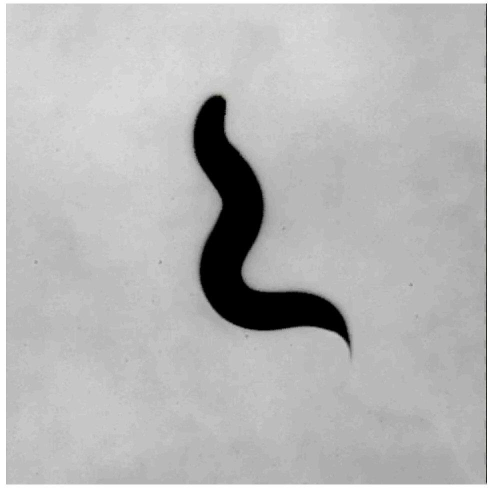
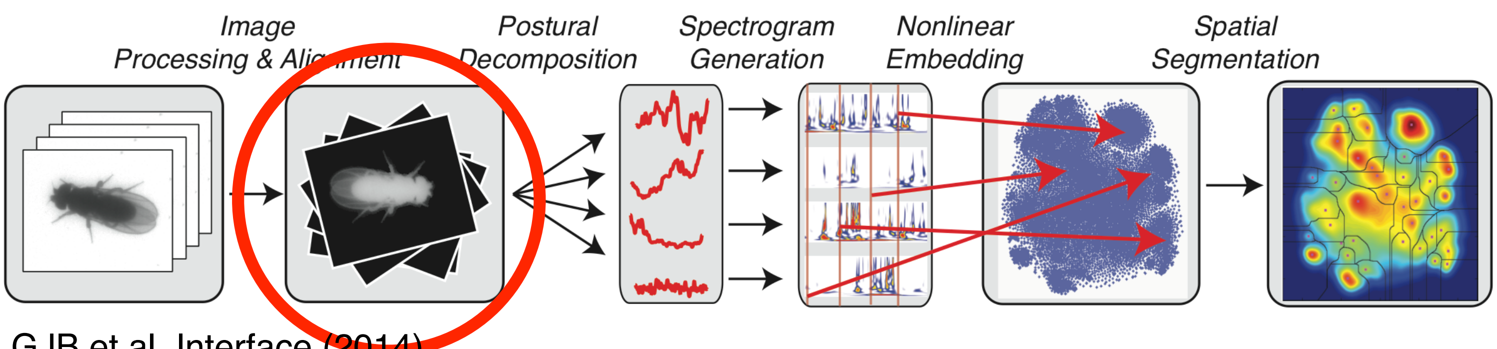
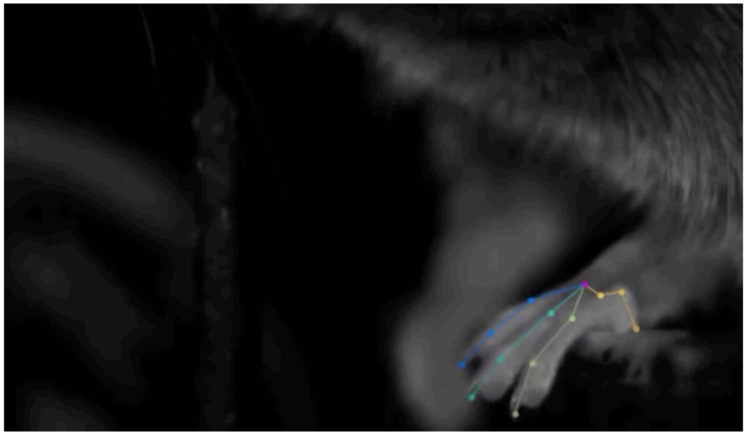




https://www.youtube.com/watch?v=-UI531GMRTM

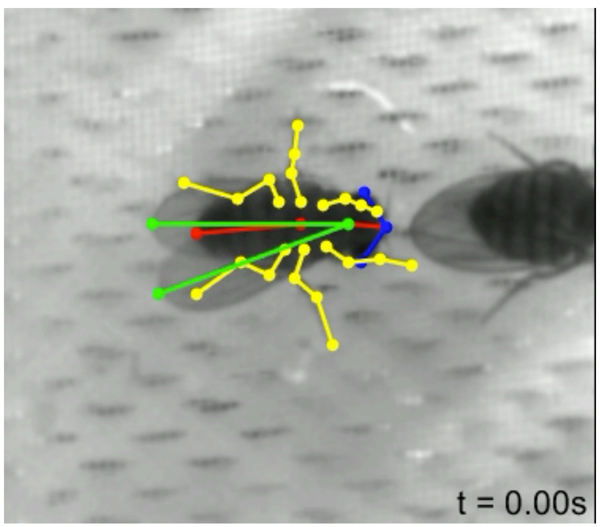


GJB et al, Interface (2014)



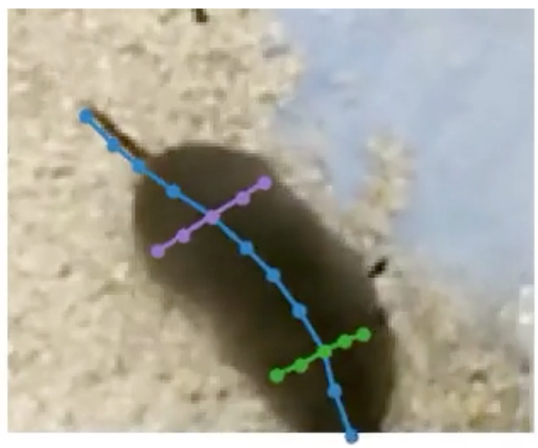
Mathis et al (2018)

Machado et al, 2015

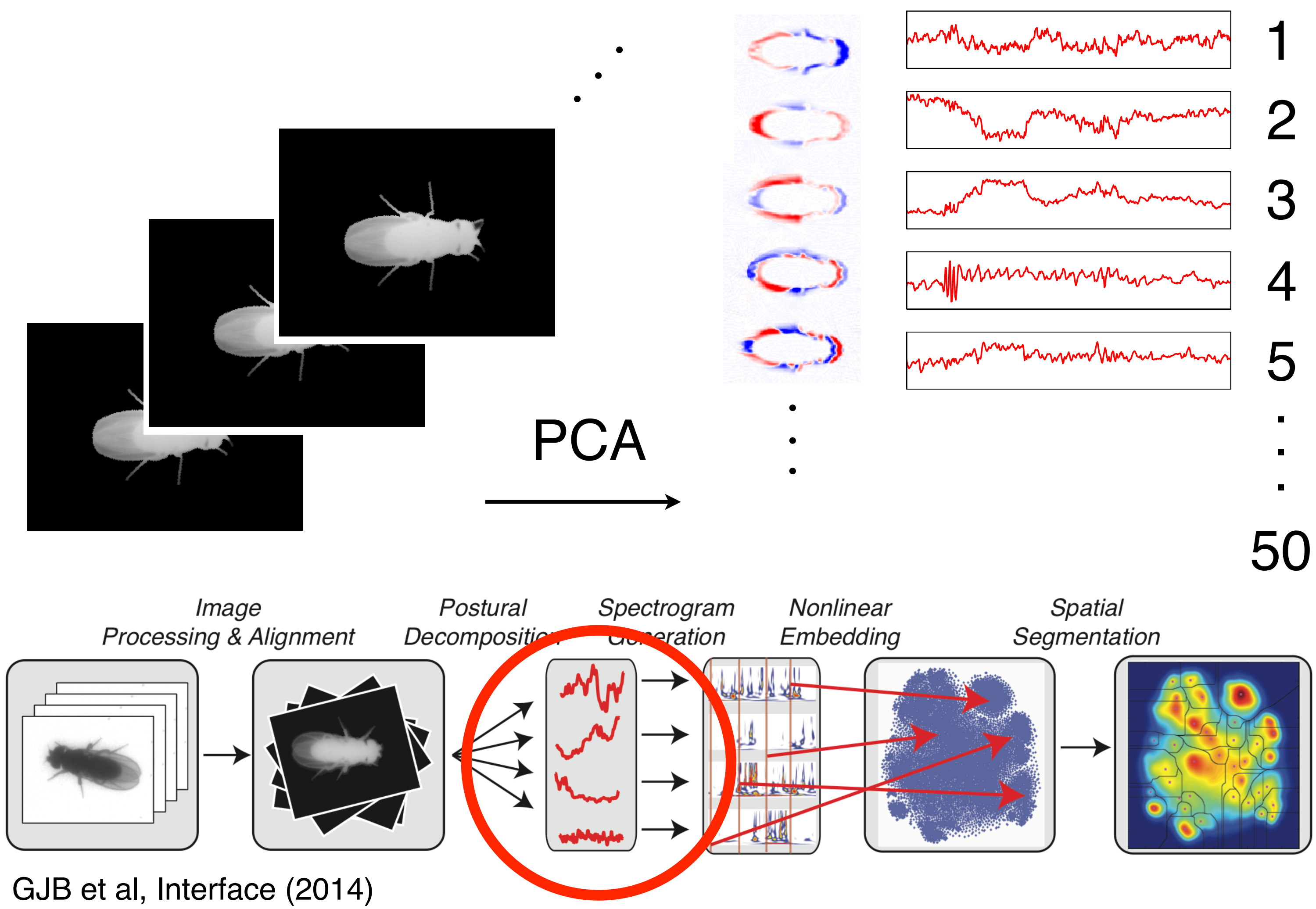


Pereira et al (2018)

