Using visual lateralization to model learning and memory in zebrafish larvae

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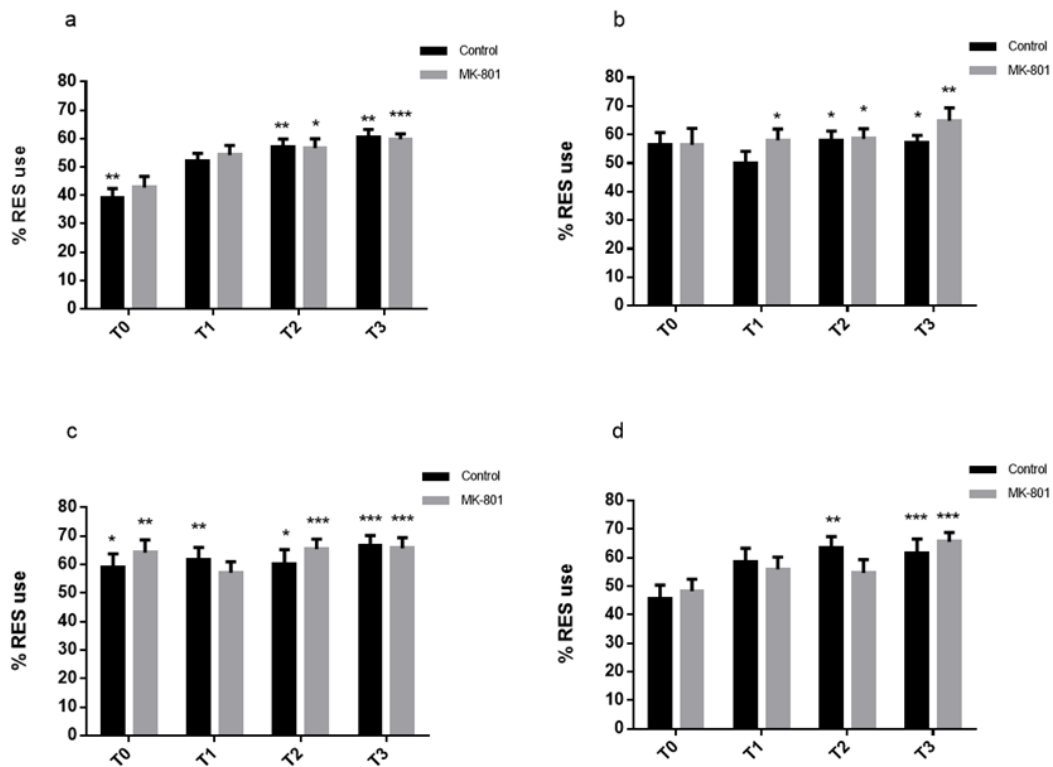
Supporting information Figures and figure captions

Figure S1. The effects of NMDA receptor antagonist MK-801 (0.1µM treatment after training) on RES use in 10 dpf zebrafish. MK-801 was administrated into the wells directly after removal of the novel objects from the familiarization phase. **a)** Amount of RES use during familiarization with the novel objects. LES preference was detected at T0 (control, t=-3.14, p=0.003; "MK-801", t=-1.64, p=0.063). RES preferences are detected at T2 (control, t=2.48, p=0.018; "MK-801", t=1.96, p=0.055) and T3 (control, t=3.69, p<0.001; "MK-801", t=5.05, p<0.001). **b)** Amount of RES use in controls and MK-801-treated individuals during reintroduction of the novel objects 1 hour after familiarization. Controls display RES preference at T2 (t=2.40, p=0.022) and T3 (t=2.70, p=0.011). MK-801 treated group displayed RES preference at T1 (t=2.07, P=0.047), T2 (t=2.45, p=0.020) and T3 (t=3.29, p=0.002). **c)** RES use in response to novel objects for controls and MK-801 treated individuals 2 hours after the familiarization phase. Significant RES preference was detected for controls at T1 (t=2.75, p=0.009), T2 (t=1.97, p=0.055) and T3 (t=4.49, p<0.001). Similarly, significant RES preference was demonstrated for the MK-801 treated group at T0 (t=3.18, p=0.003), T2 (t=4.33, p<0.001) and T3 (t=4.15, p<0.001). **d)** Measurements of RES use in control and MK-801 treated subjects during NOR 3 hours after familiarization. Controls had significant RES preference at T2 (t=3.34, p=0.002) and at T3 (t=2.36, P=0.025). MK-801-treated individuals displayed RES preference at T3 (t=4.69, p<0.001). Significance *p<0.05, **p<0.001, ***p<0.0001, computed using single sample t-test tested against 50%. For control and MK-801 treated groups, n=36. Error bars indicate SEM.

