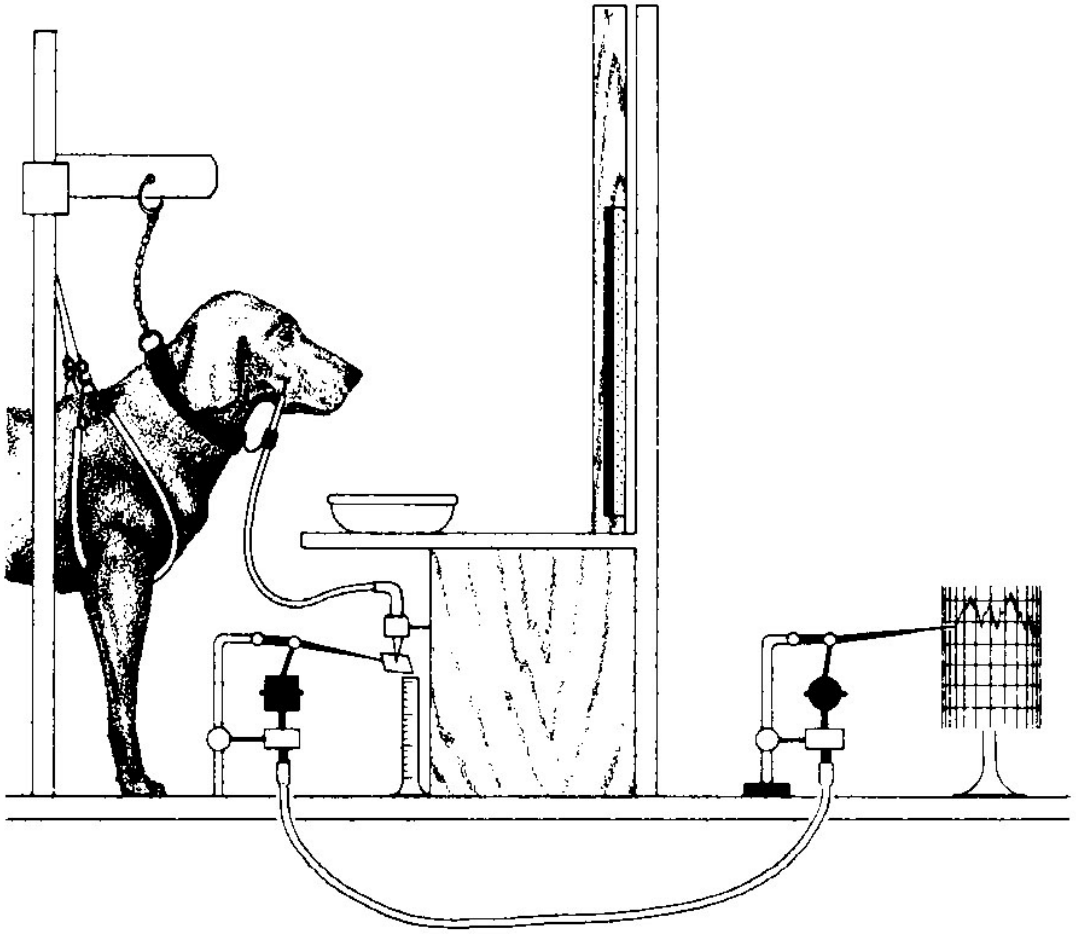
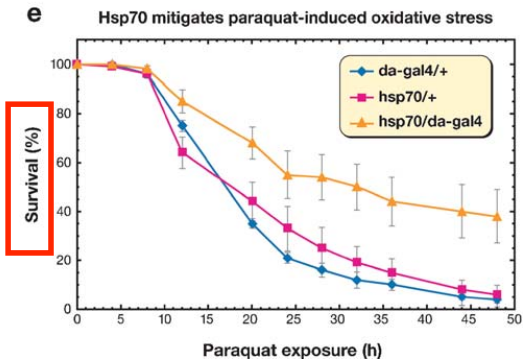
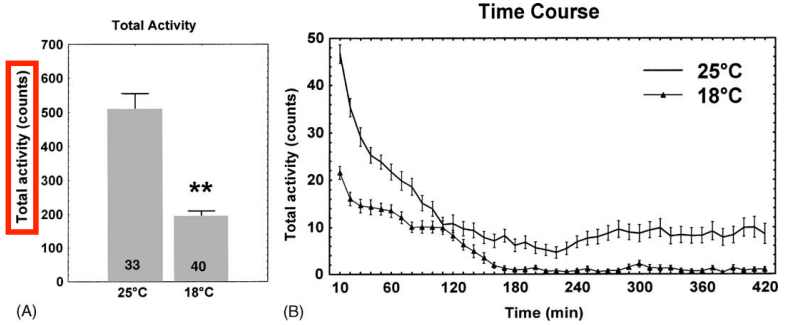
Prologue I: Dogs in the Wild

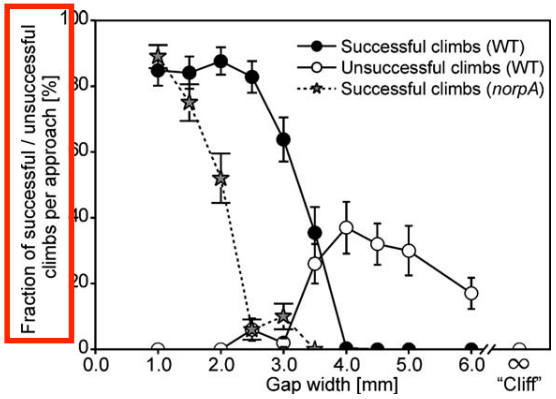
Prologue II: Pavlov and his dogs

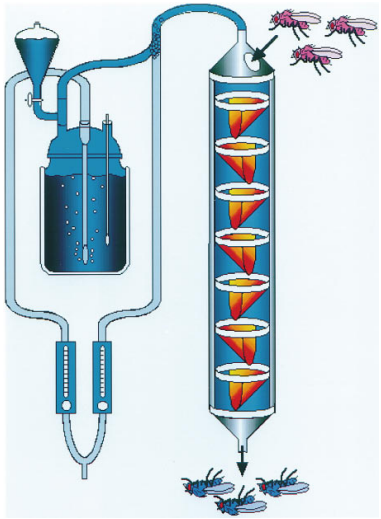


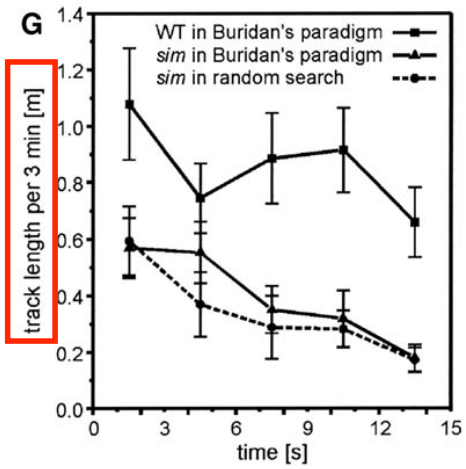
Prologue III: My dog (& cat)

