Supplementary Materials of "Neurons in the dorso-central part of zebrafish pallium encode visual numerosity"

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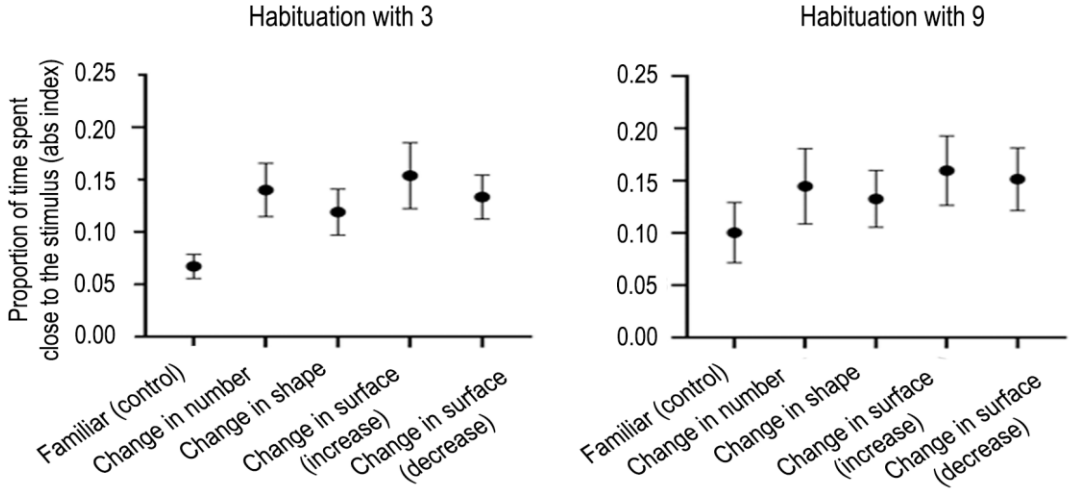

Figure S1. Related to Figure 2. Proportion of time spent near the stimulus during dishabituation (comparing the dishabituation trial (*test time*) with the previous habituation session (average of the four trials, *habituation time*)) as a function of habituation conditions (with 3 or 9 dots) and test conditions [no change (familiar), change in number, change in shape, change in surface area (increase), change in surface area (decrease).