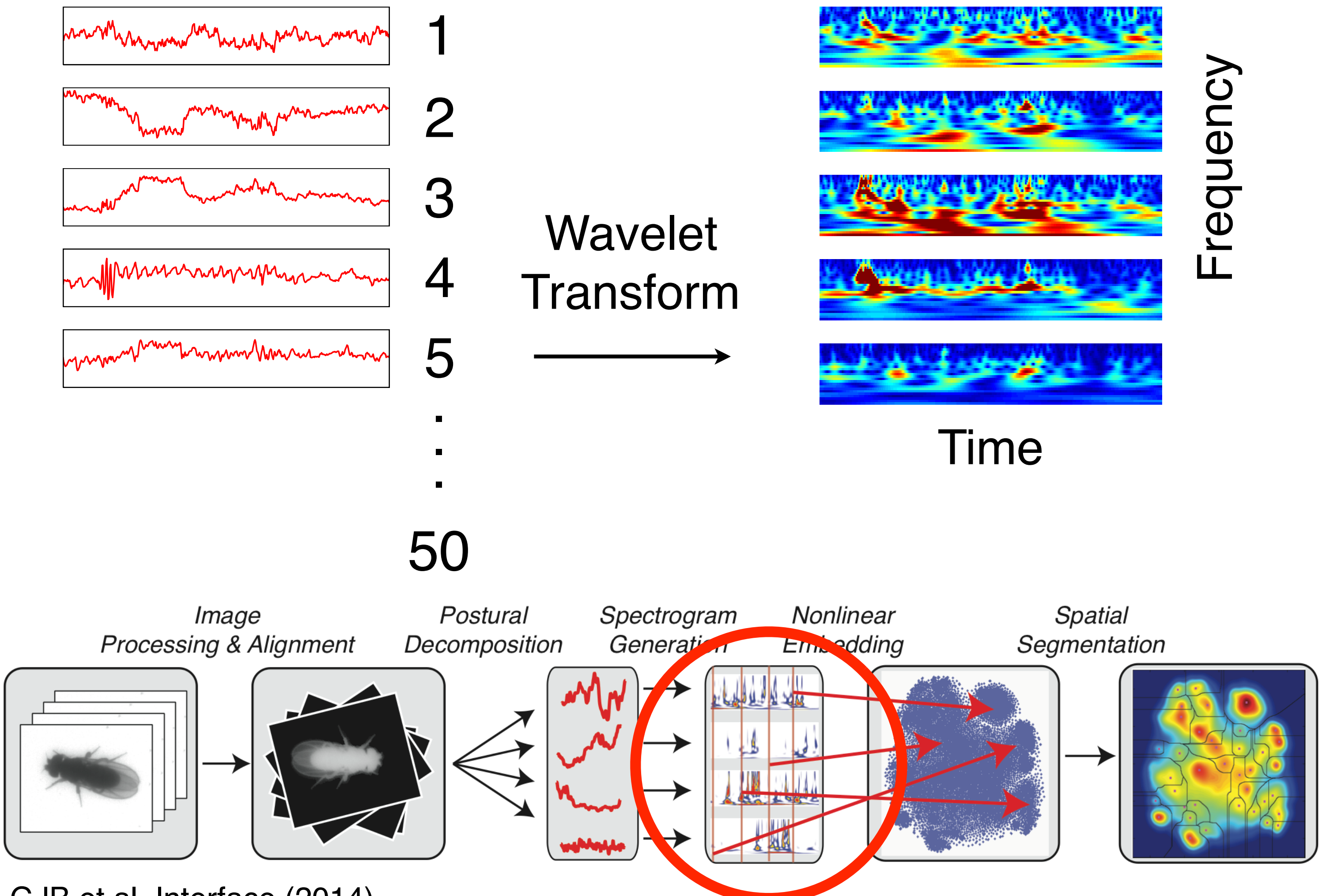
Kanishk Jain



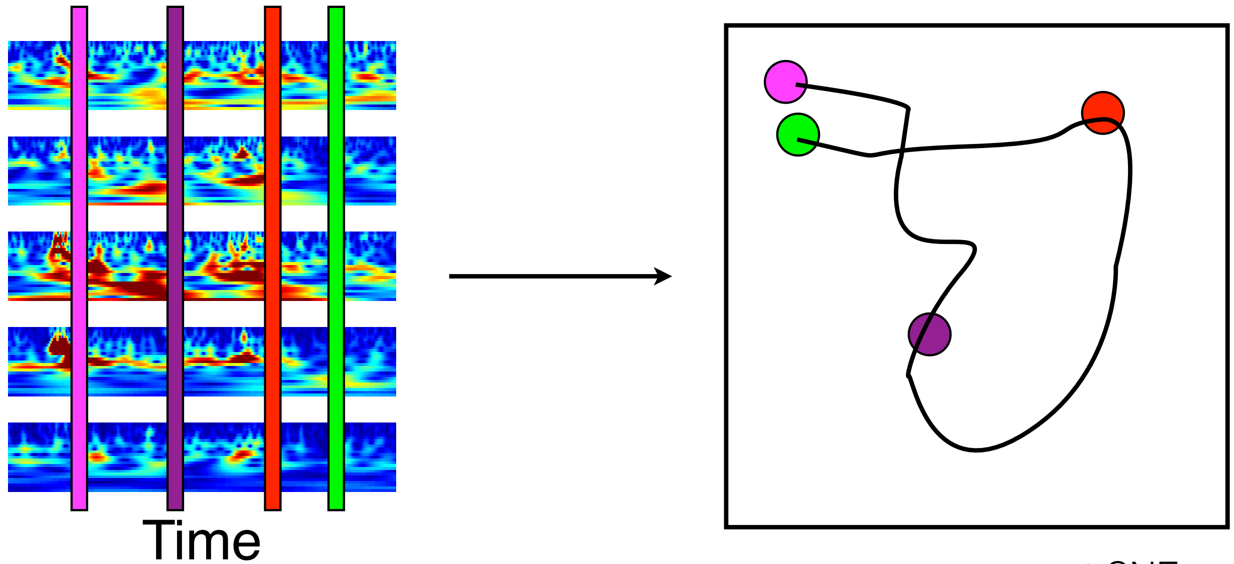
Romero-Ferrero et al, 2019



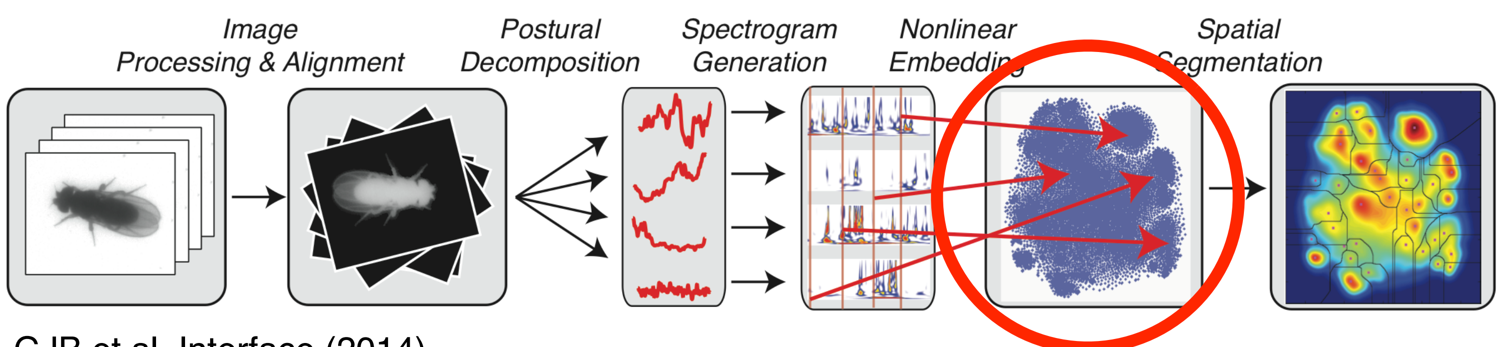
GJB et al, Interface (2014)