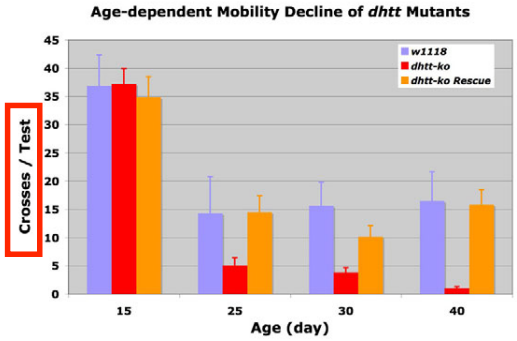

e
Hsp70 mitigates paraquat-induced oxidative stress
da-gal4/+
hsp70/+
hsp70/da-gal4
Survival (%)
Paraquat exposure (h)

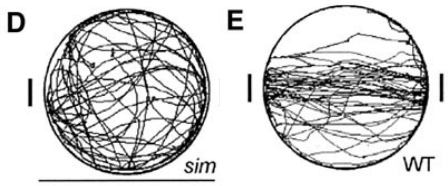

Total Activity
Total activity (counts)
33
40
**
25°C
18°C
(A)
Time Course
25°C
18°C
Total activity (counts)
Time (min)
(B)


Successful climbs (WT)
Unsuccessful climbs (WT)
Successful climbs (norpA)
Fraction of successful / unsuccessful climbs per approach [%]
Gap width [mm]
"Cliff"




G
WT in Buridan's paradigm
sim in Buridan's paradigm
sim in random search
track length per 3 min [m]
time [s]


Age-dependent Mobility Decline of dhtt Mutants
w1118
dhtt-ko
dhtt-ko Rescue
Crosses / Test
Age (day)


D
sim
E
WT

We have found seven distinct components of face grooming: (1) shimmy (H), rapid vibration of body; (2) circle (C), flurry of forelimbs below face; (3) lick (L), wetting forepaws with tongue; (4) overhand (O), large synchronous but asymmetric strokes of forelimbs over top of head; (5) parallel (P), excursions of both limbs in similar half moon trajectories on sides of snout; (6) single stroke (S), 10 s^{-1} horizontal movements on side of face in which each limb alternately makes the larger excursion; (7) pause (N), momentary interruption of active movement, with forelimbs at chest height. A more detailed description of these components, with illustrations, is available[2]. Face grooming frequently leads into body grooming (B) but may also be followed by other behaviour patterns[1,2].

Grammar of a Movement Sequence in Inbred Mice

JOHN C. FENTRESS
FRANCES P. STILWELL

NATURE VOL. 244 JULY 6 1973

JAABA: interactive machine learning for automatic annotation of animal behavior

Mayank Kabra[1,4], Alice A Robie[1,4], Marta Rivera-Alba[1,2], Steven Branson[1,3] & Kristin Branson[1]

We present a machine learning–based system for automatically computing interpretable, quantitative measures of animal behavior. Through our interactive system, users encode their intuition about behavior by annotating a small set of video frames. These manual labels are converted into classifiers that can automatically annotate behaviors in screen-scale data sets. Our general-purpose system can create a variety of accurate individual and social behavior classifiers for different organisms, including mice and adult and larval *Drosophila*.

