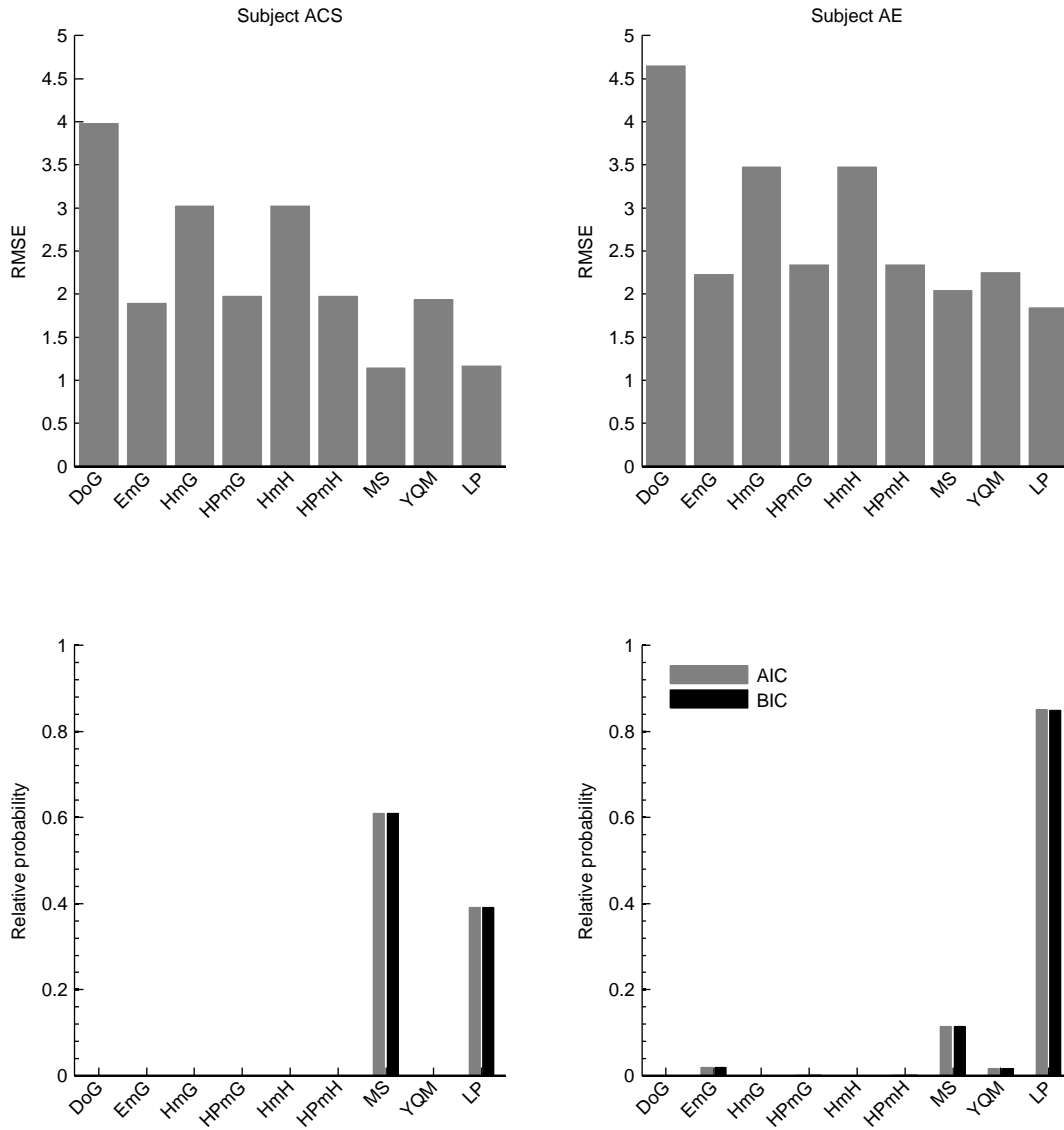


Fig. S2. Experiment 2, fixed cycles Gabor: Quality of function fit. Conventions are the same as in Fig. S1.