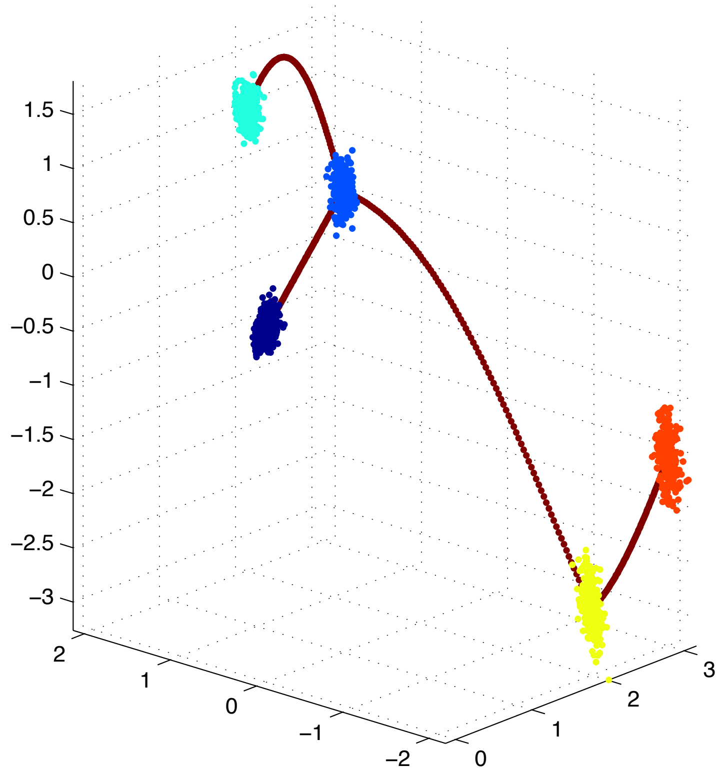
GJB et al, Interface (2014)



t-SNE
van der Maaten & Hinton, 2008



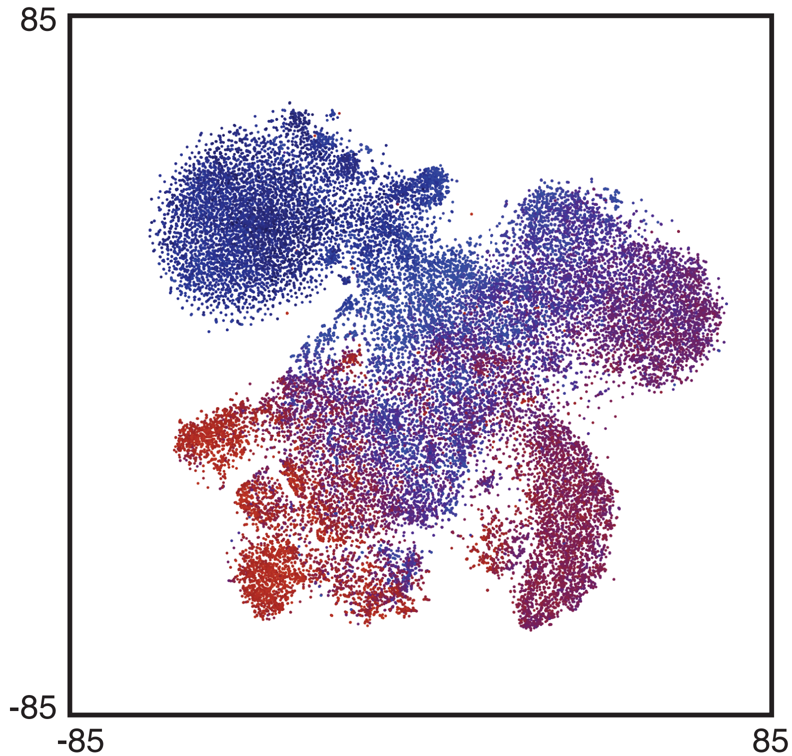
GJB et al, Interface (2014)

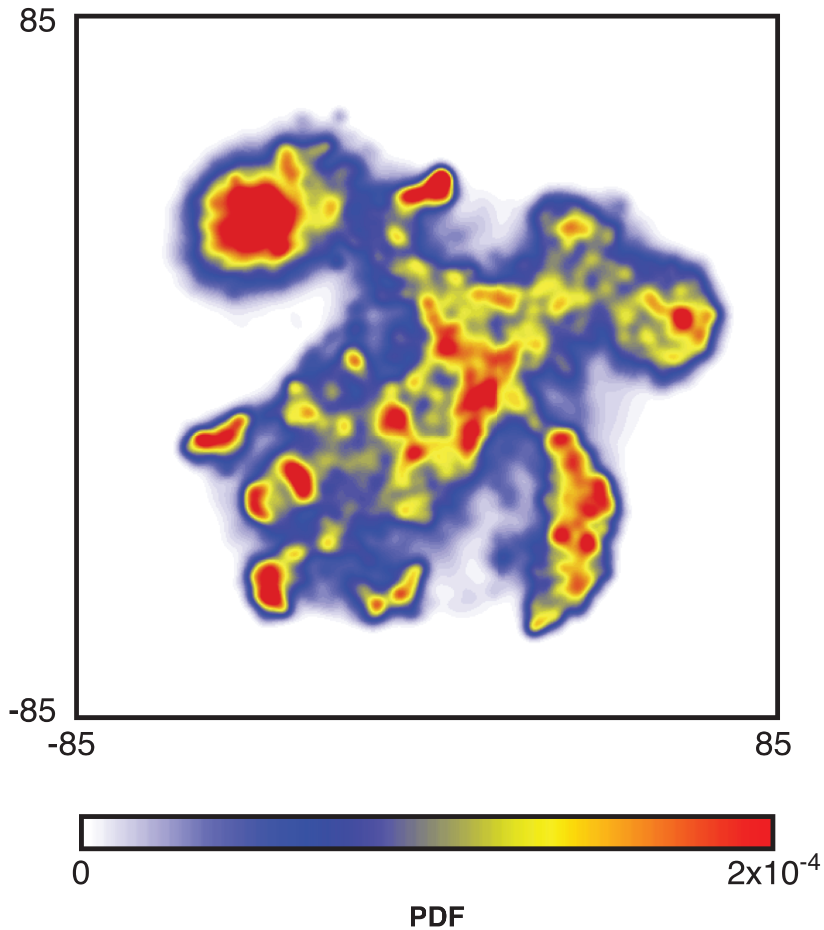


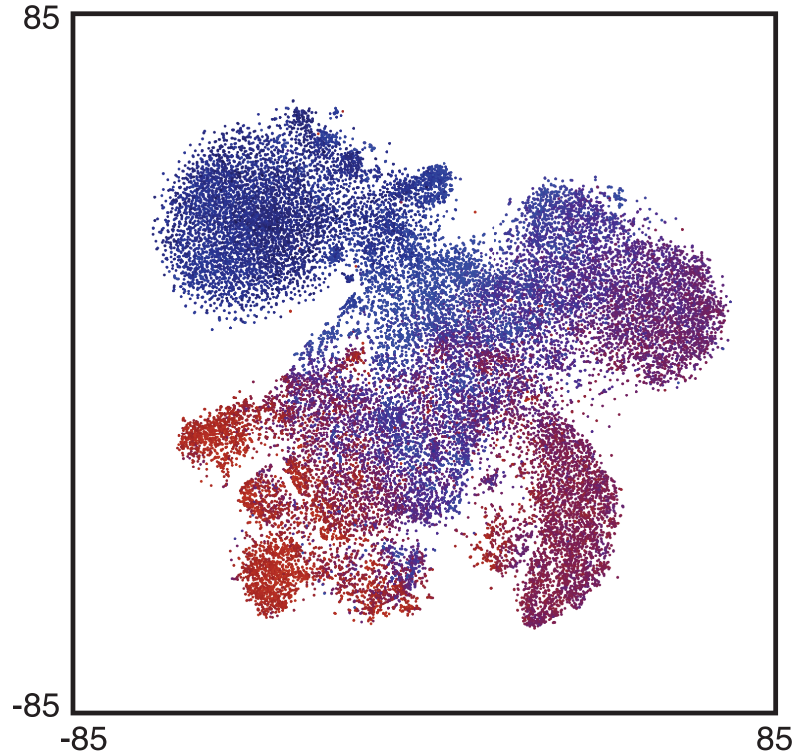
$$p_{ij} = \frac{\exp(-||x_i - x_j||^2/2\sigma_i^2)}{\sum_{k \neq i} \exp(-||x_i - x_k||^2/2\sigma_i^2)} \qquad q_{ij} = \frac{\left(1 + \|y_i - y_j\|^2\right)^{-1}}{\sum_{k \neq l}\left(1 + \|y_k - y_l\|^2\right)^{-1}}$$