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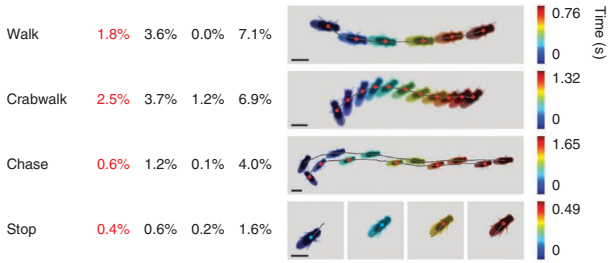
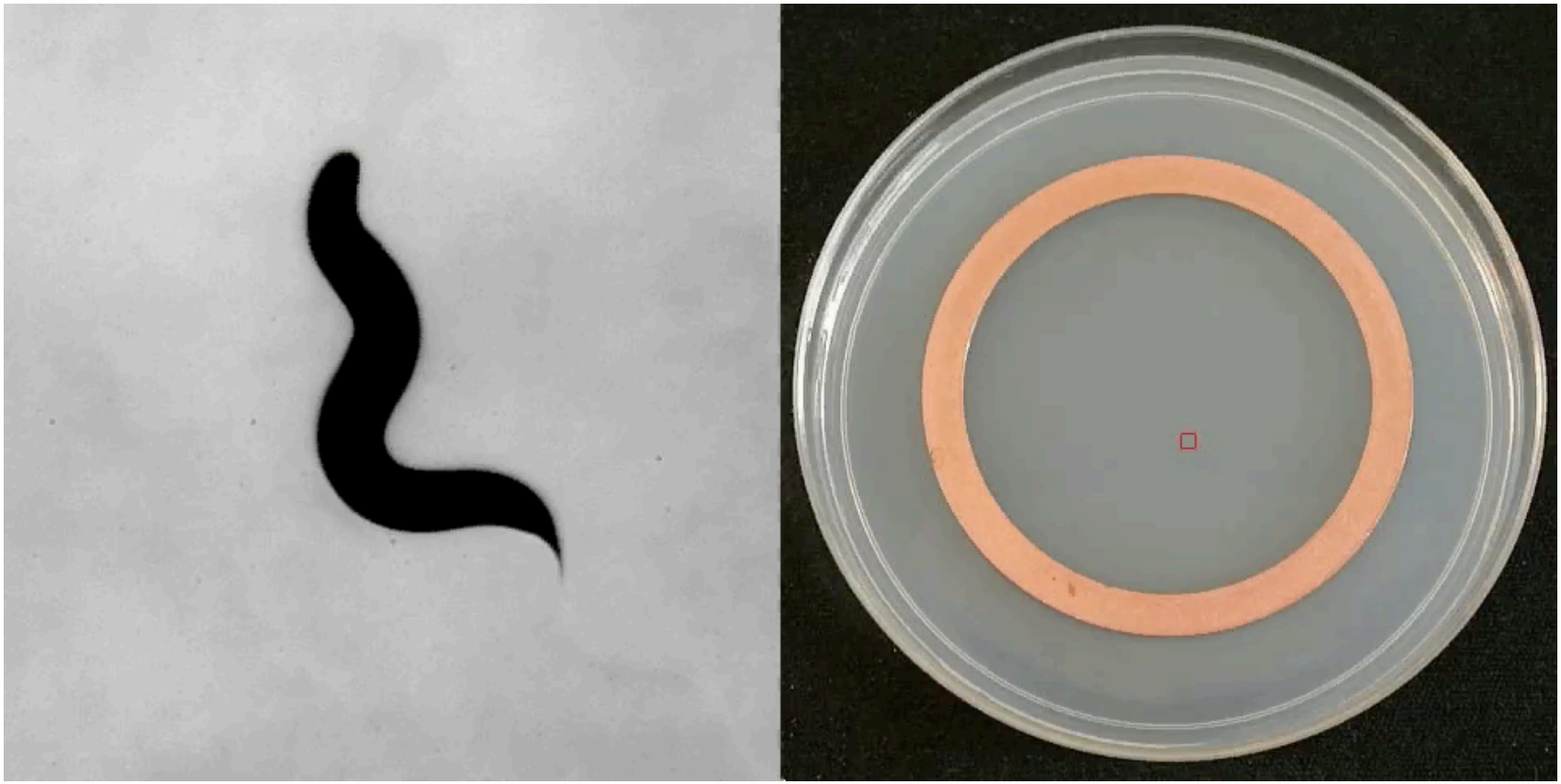
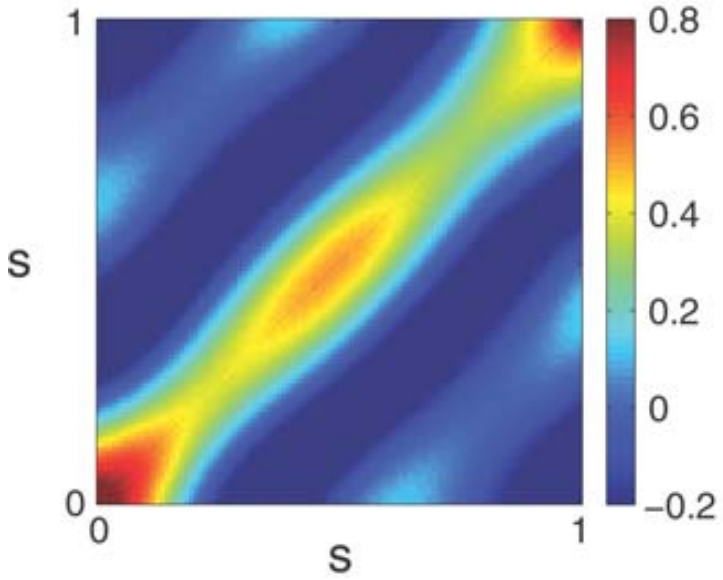
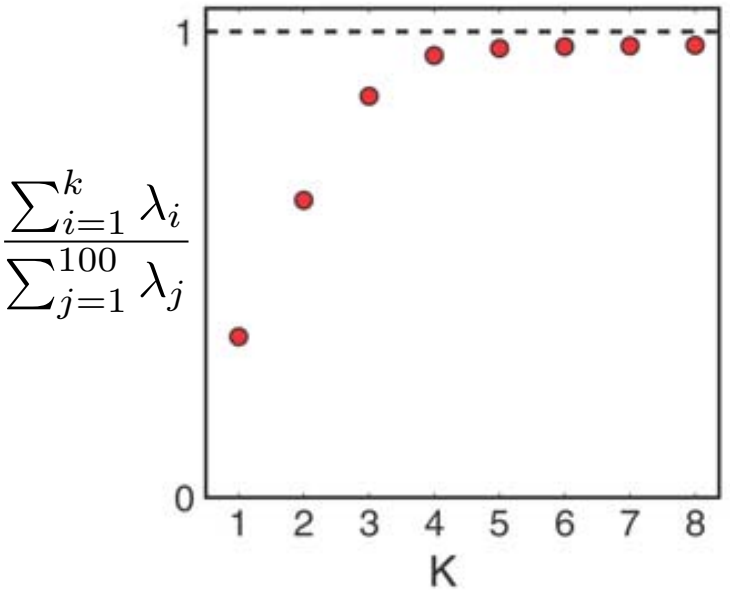
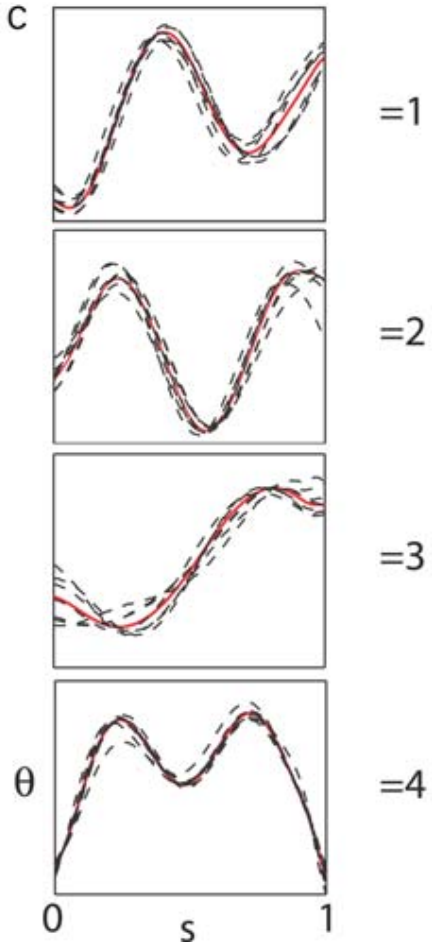
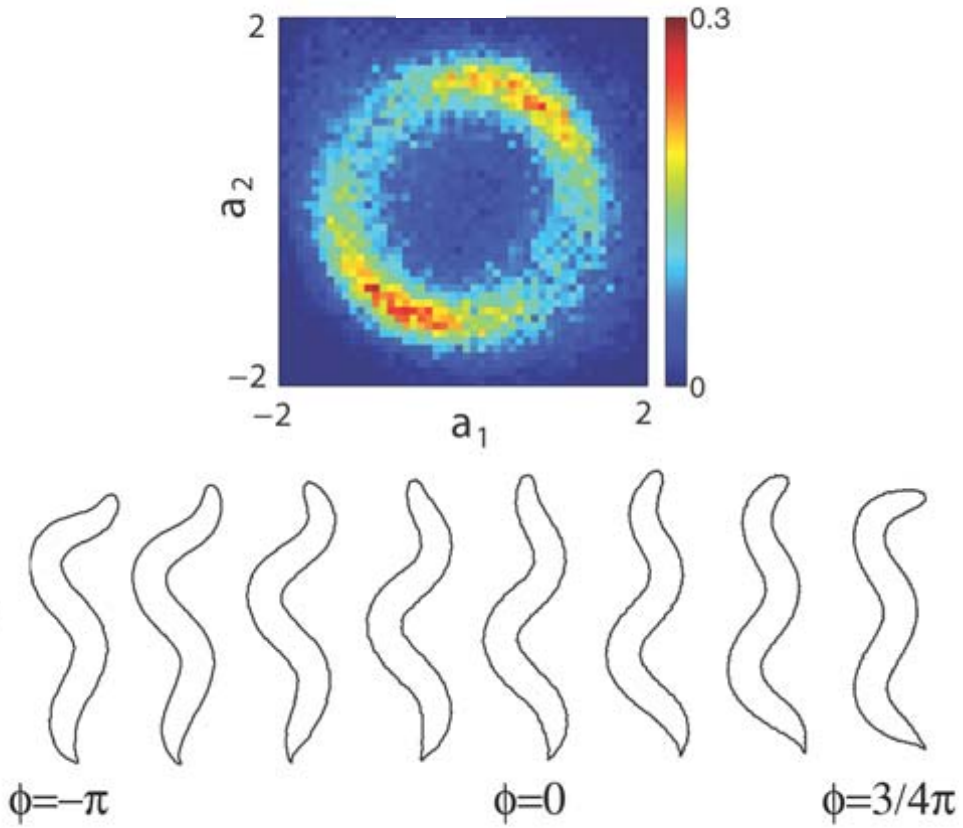