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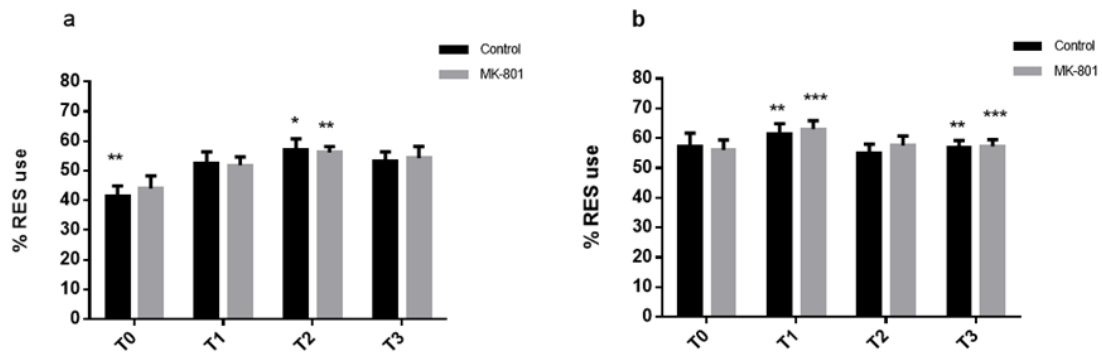Madelene Åberg Andersson
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Figure S2. The effects of NMDA receptor antagonist MK-801 (1µM treatment after familiarization) on RES use in 10 dpf zebrafish. MK-801 was administrated into the wells directly after removal of the novel objects from the training session. **A)** Amount of RES use during training with the novel objects. Groups are denoted as control and MK-801 although no treatment had been added to the wells at this time. Controls displayed a significant LES preference at T0 (t=-2.46, p=0.019), and at T2 a significant RES preference was found (t=2.00, p=0.051). MK-801 treated individuals displayed significant RES use at T3 (t=3.28, p=0.002). **B)** Amount of RES use in controls and MK-801 treated individuals during reintroduction of the novel objects 1 hour after the familiarization phase. Controls display RES preference at T1 (t=3.02, p=0.003) and at T3 (t=3.06, p=0.004). MK-801 treated group displayed RES preference at T1 (t=4.94, p<0.001), and T3 (t=4.22, p<0.001). Significance *p<0.05, **p<0.001, ***p<0.0001, computed using single sample t-test tested against 50%. For control and MK-801-treated groups, n=36. Error bars indicate SEM.

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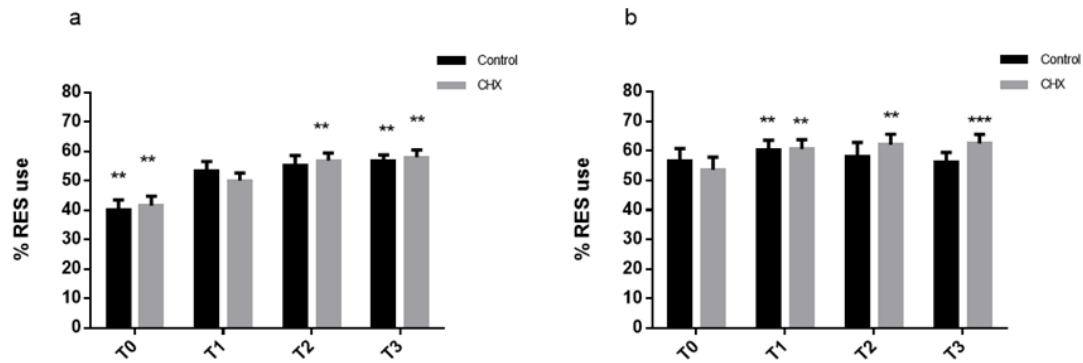Madelene Åberg Andersson
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Figure S3. The effects of disrupted protein synthesis on memory formation and short-term memory maintenance in 10 dpf zebrafish larvae. CHX was added to the wells 30 min prior to the familiarization phase. **A)** RES use in controls and CHX-treated individuals during an 8 min familiarization phase. Significant LES preferences were found at T0 for both groups (control: t=-2.87, p=0.007; CHX: t=-2.66, p=0.011) and RES preferences at T2 (CHX: t=2.66, p=0.011), and T3 (control: t=2.87, p=0.007; CHX: t=3.14, p=0.003). **B)** RES use in controls and CHX treated individuals in response to NOR 1 hour after familiarization. Significant RES preference was detected for the controls at T1 (t=3.01, p=0.005). CHX-treated individuals display significant RES at T1 (t=3.29, p=0.002), T2 (t=3.66, p=0.001), and T3 (t=3.99, p<0.001). Significance *p<0.05, **p<0.001, ***p<0.0001, computed using a single sample t-test tested against 50%. For control and CHX treated groups, n= 36. Error bars indicate SEM.