$$C = KL(P||Q) = \sum_i \sum_j p_{ij} \log \frac{p_{ij}}{q_{ij}}$$

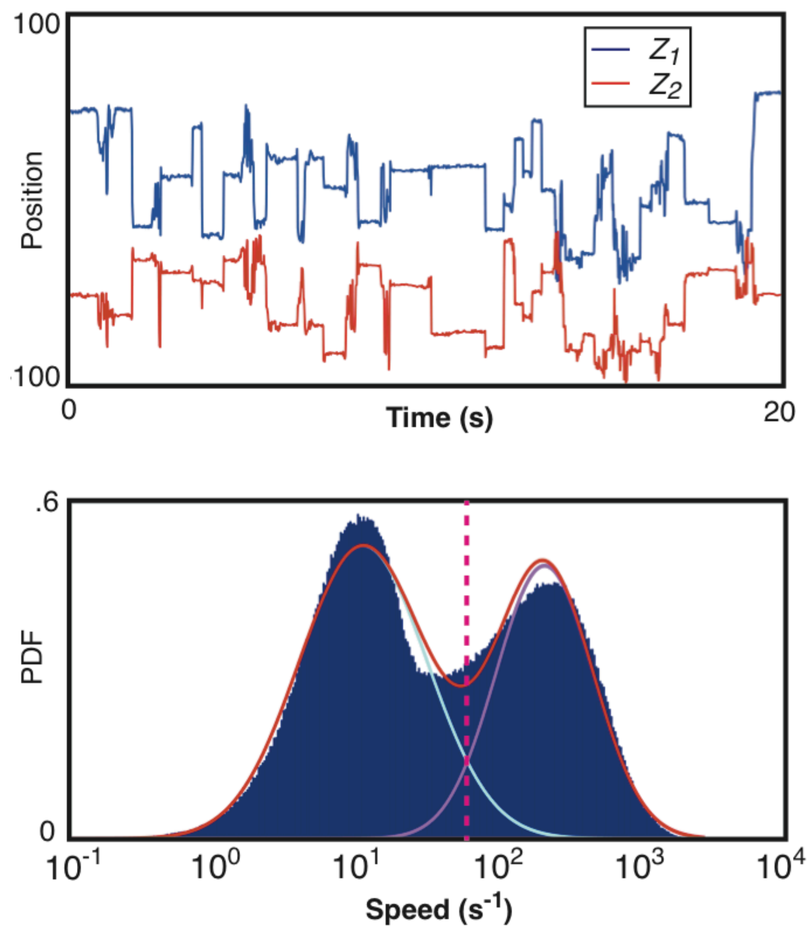
van der Maaten & Hinton, 2008


85
-85
-85
85

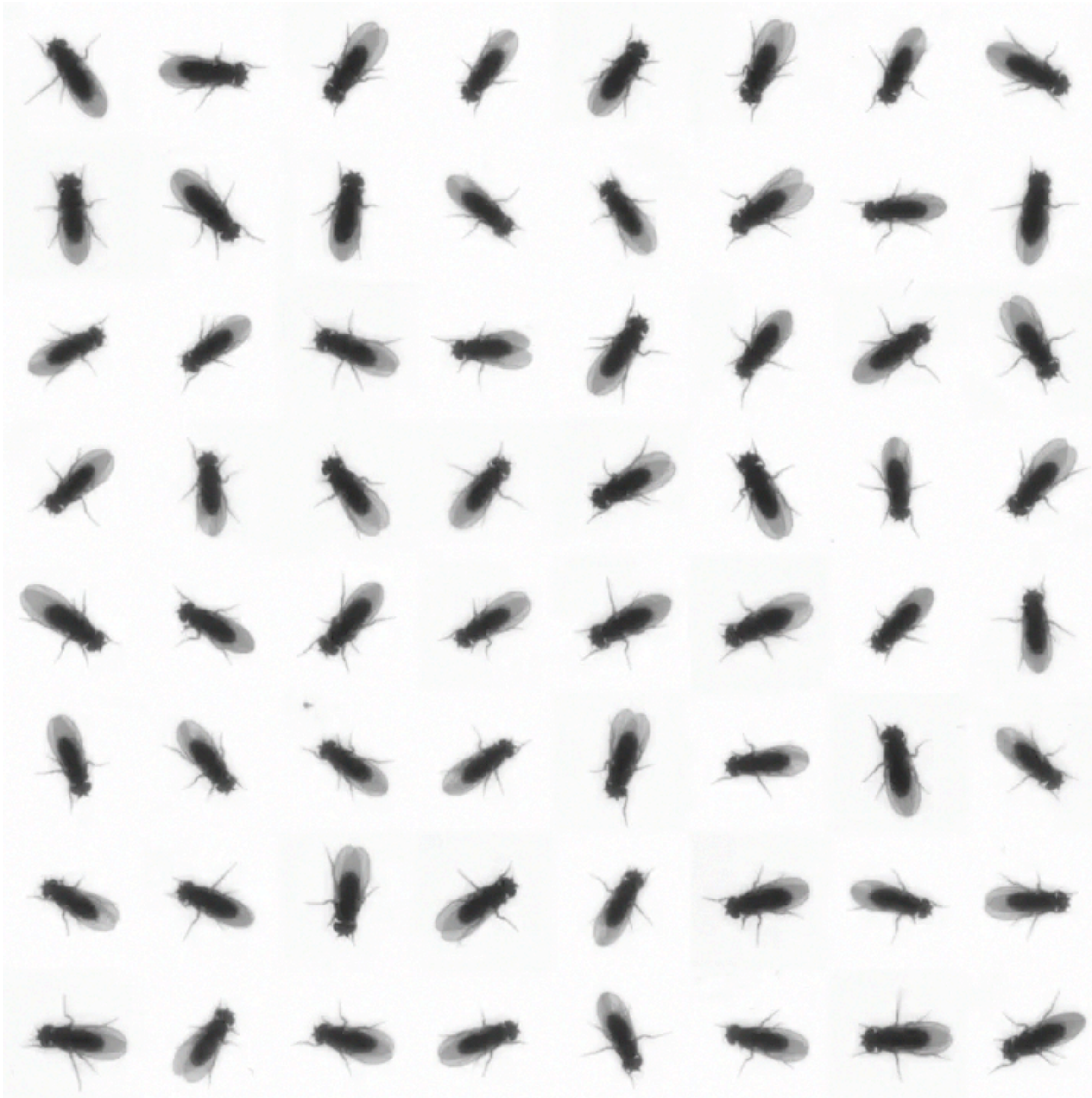

85
-85
-85
85
0
2x10-4
PDF