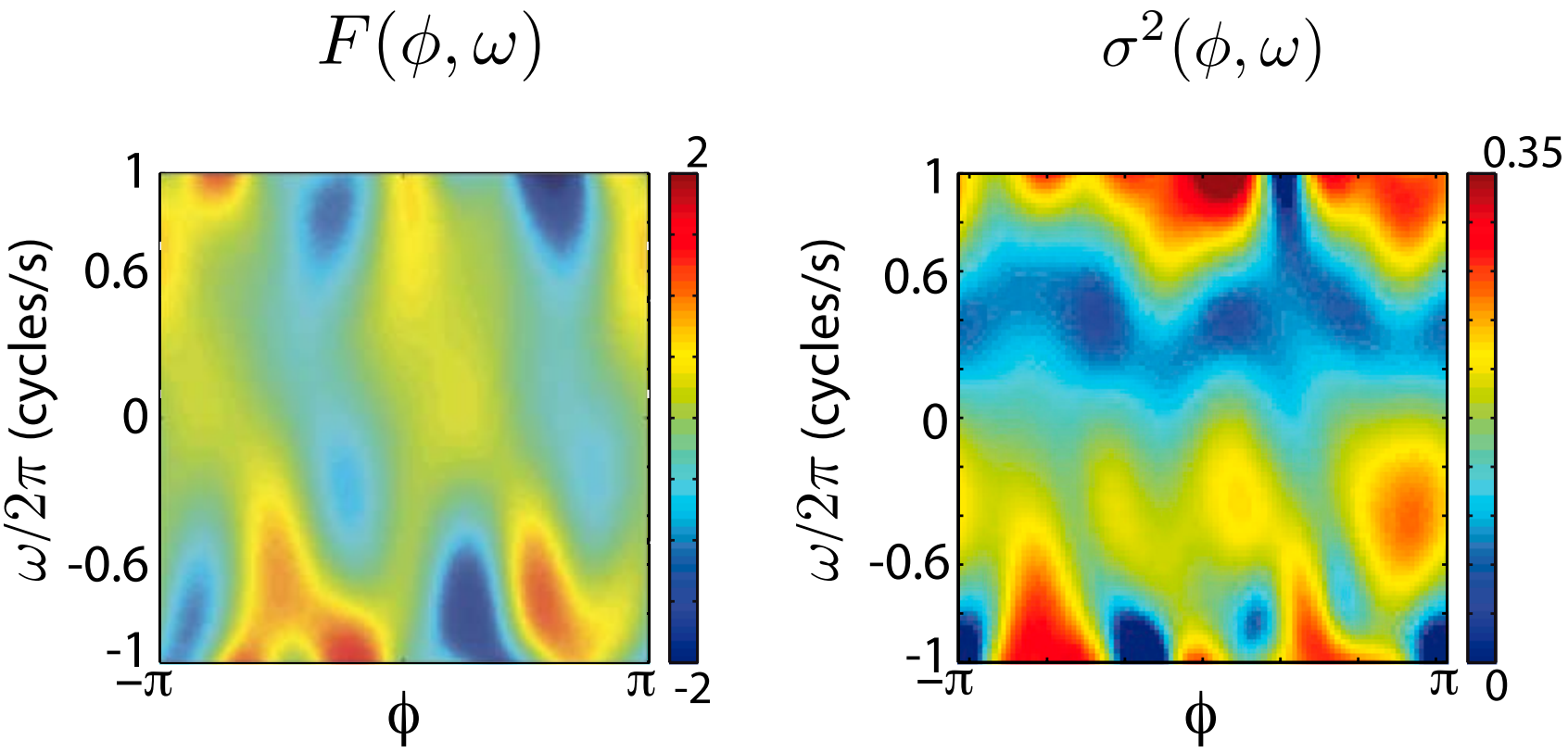


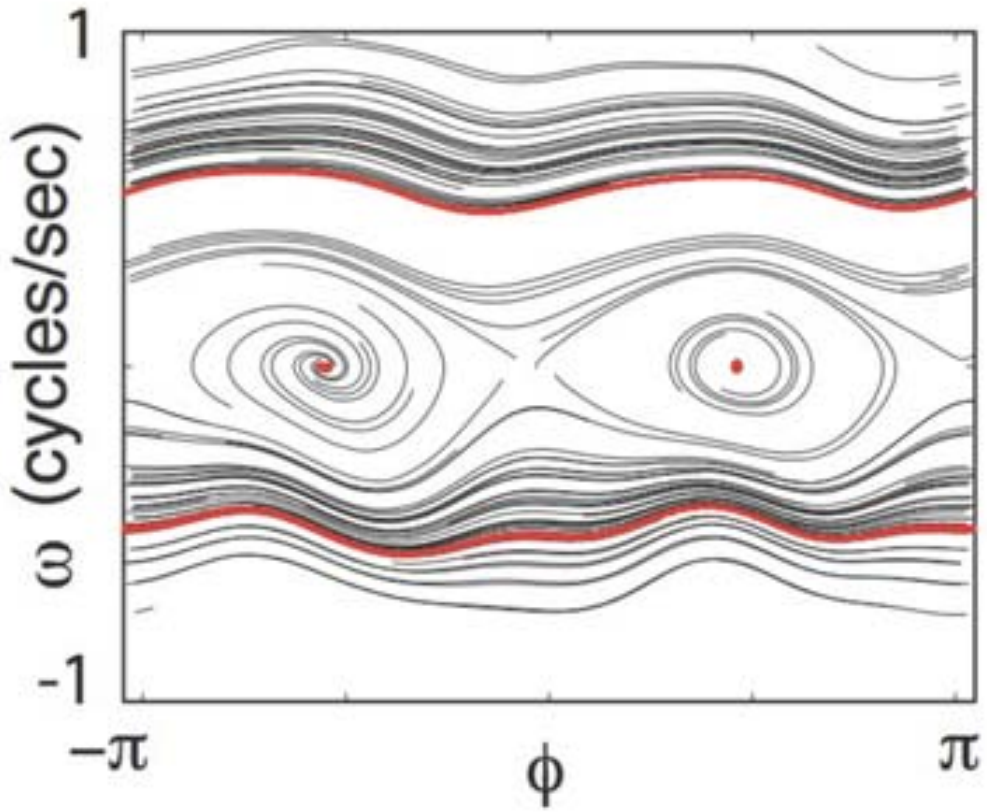

1
0
s
0
1
s
0.8
0.6
0.4
0.2
0
−0.2

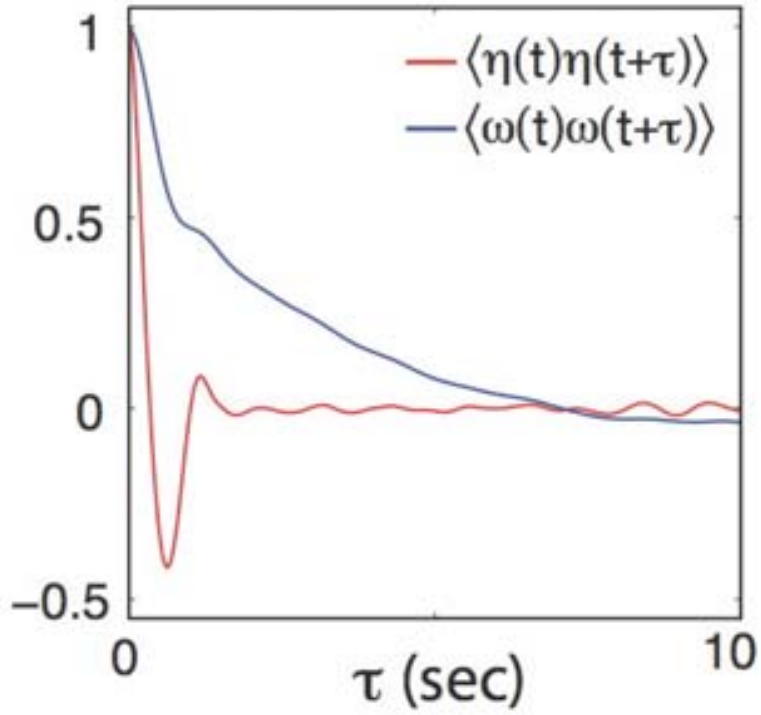

$\frac{\sum_{i=1}^{k} \lambda_i}{\sum_{j=1}^{100} \lambda_j}$
1
0
1 2 3 4 5 6 7 8
K

