Identification and localization of the Protein Kinase C requirement for operant self-learning in *Drosophila*

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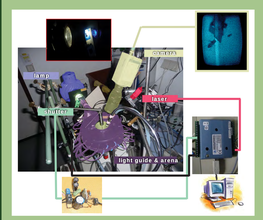
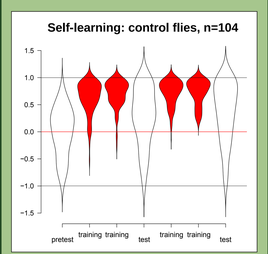
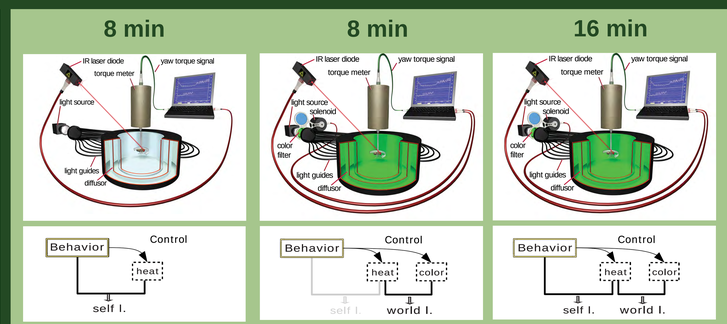
Introduction







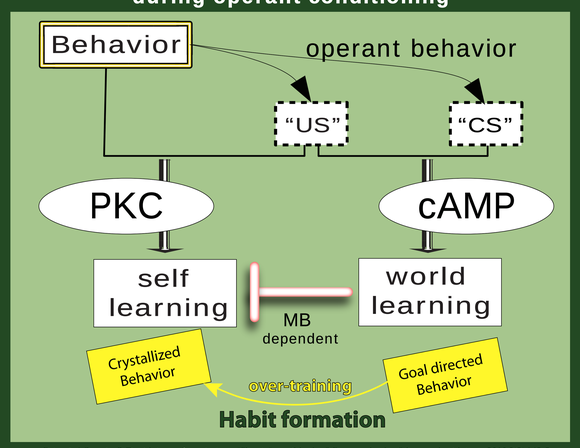
PKC-dependent

adenylate cyclase type I dependent

dFoxP-dependent

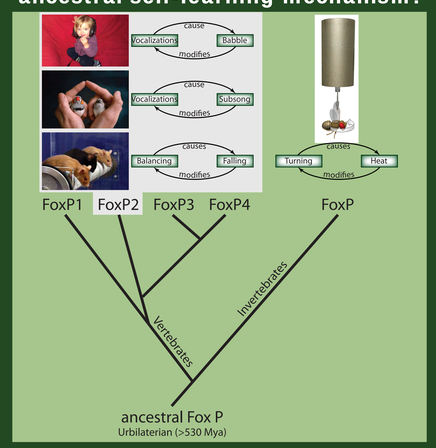
dFoxP-dependent

world- and self-learning interact during operant conditioning

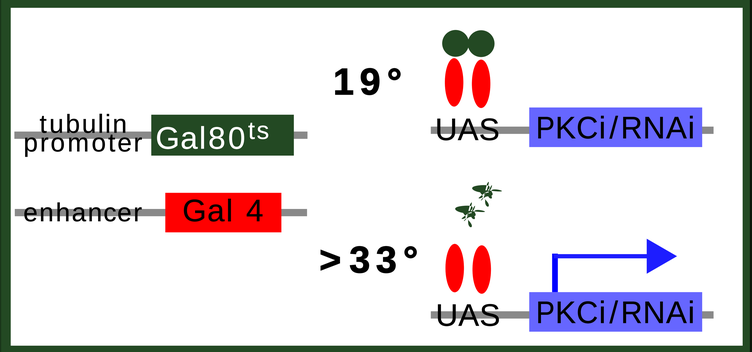


Colomb J, Brembs B. The biology of psychology: "Simple" conditioning? Communicative & integrative biology. 2010;3(2):142-5

Did language evolve using an ancestral self-learning mechanism?

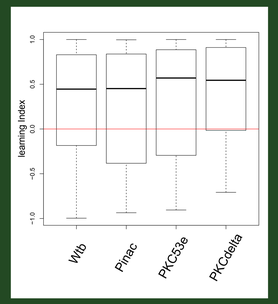


Method: The TARGET system

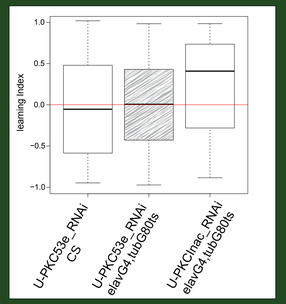


Results 1: PKC53e as a candidate

Putative mutants



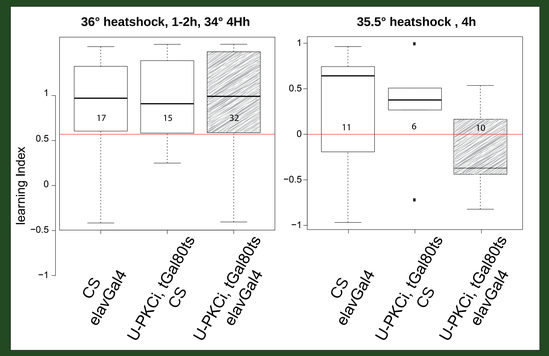
RNAi using TARGET



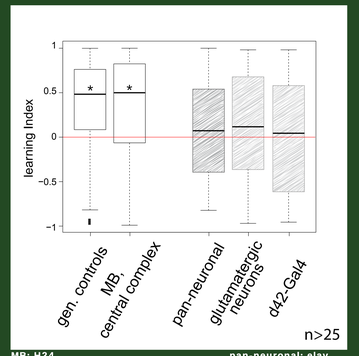
Results 2: Localization of PKC action to glutamatergic neurons

finding a working heat shock protocol:

tub-Gal80ts;UAS-PKCi x elav-Gal4 lines



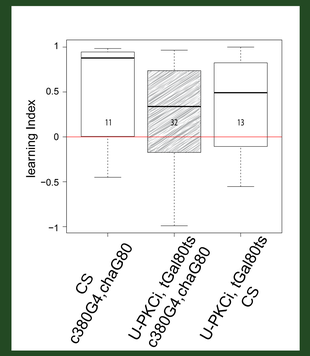
Candidate screen



MB: H24
central complex: c232 and 007y;c819
pan-neuronal: elav
glutamatergic: OK371

motorneuron line

tub-Gal80ts;UAS-PKCi x c380-Gal4, chaGal80



Conclusions

Using an inhibitory peptide of Protein Kinase C (PKCi) we have been able to discover a novel learning mechanism underlying operant self-learning. This mechanism appears to be conserved in the bilaterian clade and also involves the *Drosophila* orthologue of the human 'language gene' FOXP2, *dFoxP*. Experiments using the TARGET system to temporally restrict RNAi expression to adulthood yielded PKC53e as the putative PKC isoform involved in self-learning. Spatially restricting PKCi expression with the TARGET system revealed that PKC activity is required in glutamatergic neurons. Data are currently ambiguous if motorneurons are the responsible glutamatergic subpopulation and further, potentially disambiguating studies are currently ongoing.

SfN meeting 2012 New Orleans