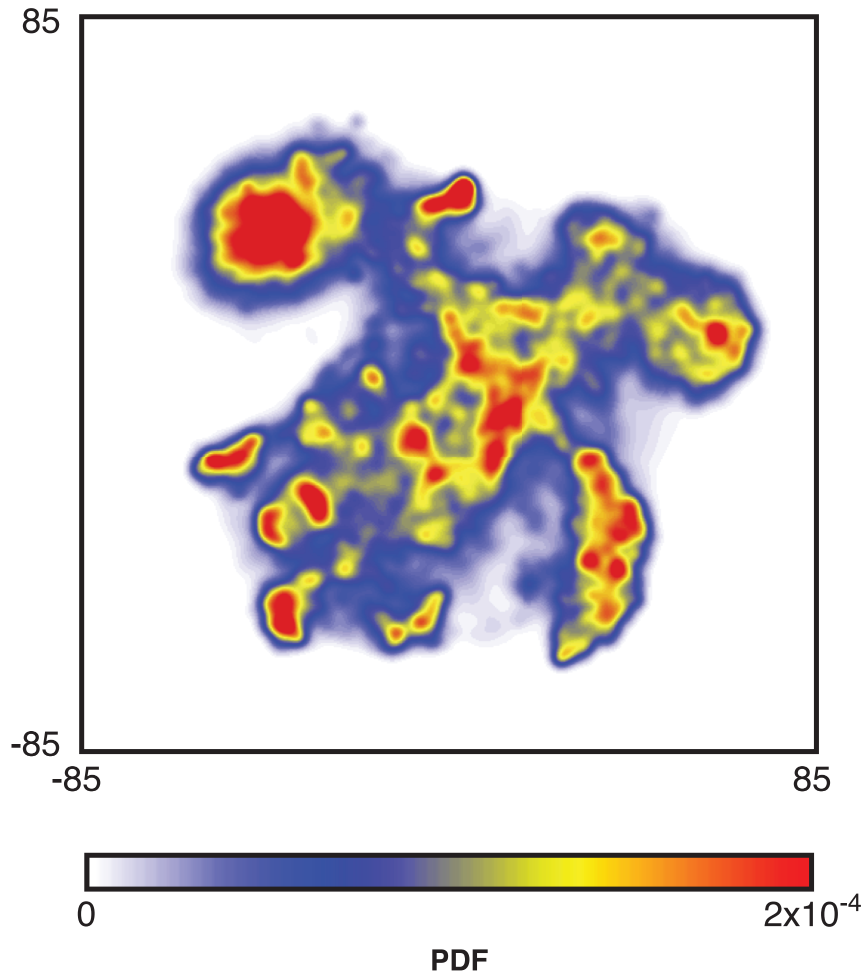


85
-85
-85
85

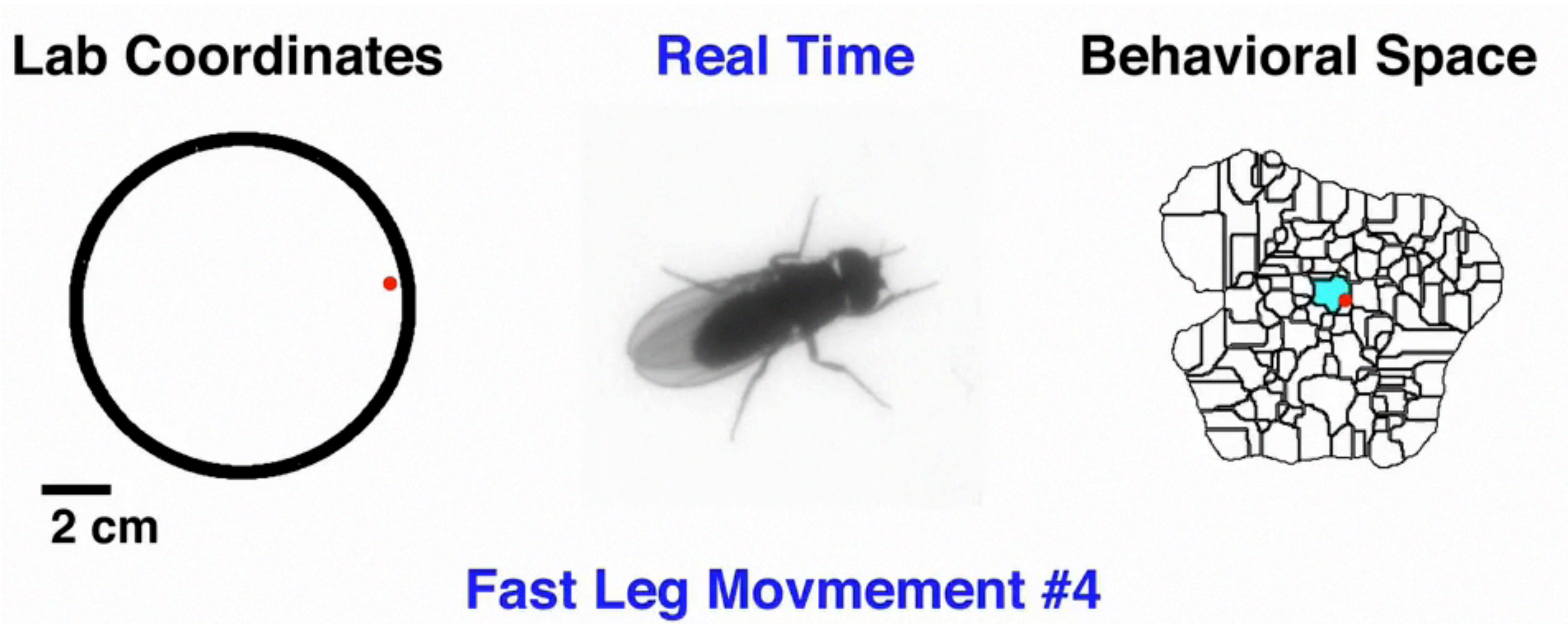


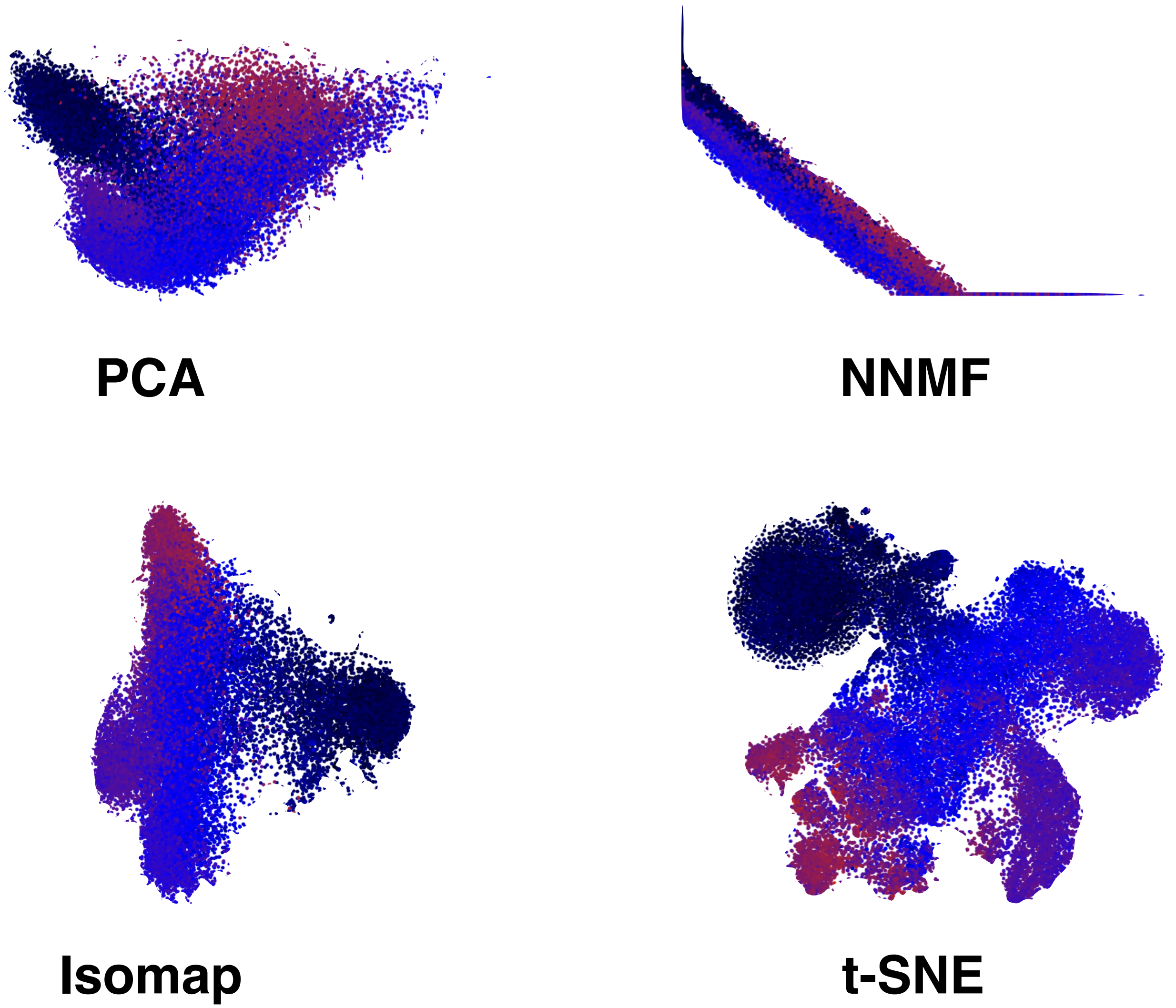
100
-100
Position
Z1
Z2
0
Time (s)
20
.6
0
PDF
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
Speed (s^{-1})