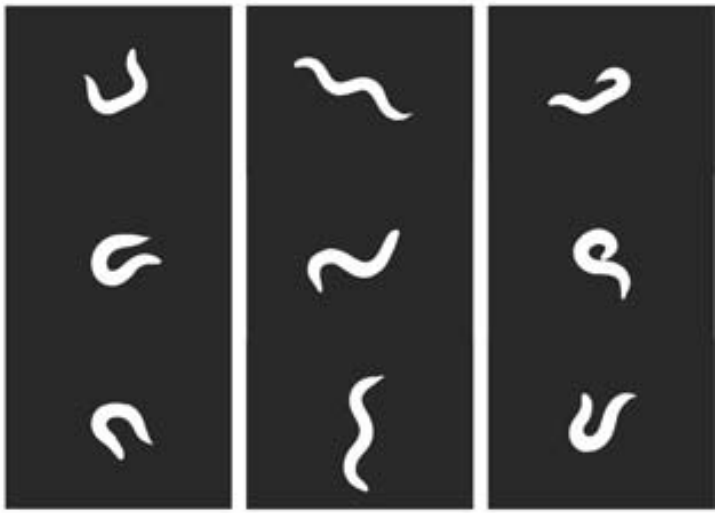

c
=1
=2
=3
θ
=4
0
s
1

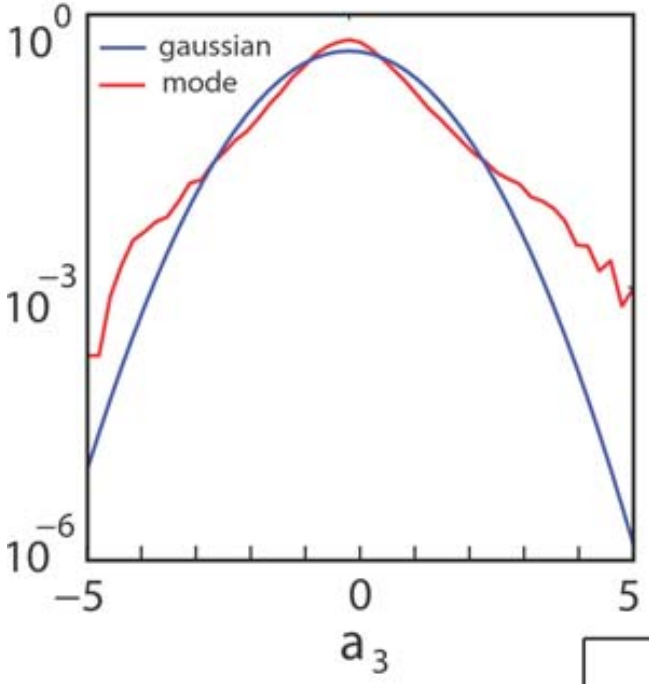

2
−2
a2
−2
a1
2
0.3
0
ϕ=−π
ϕ=0
ϕ=3/4π

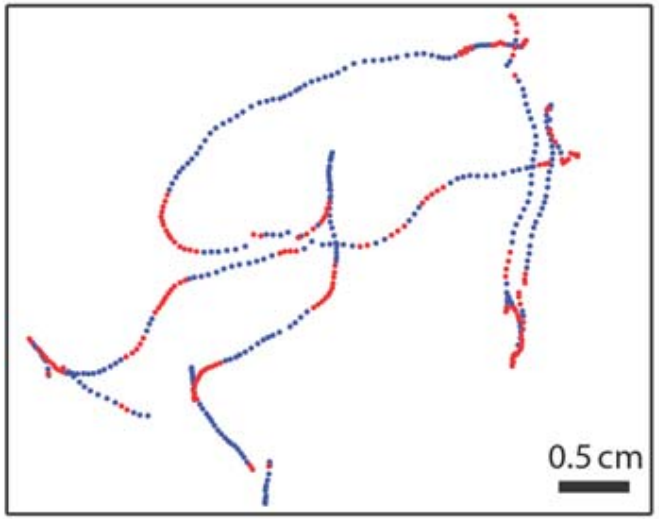

$F(\phi, \omega)$
$\sigma^2(\phi, \omega)$
1
0.6
0
-0.6
-1
$\omega/2\pi$ (cycles/s)
$-\pi$
π
ϕ
2
-2
0.35
0