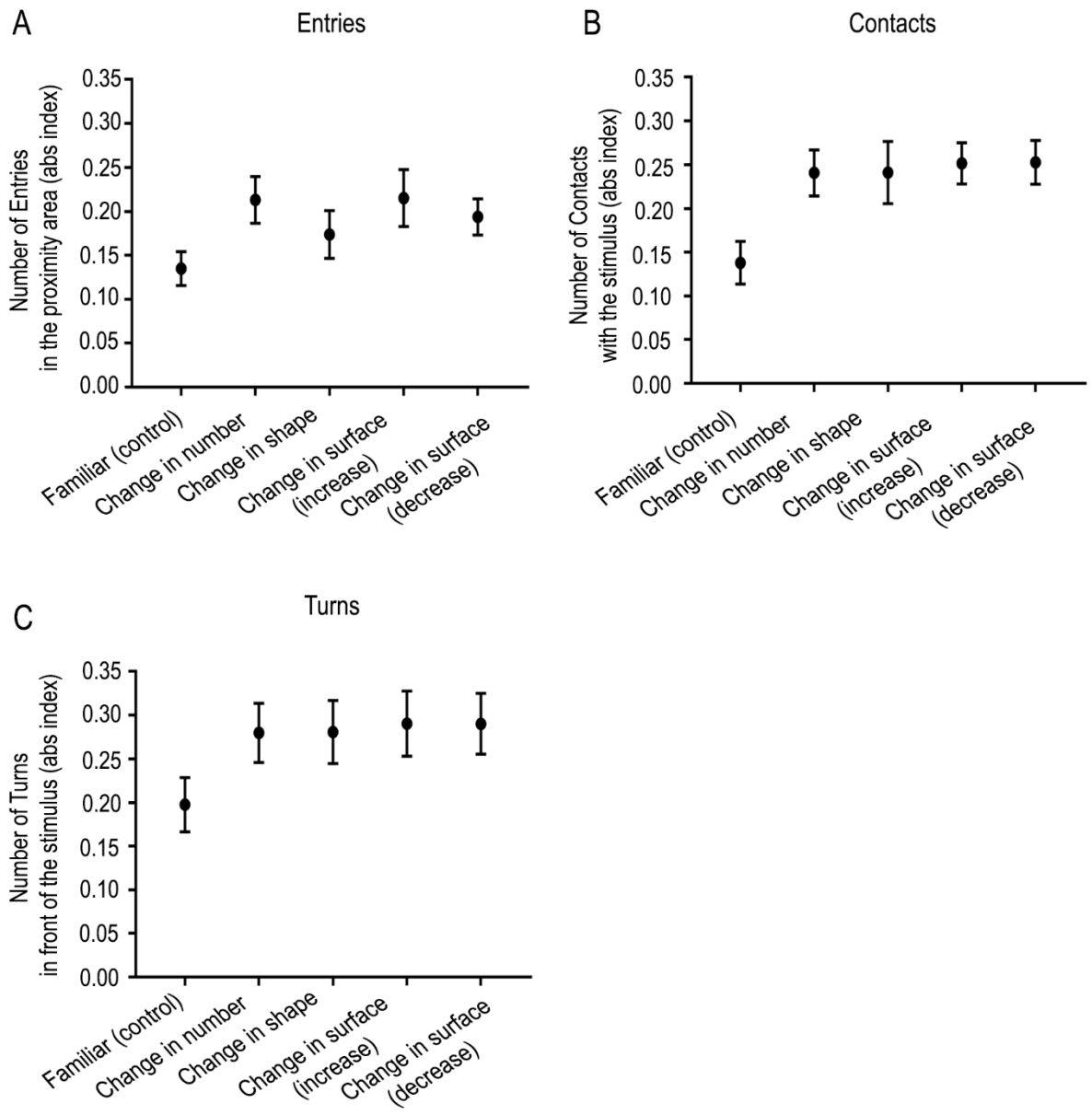

Figure S2. Related to Figure 2. Behavioral measures concerning the proportions of "*entries in the proximity area*" (A), "contacts with the stimulus", and (B) "turns in front of the stimulus in the proximity area" (C) for the different testing conditions. Group means with SEM are shown. The ANOVA revealed a significant heterogeneity among conditions in the proportion of contacts with the stimulus ($F(4,233) = 3.214$, $p = 0.014$; LSD post hoc tests: Familiar vs. Change in number $p = 0.008$; Familiar vs. Change in shape $p = 0.008$; Familiar vs. Change in area (increase) $p = 0.004$; Familiar vs. Change in area (decrease) $p = 0.003$). There was no overall heterogeneity in the proportion of entries in the proximity area ($F(4,240) = 1.662$,

p = 0.160) and in the proportion of turns in front of the stimulus ($F(4,232) = 1.320$, $p = 0.263$). However, when comparing the four test conditions involving a change with the control condition (no change), a significant effect was observed also for entries in proximity area ($F(1,246) = 5.033$, $p = 0.026$) and turns in front of the stimulus ($F(1,238) = 5.268$, $p = 0.023$).