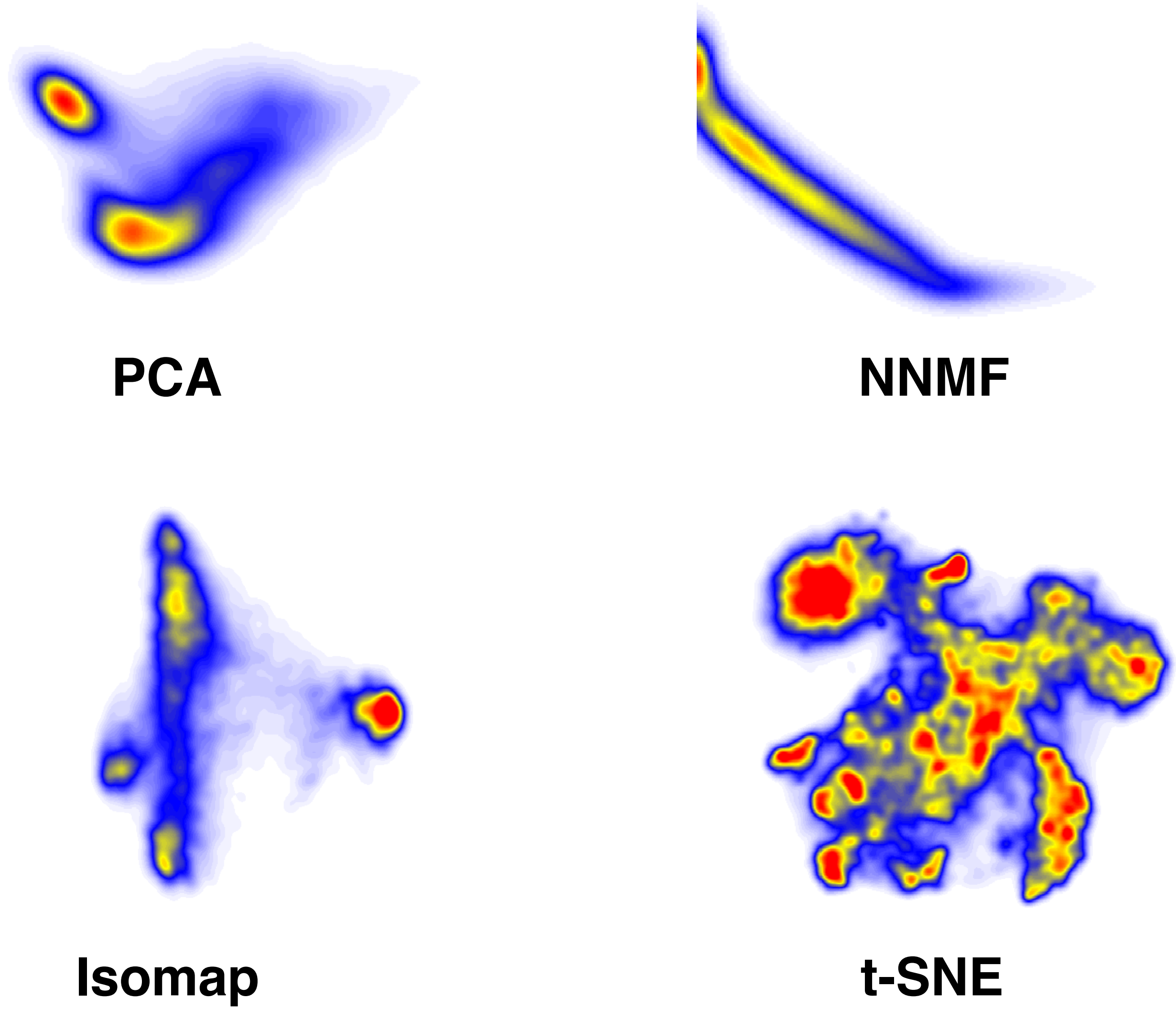



85
-85
-85
85
0
2x10-4
PDF

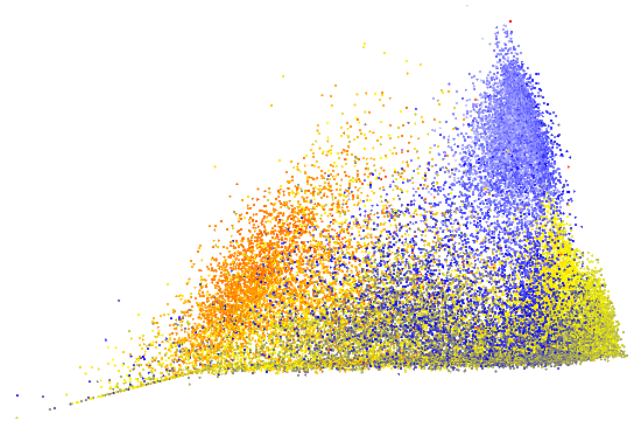
Slow
Idle
Anterior
Side Leg
Posterior
Locomotion