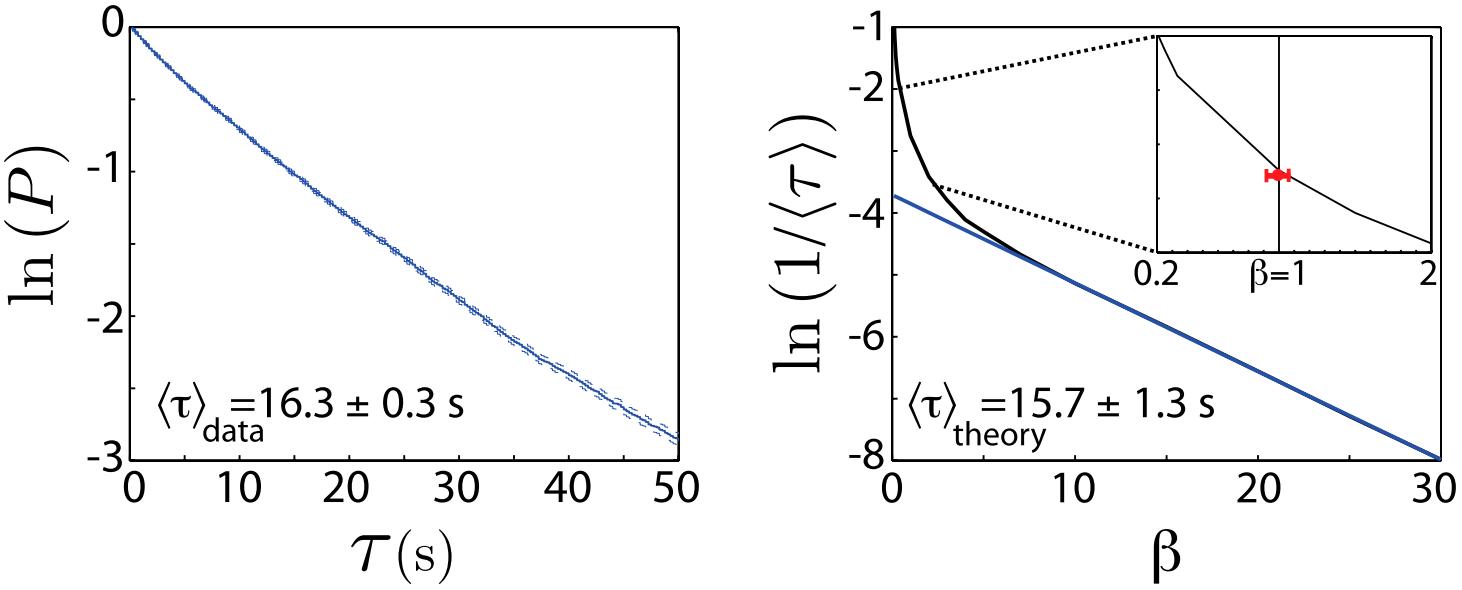

1
-1
ω (cycles/sec)
−π
ϕ
π

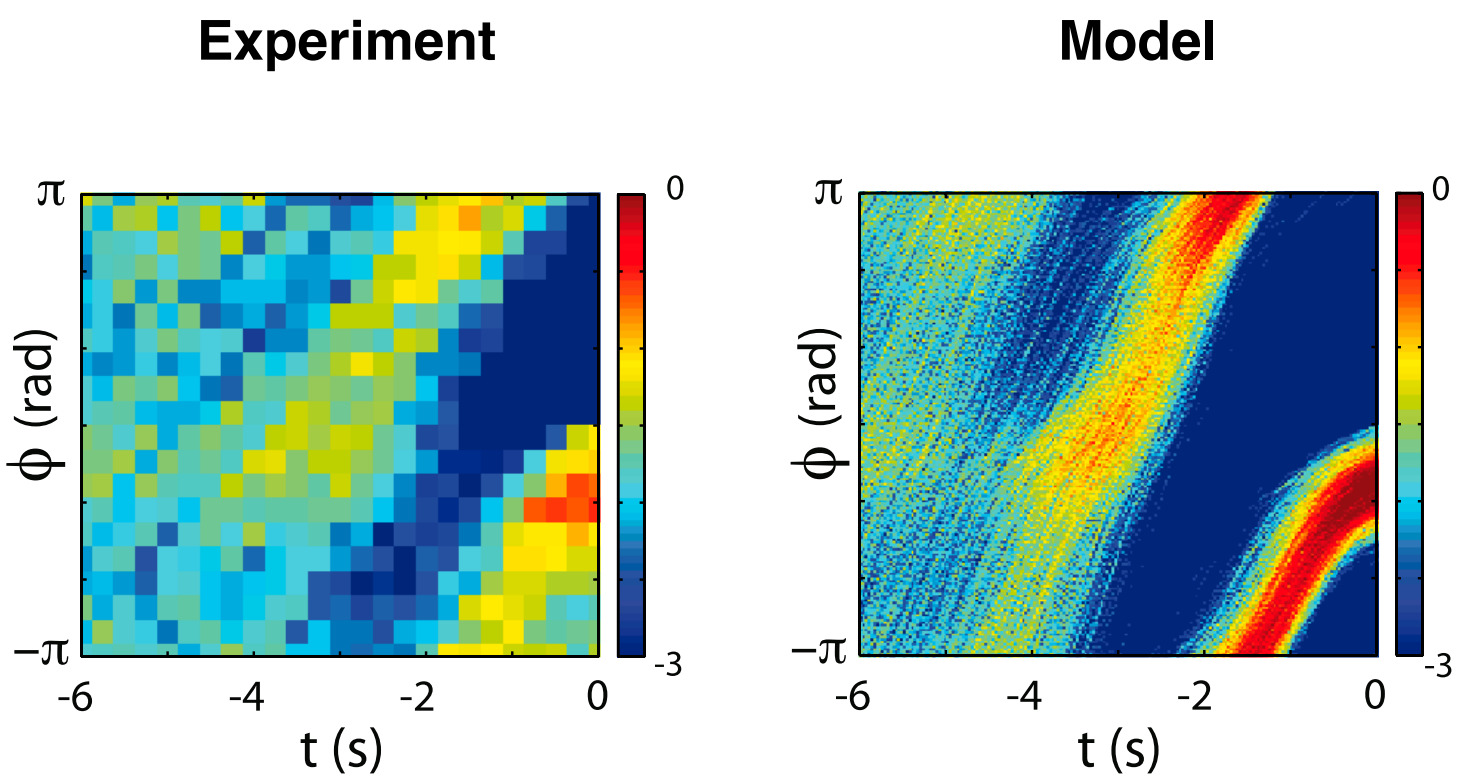

1
0.5
0
−0.5
0
10
τ (sec)
⟨η(t)η(t+τ)⟩
⟨ω(t)ω(t+τ)⟩

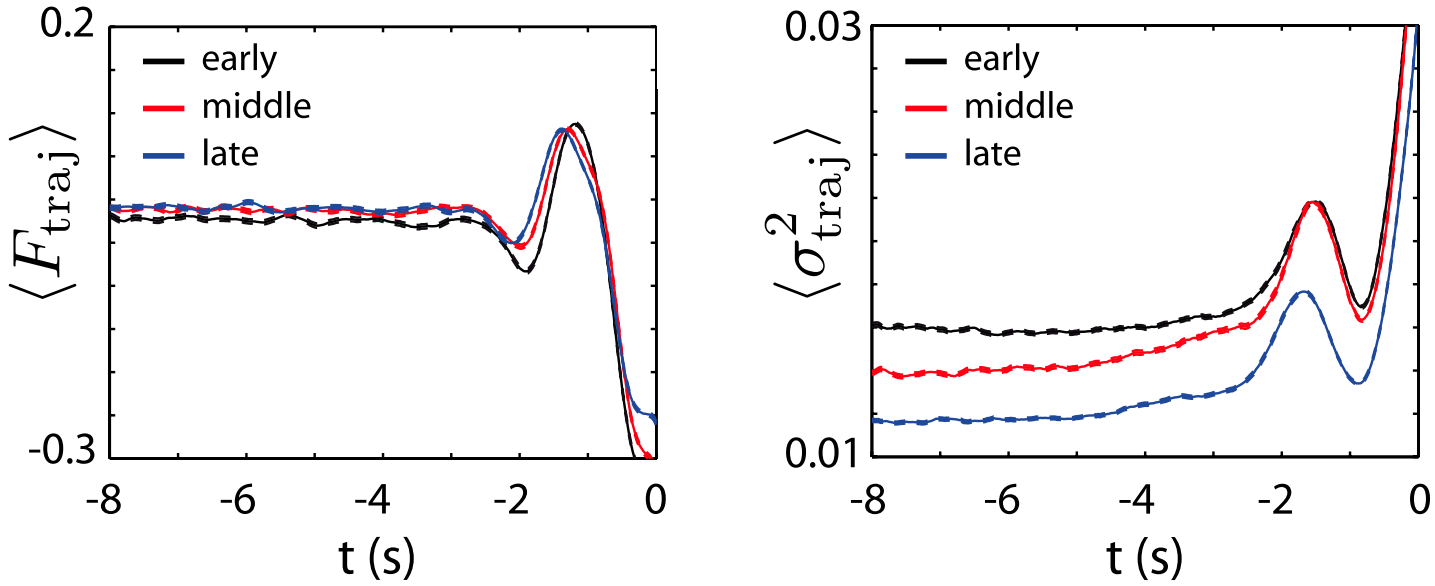

a_3<-3
-1<a_3<1
a_3>3

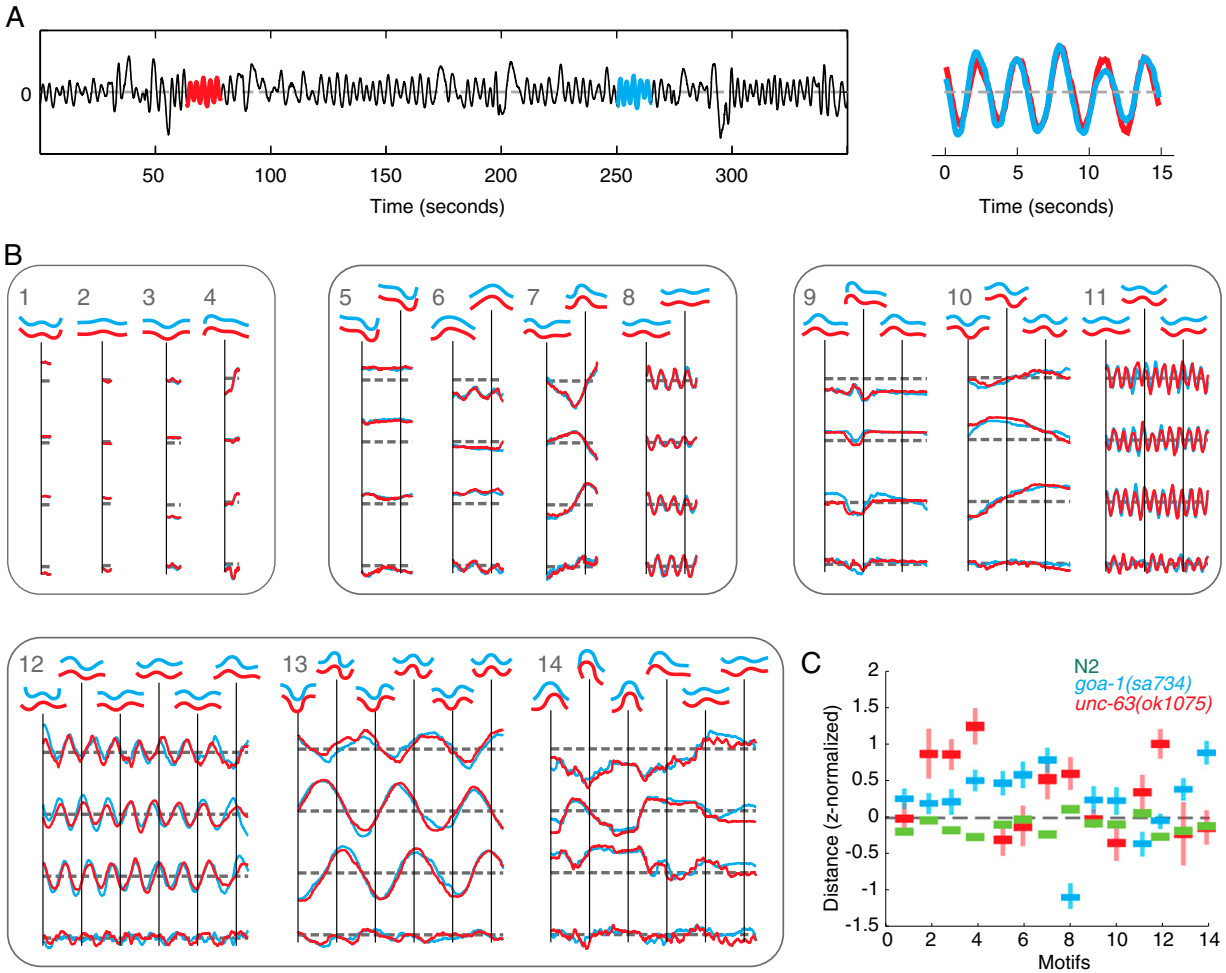

10^0
10^{-3}
10^{-6}
gaussian
mode
−5
0
5
a_3


0.5 cm


0
-1
-2
-3
ln (P)
⟨τ⟩data=16.3 ± 0.3 s
0
10
20
30
40
50
τ (s)
-1
-2
-4
-6
-8
ln (1/⟨τ⟩)
0.2
β=1
2
⟨τ⟩theory=15.7 ± 1.3 s
0
10
20
30
β

