

Supplementary Results

Morphometric measurements

Table S1. Brain volume as a function of treatment, sex, rearing tank and body length

Fixed effects	Estimate	Lower 95% CI	Upper 95% CI	P
Intercept	16.67	15.10	18.24	< 0.001
Treatment	-0.11	-0.26	0.02	0.496
Sex	0.11	-0.04	0.27	< 0.001
Rearing tank	0.02	-0.01	0.06	0.715
Body length	1.54	1.08	2.00	< 0.001

Table S2. Optic tectum volume as a function of treatment, sex, rearing tank and body length

Fixed effects	Estimate	Lower 95% CI	Upper 95% CI	P
Intercept	5.49	1.36	9.62	0.010
Treatment	-0.27	-0.40	-0.14	< 0.001
Sex	0.09	-0.05	0.24	< 0.001
Rearing tank	-0.003	-0.04	0.03	0.712
Brain volume	0.73	0.54	0.93	< 0.001

Table S3. Olfactory bulb volume as a function of treatment, sex, rearing tank and body length

Fixed effects	Estimate	Lower 95% CI	Upper 95% CI	P
Intercept	-8.54	-17.85	0.76	0.071
Treatment	0.82	0.57	1.08	< 0.001
Sex	0.03	-0.26	0.34	< 0.001
Rearing tank	-0.01	-0.08	0.05	0.550
Brain volume	1.20	0.78	1.63	< 0.001

Table S4. Cerebellum volume as a function of treatment, sex, rearing tank and body length

Fixed effects	Estimate	Lower 95% CI	Upper 95% CI	P
Intercept	1.63	-4.50	7.77	0.592
Treatment	0.11	-0.05	0.29	0.429
Sex	-0.01	-0.22	0.19	< 0.001
Rearing tank	0.03	-0.01	0.08	0.428
Brain volume	0.87	0.59	1.15	< 0.001

Table S5. Dorsal medulla volume as a function of treatment, sex, rearing tank and body length

Fixed effects	Estimate	Lower 95% CI	Upper 95% CI	P
Intercept	2.71	-3.17	8.61	0.356
Treatment	0.18	0.02	0.35	0.440
Sex	0.19	-0.00001	0.39	< 0.001
Rearing tank	-0.06	-0.11	-0.01	0.006
Brain volume	0.76	0.44	1.03	< 0.001

Table S6. Telencephalon volume as a function of treatment, sex, rearing tank and body length

Fixed effects	Estimate	Lower 95% CI	Upper 95% CI	P
Intercept	-4.39	-10.05	1.27	0.124
Treatment	0.04	-0.11	0.19	0.792
Sex	-0.01	-0.19	0.16	< 0.001
Rearing tank	-0.004	-0.04	0.03	0.611
Brain volume	1.12	0.86	1.38	< 0.001

Control trials

Table S7. Preference as a function of shoal size ratio, in the visually-unrestricted treatment with access to chemical information only

Fixed effects	Estimate	Lower 95% CI	Upper 95% CI	P
Intercept	2.22	1.73	2.78	< 0.001
Shoal size ratio	-1.06	-1.68	-0.44	< 0.001
Random effects	Variance	Lower 95% CI	Upper 95% CI	
Fish identity	0.11	0.03	0.74	
Rearing tank	0.02	0.00	0.84	
Sex	0.00	0.00	0.75	

Table S8. Preference as a function of shoal size ratio, in the visually-unrestricted treatment with access to visual information only

Fixed effects	Estimate (β)	Lower 95% CI	Upper 95% CI	P
Intercept	2.04	1.53	2.55	< 0.001
Shoal size ratio	-1.06	-1.54	-0.58	< 0.001
Random effects	Variance	Lower 95% CI	Upper 95% CI	
Fish identity	0.01	0.00	0.54	
Rearing tank	0.05	0.00	0.87	
Sex	0.00	0.00	0.66	

Table S9. Preference as a function of shoal size ratio, in the visually-restricted treatment with access to chemical information only

Fixed effects	Estimate (β)	Lower 95% CI	Upper 95% CI	P
Intercept	1.00	0.60	1.41	< 0.001
Shoal size ratio	0.43	0.09	0.78	< 0.001
Random effects	Variance	Lower 95% CI	Upper 95% CI	
Fish identity	0.19	0.24	0.82	
Rearing tank	0.00	0.00	0.59	
Sex	0.00	0.00	0.60	

Table S10. Preference as a function of shoal size ratio, in the visually-restricted treatment with access to visual information only

Fixed effects	Estimate (β)	Lower 95% CI	Upper 95% CI	P
Intercept	0.73	-0.35	2.02	0.026
Shoal size ratio	-2.29	-2.69	-1.92	< 0.001
Random effects	Variance	Lower 95% CI	Upper 95% CI	
Fish identity	0.19	0.09	0.98	
Rearing tank	0.24	0.00	2.04	
Sex	0.00	0.00	1.68	

Experimental trials

Table S11. Preference as a function of shoal size ratio, in the visually-unrestricted treatment

Fixed effects	Estimate	Lower 95% CI	Upper 95% CI	P
Intercept	0.80	-0.47	2.05	0.0731
Shoal size ratio	-0.68	-0.93	-0.43	< 0.001
Random effects	Variance	Lower 95% CI	Upper 95% CI	
Fish identity	3.43	1.31	2.75	
Rearing tank	0.062	0.00	2.20	
Sex	0.000000006	0.00	0.74	

Table S12. Preference as a function of shoal size ratio, in the visually-restricted treatment

Fixed effects	Estimate (β)	Lower 95% CI	Upper 95% CI	P
Intercept	-0.44	-1.15	0.22	0.109
Shoal size ratio	0.48	0.26	0.70	< 0.001
Random effects	Variance	Lower 95% CI	Upper 95% CI	
Fish identity	1.51	0.91	1.76	
Rearing tank	0.00	0.00	0.89	
Sex	0.00	0.00	1.08	

Table S13. Preference as a function of optic tectum volume, for the 8:4 shoal size ratio

Fixed effects	Estimate	Lower 95% CI	Upper 95% CI	P
Intercept	0.47	-1.94	2.89	0.554
Optic tectum	0.18	0.002	0.37	0.047
Random effects	Variance	Lower 95% CI	Upper 95% CI	
Rearing tank	0.14	0.15	1.01	
Sex	0.41	0.25	1.53	
Treatment	0.81	0.28	0.93	

Table S14. Preference as a function of olfactory bulb volume, for the 8:4 shoal size ratio

Fixed effects	Estimate	Lower 95% CI	Upper 95% CI	P
Intercept	0.49	-2.34	3.34	0.590
Olfactory bulb	0.27	0.07	0.46	0.008
Random effects	Variance	Lower 95% CI	Upper 95% CI	
Treatment	1.16	0.39	2.45	
Sex	0.46	0.26	1.18	
Rearing tank	0.68	0.19	1.12	

Table S15. Preference as a function of olfactory bulb/optic tectum ratio, for the 8:4 shoal size ratio

Fixed effects	Estimate	Lower 95% CI	Upper 95% CI	P
Intercept	0.49	-2.41	3.40	0.592
Olfactory bulb	0.25	0.01	0.49	0.040
Random effects	Variance	Lower 95% CI	Upper 95% CI	
Treatment	1.26	0.42	2.13	
Sex	0.36	0.23	0.71	
Rearing tank	0.68	0.19	1.13	