Lab Coordinates
Real Time
Behavioral Space
2 cm
Fast Leg Movmement #4


PCA
NNMF
Isomap
t-SNE

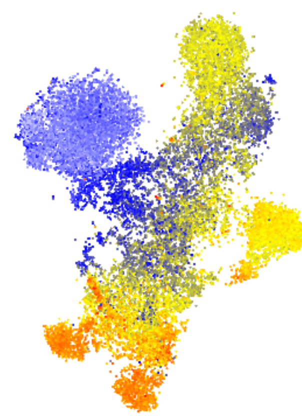

PCA
NNMF
Isomap
t-SNE

PCA



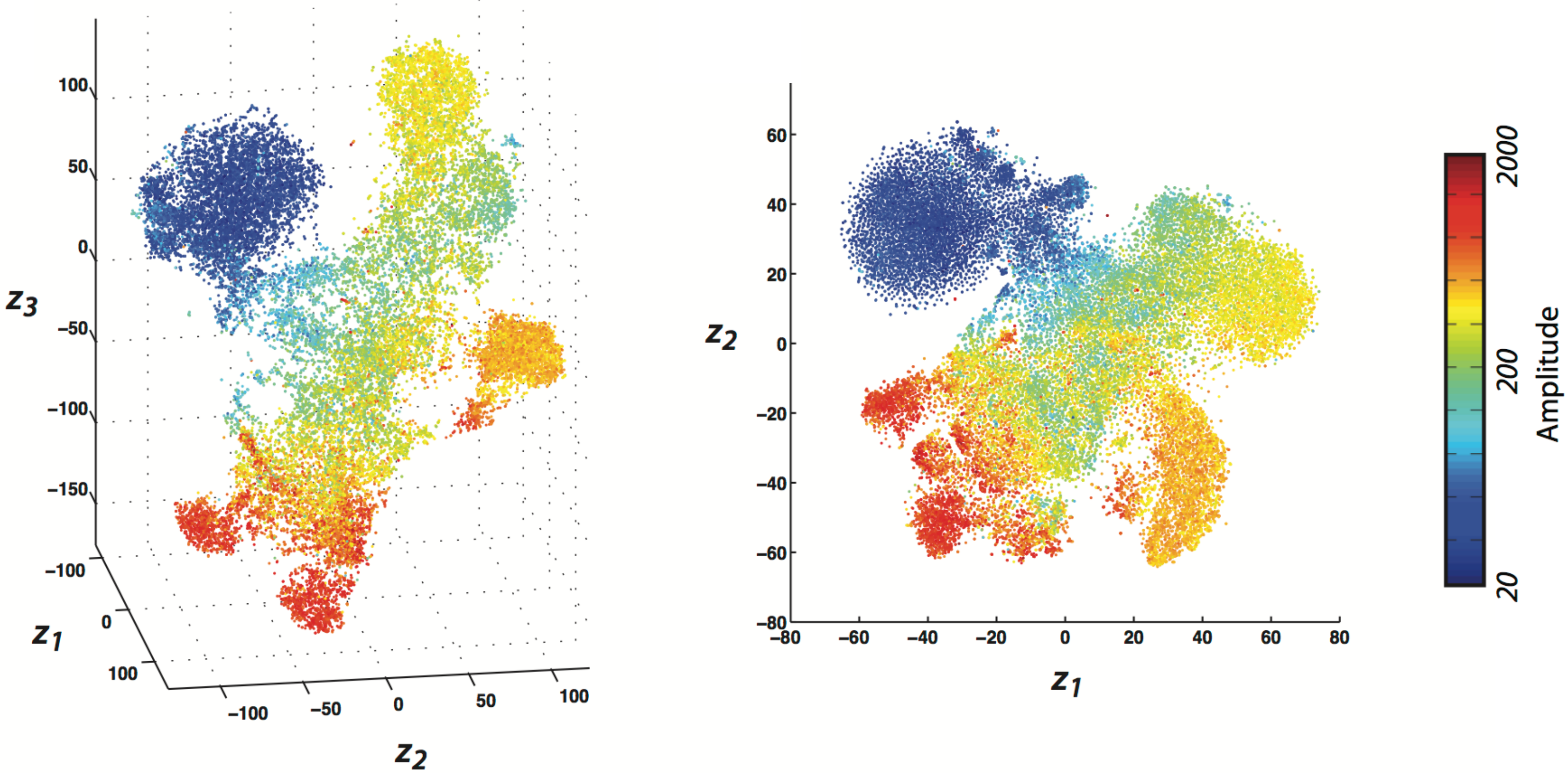
NNMF

Isomap



t-SNE

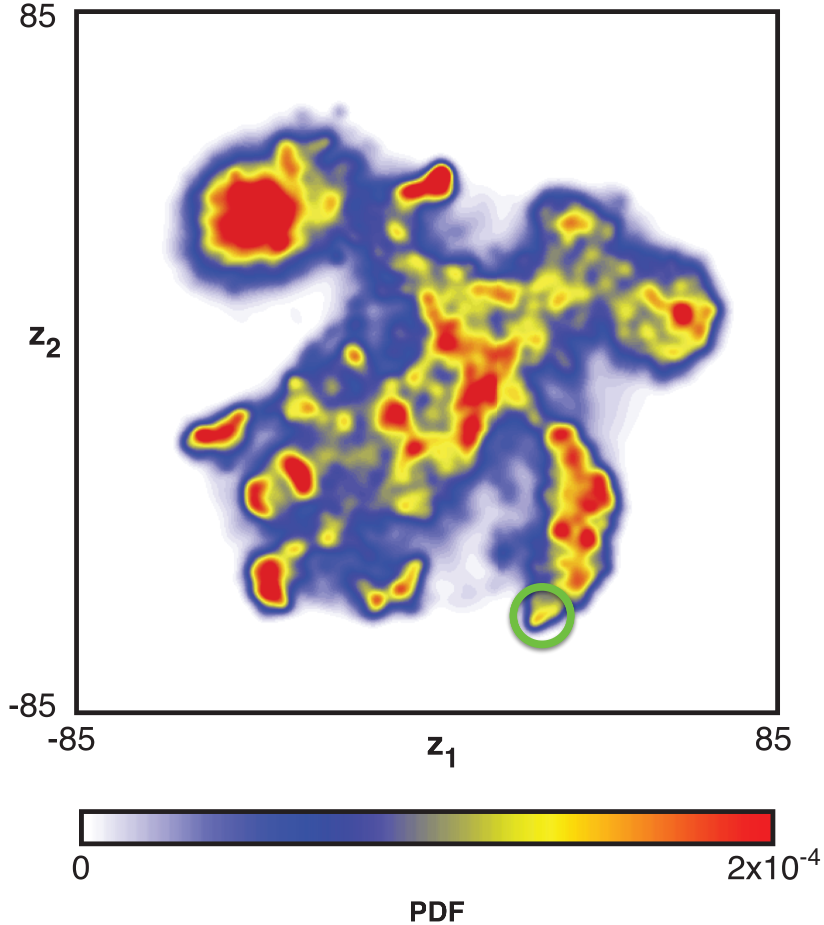
2D vs. 3D

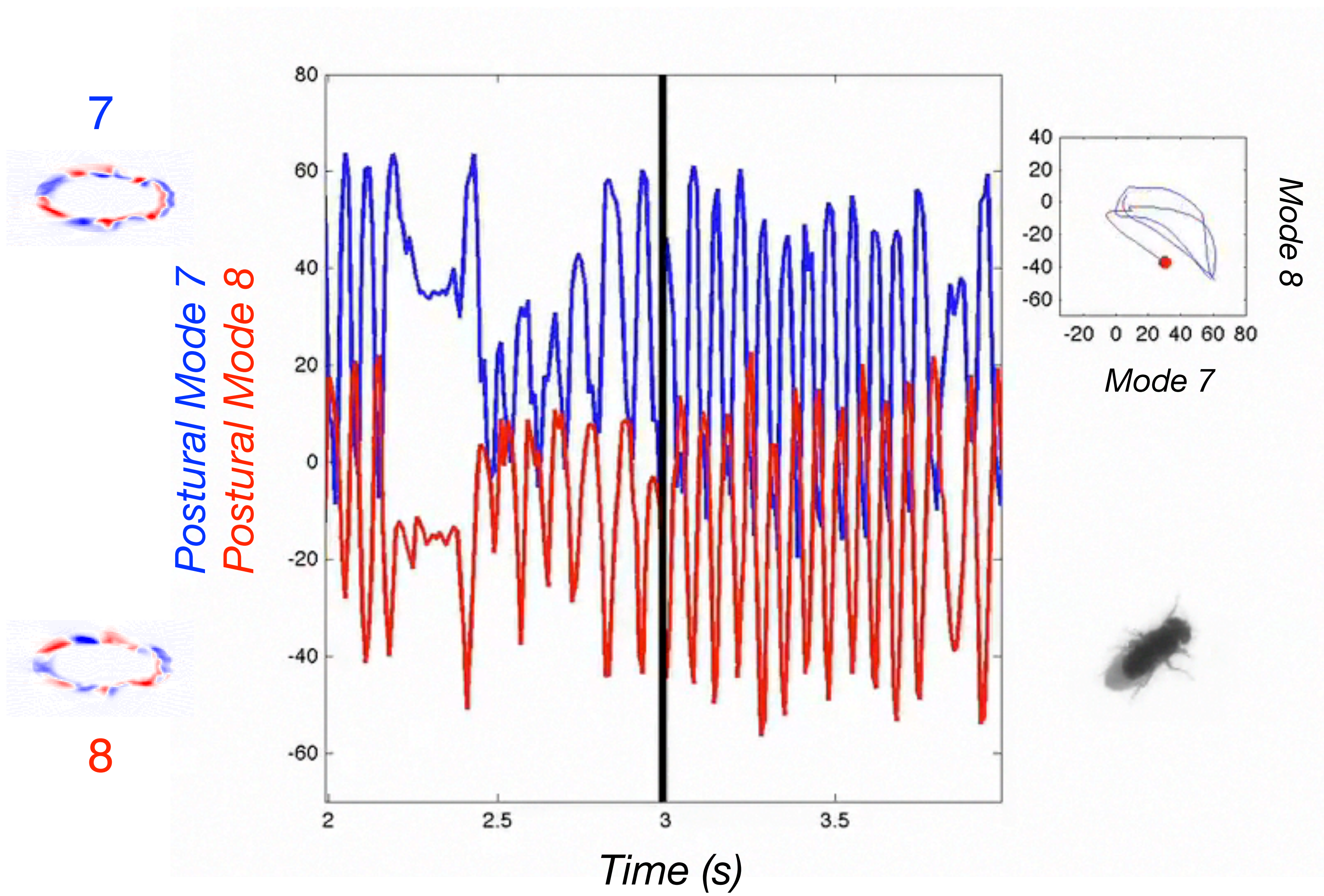


Error = 2.9 bits

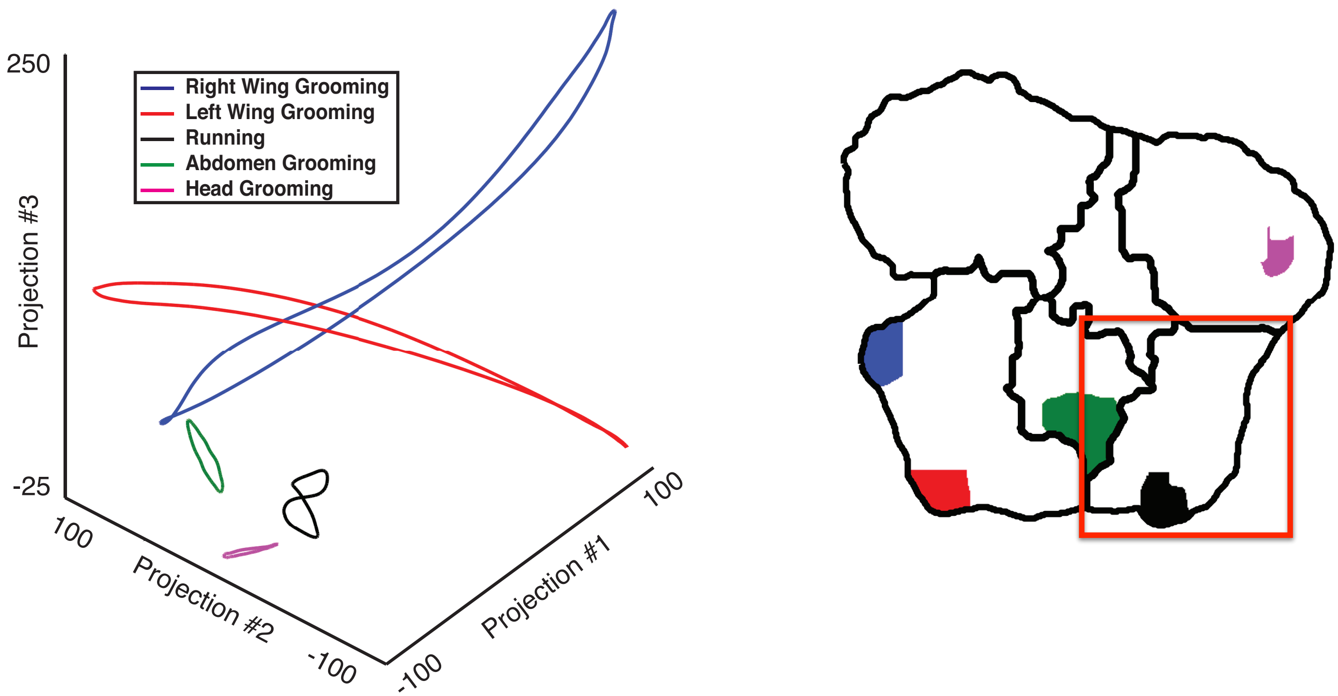
Error = 3.3 bits