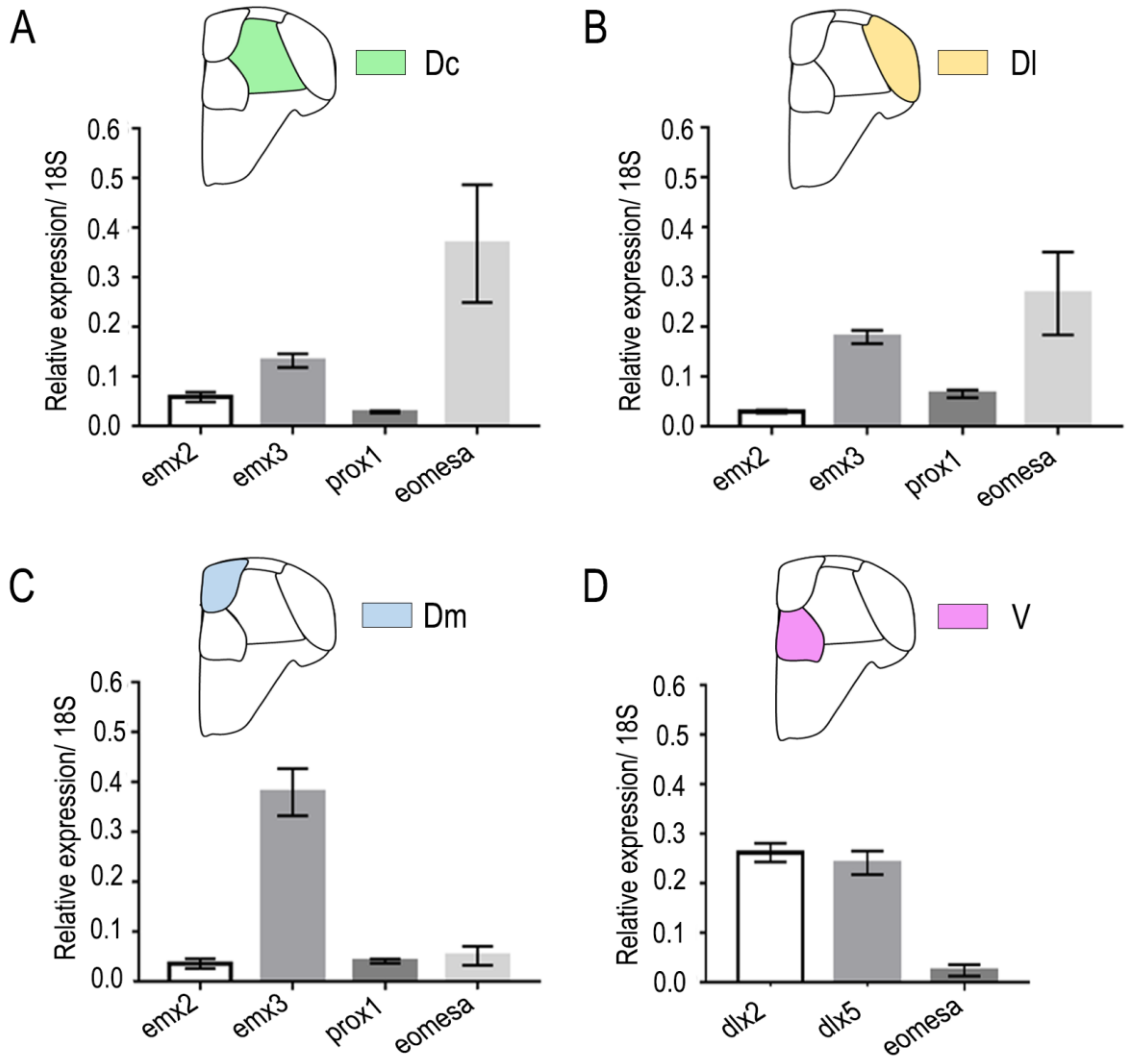

Figure S3. Related to Figure 3. Molecular signature of regional markers**.** qPCR results for the relative expression of molecular markers in the central part of *area dorsalis telencephali* (A), in the lateral part of *area dorsalis telencephali* (B), in the medial part of *area dorsalis telencephali* (C), and in the *ventral subpallium* (D) in the different test conditions. Group means with SEM are shown. ANOVA revealed a significant main effect of the nuclei for each gene analysed : emx2 ($F(2, 192) = 3.543$, $p = 0.034$; LSD post hoc tests: Dc vs. Dl $p = 0.015$; Dc vs. Dm $p = 0.043$); emx3, ($F(2, 192) = 19.947$, $p = 0.0001$; LSD post hoc tests: Dc vs. Dm $p = 0.0001$); Dl vs. Dm $p = 0.0001$); prox1, ($F(2, 192) = 12.849$, $p = 0.0001$: LSD post hoc tests: Dc vs. Dl $p = 0 .0001$; Dl vs. Dm $p = 0.001$); eomesa ($F(2, 192) = 3.669$, $p = 0.027$; LSD post hoc tests; Dc vs. Dm $p = 0.009$).