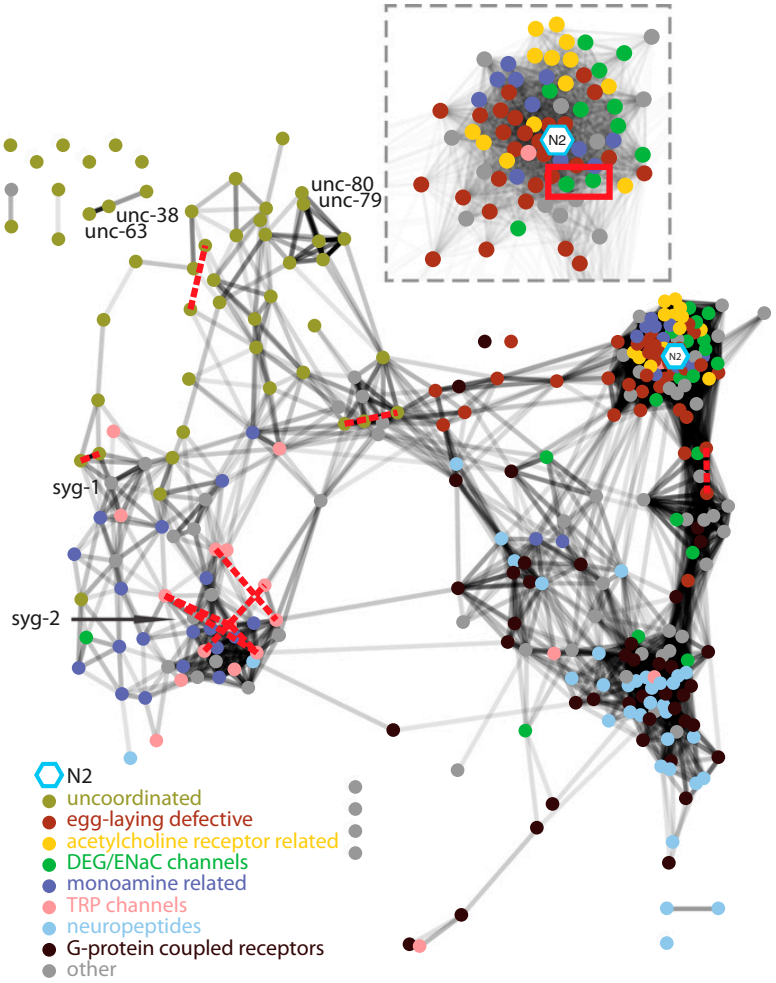

Experiment
Model
π
−π
ϕ (rad)
-6
-4
-2
0
t (s)
0
-3


0.2
-0.3
early
middle
late
$\langle F_{\mathrm{traj}} \rangle$
-8
-6
-4
-2
0
t (s)
0.03
0.01
early
middle
late
$\langle \sigma^2_{\mathrm{traj}} \rangle$
-8
-6
-4
-2
0
t (s)



A dictionary of behavioral motifs reveals clusters of genes affecting *Caenorhabditis elegans* locomotion

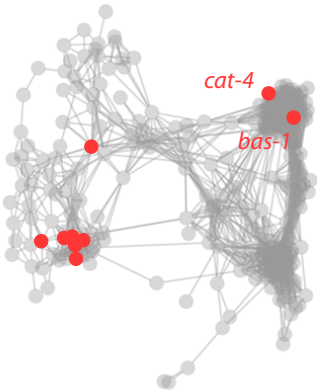