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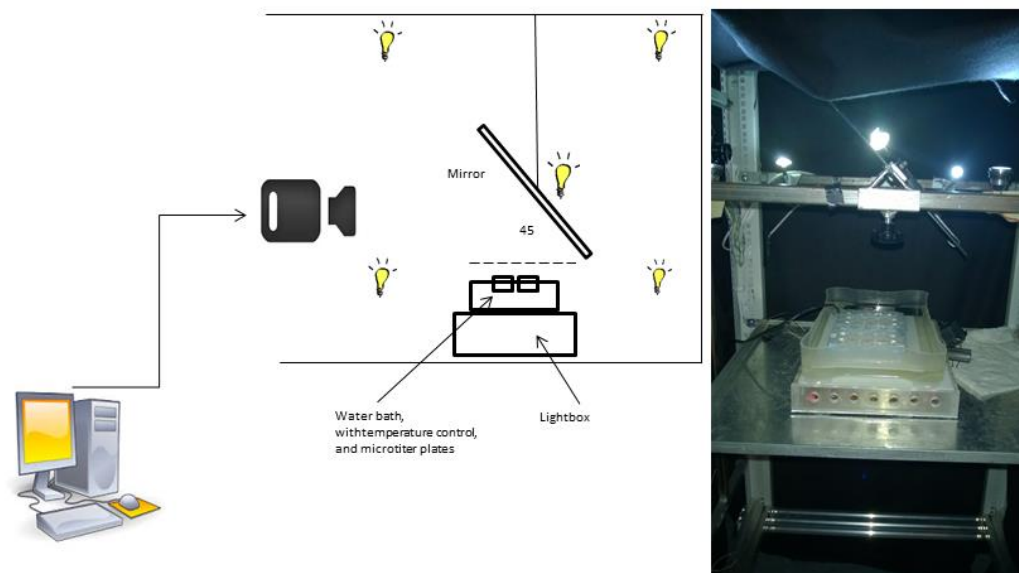Madelene Åberg Andersson
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Figure S4. Schematic view of the testing apparatus for the behavioral analysis. This image was constructed by the first author of this manuscript, MÅA.

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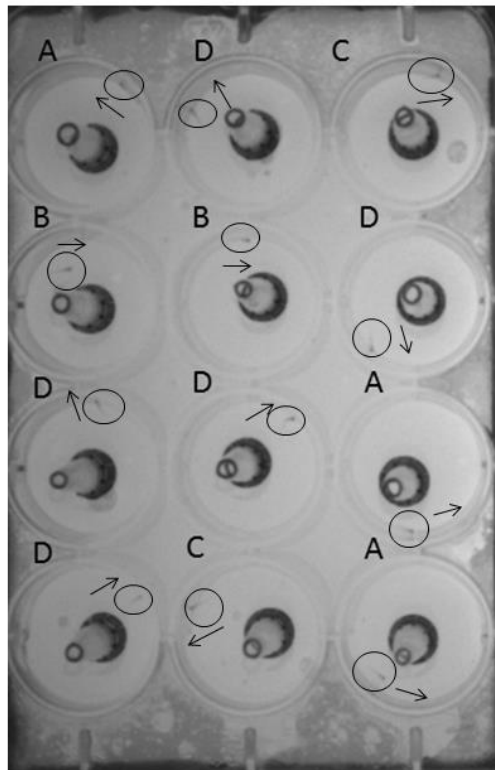Authors:
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Figure S5. Digital image of the VLNOR, demonstrating zebrafish larvae postures in relation to the novel object. A) Parallel positioning to the object; LES view. B) Parallel positioning; RES view. C) Angled positioning; LES or RES view. D) Facing away from object; no score.