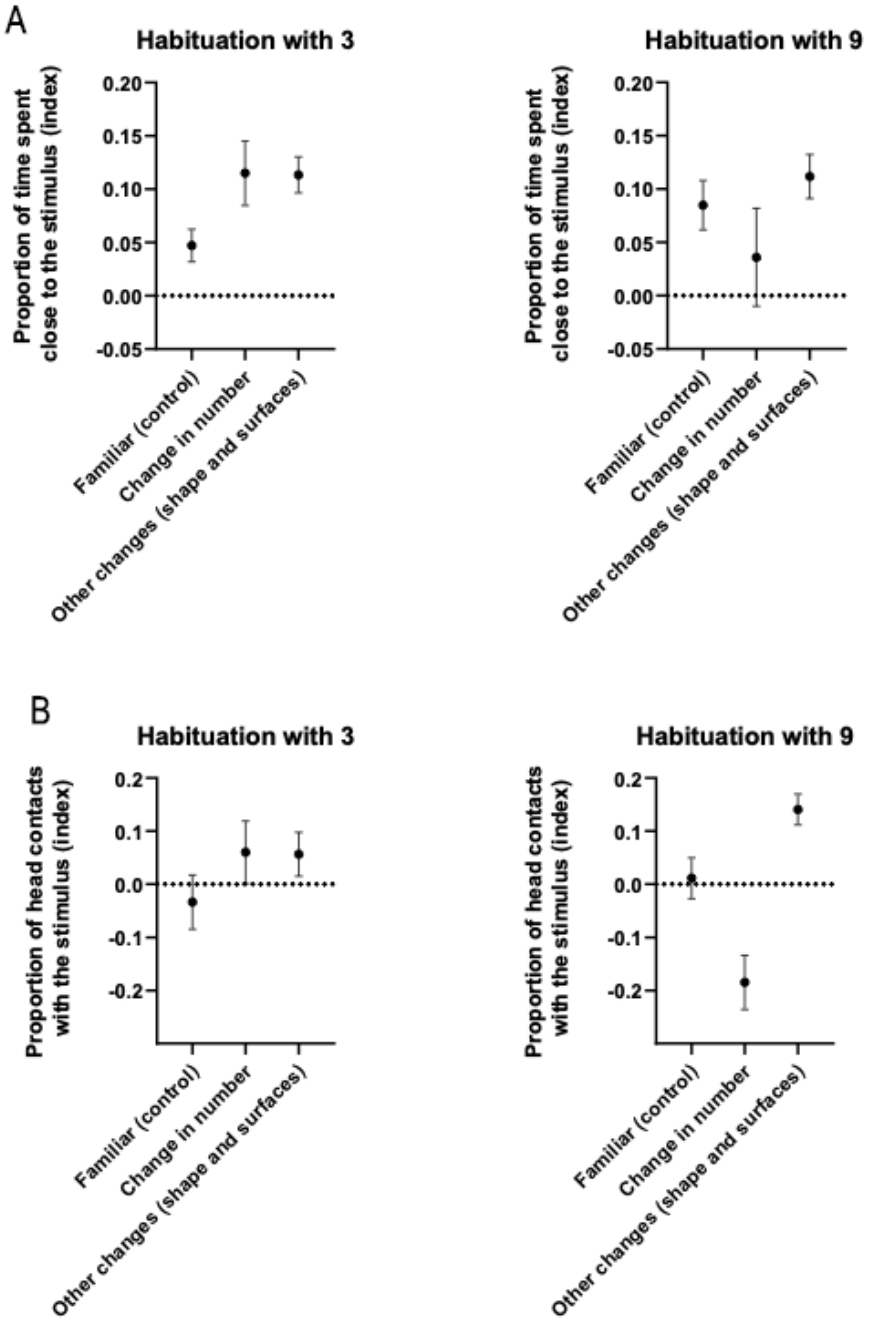

Figure S4. Relative index of the proportion of time spent near the stimulus (A) and of stimulus contacts (B) at test (dishabituation) as a function of habituation conditions (with 3 or 9 dots). As can be seen, change in number were associated with significant interactions with habituation conditions (see text for statistical analyses), with increase or decrease of behavioural responses depending on increase or decrease of numerosity, whereas this was not observed with the non-numerical changes (in shape and surface areas, here lumped together because there was no difference, see text for statistical analyses].

Table S1. Overall analyses of variance (ANOVA) for *c-fos* and for *egr-1* in qPCR, with habituation (habituation with 3 dots, habituation with 9 dots) and type of test (familiar, number, shape, surface area increase, surface area decrease) as between-subject factors, and telencephalic nuclei (Dc, Dl, Dm, V) as a within-subject factor.