André E. X. Brown, Eviatar I. Yemini, Laura J. Grundy, Tadas Jucikas, and William R. Schafer[1]



Dopamine and Receptors

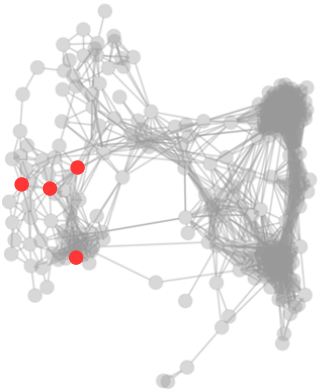
mean shortest path: 1 ± 0
p = 2 x 10^{-31}

Serotonin and Receptors



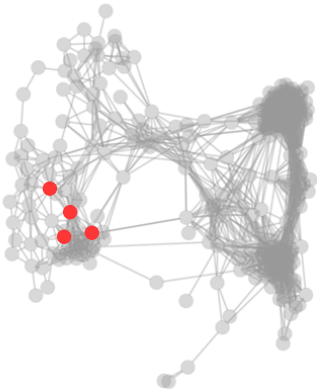
mean shortest path: 3.2 ± 0.4
p = 0.2 (without *cat-4* and *bas-1*, 1.8 ± 0.2, p = 2 x 10^{-4})

Tyramine and Receptors



mean shortest path: 2 ± 0.4
p = 0.009

Octopamine and Receptors



mean shortest path: 1.5 ± 0.2
p = 9 x 10^{-4}