ANOVA			
c-fos	Main effect of Telencephalic Nuclei	F(2.55,178.880)=0.712	p=0.524
	Main effect of Habituation	F(1,70)=1.270	p=0.264
	Main effect of Test	F(4,70)=5.646	p=0.001
	Telencephalic Nuclei x Test interaction	F(10.222,178.880)=1.444	P=0.163
	Habituation x Test interaction	F(4,70)=0.437	p=0.781
	Telencephalic Nuclei x Habituation interaction	F(2.555,178.880)=2.918	p=0.044
	Telencephalic Nuclei x Test x Habituation interaction	F(10.222,178.880)=1.324	p=0.219
egr-1	Main effect of Telencephalic Nuclei	F(2.705,189.3199)=22.083	p=0.0001
	Main effect of Habituation	F(1,70)=1.241	p=0.269
	Main effect of Test	F(4,70)=15.217	p=0.0001
	Telencephalic Nuclei x Test interaction	F(10.818,189.319)=2.307	p=0.012
	Habituation x Test interaction	F(4,70)=0.975	p=0.427
	Telencephalic Nuclei x Habituation interaction	F(2.705,189.319)=0.098	p=0.950
	Telencephalic Nuclei x Test x Habituation interaction	F(10.818,189.319)=0.853	p=0.585

Table S2. Analyses of variance (ANOVA) for *c-fos* and for *egr-1* mRNA expression level in qPCR for Dc, with habituation (habituation with 3 dots, habituation with 9 dots) and type of test (familiar, number, shape, surface area increase, surface area decrease) as between-subject factors.

Dc			
c-fos	Main effect of Habituation	F(1,70)=0.175	p=0.677
	Main effect of Test	F(4,70)=9.484	P=0.0001
	Habituation x Test interaction	F(4,70)=3.838	p=0.007
egr-1	Main effect of Habituation	F(1,70)=1.156	p=0.286
	Main effect of Test	F(4,70)=19.382	p=0.0001
	Habituation x Test interaction	F(4,70)=2.306	p=0.067

Table S3. Analyses of variance (ANOVA) for *c-fos* and for *egr-1* mRNA expression level in qPCR for Dl, with habituation (habituation with 3 dots, habituation with 9 dots) and type of test (familiar, number, shape, surface area increase, surface area decrease) as between-subject factors.

Dl			
c-fos	Main effect of Habituation	F(1,70)=0.35	p=0.852
	Main effect of Test	F(4,70)=1.917	p=0.117
	Habituation x Test interaction	F(4,70)=0.209	p=0.933
egr-1	Main effect of Habituation	F(1,70)=0.168	p=0.683
	Main effect of Test	F(4,70)=6.531	p=0.0001
	Habituation x Test interaction	F(4,70)=0.406	p=0.804

Table S4. Analyses of variance (ANOVA) for *c-fos* and for *egr-1* mRNA expression level in qPCR for Dm, with habituation (habituation with 3 dots, habituation with 9 dots) and type of test (familiar, number, shape, surface area increase, surface area decrease) as between-subject factors.

Dm			
c-fos	Main effect of Habituation	F(1,70)=0.004	p=0.949
	Main effect of Test	F(4,70)=0.939	p=0.447
	Habituation x Test interaction	F(4,70)=0.142	p=0.966
egr-1	Main effect of Habituation	F(1,70)=0.189	p=0.665
	Main effect of Test	F(4,70)=0.938	p=0.447
	Habituation x Test interaction	F(4,70)=0.578	p=0.680

Table S5. Analyses of variance (ANOVA) for *c-fos* and for *egr-1* mRNA expression level in qPCR for V, with habituation (habituation with 3 dots, habituation with 9 dots) and type of test (familiar, number, shape, surface area increase, surface area decrease) as between-subject factors

V			
c-fos	Main effect of Habituation	F(1,70)=10.052	p=0.002
	Main effect of Test	F(4,70)=3.159	p=0.019
	Habituation x Test interaction	F(4,70)=0.282	p=0.889
egr-1	Main effect of Habituation	F(1,70)=0.882	p=0.351
	Main effect of Test	F(4,70)=5.487	p=0.001
	Habituation x Test interaction	F(4,70)=0.858	p=0.493