Entropy = 20.6 bits

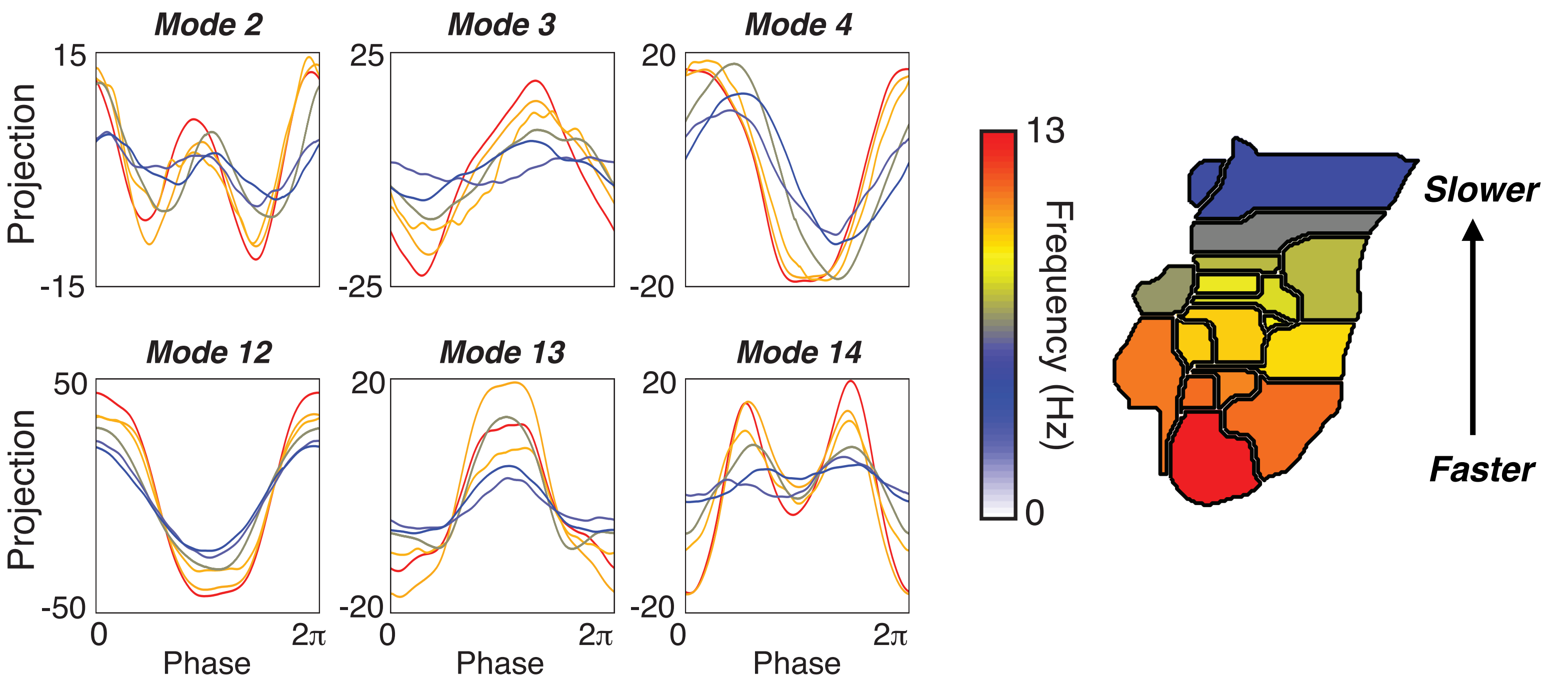

85
-85
-85
85
z1
z2
0
2x10-4
PDF



7
8
Postural Mode 7
Postural Mode 8
Time (s)
Mode 8
Mode 7

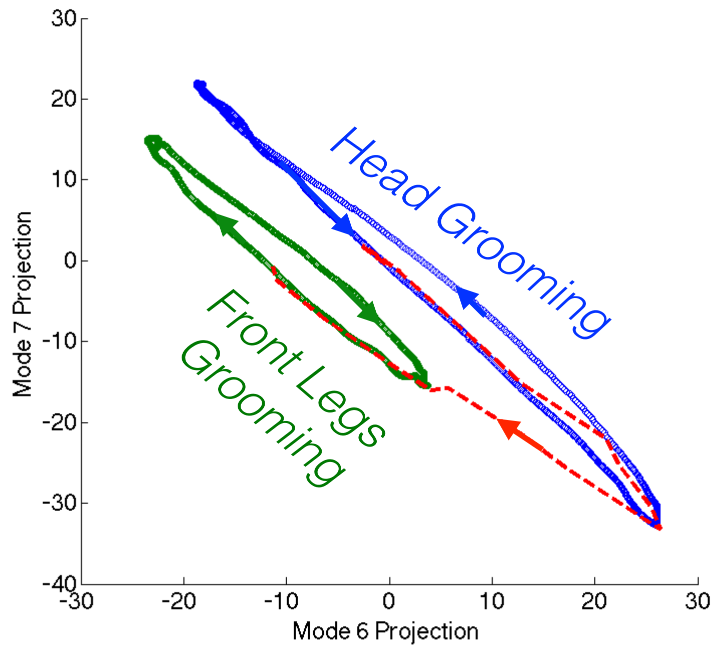


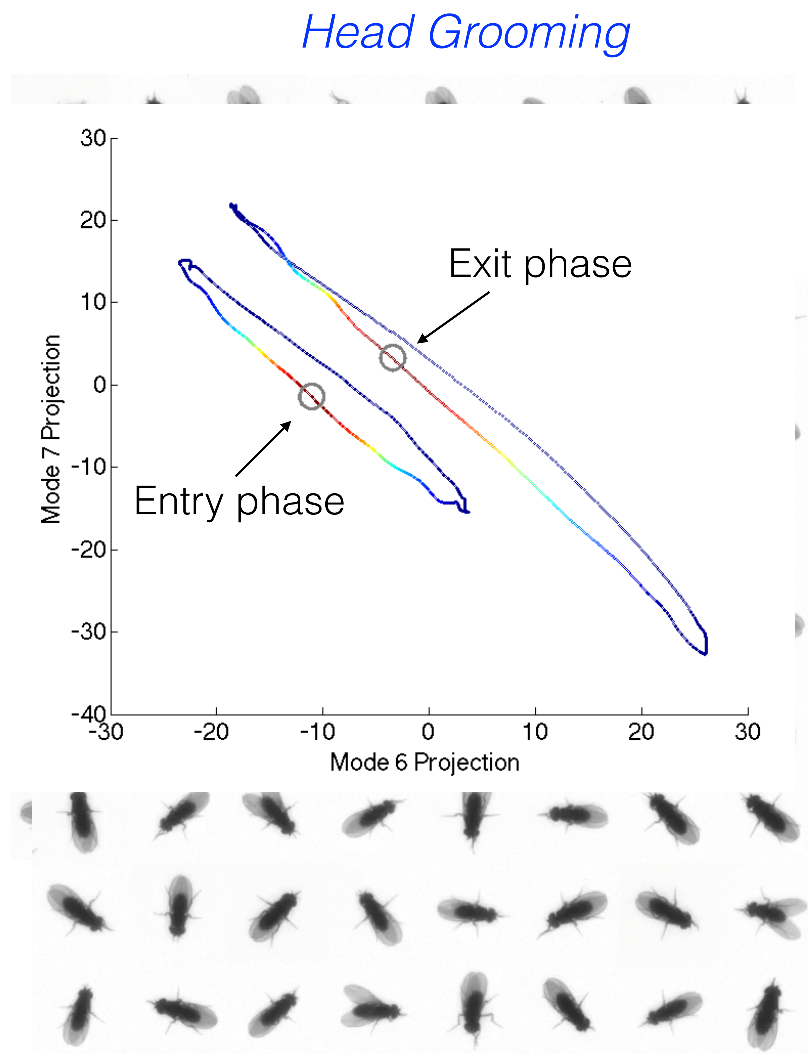
250
-25
Projection #3
Right Wing Grooming
Left Wing Grooming
Running
Abdomen Grooming
Head Grooming
100
Projection #2
-100
-100
Projection #1
100

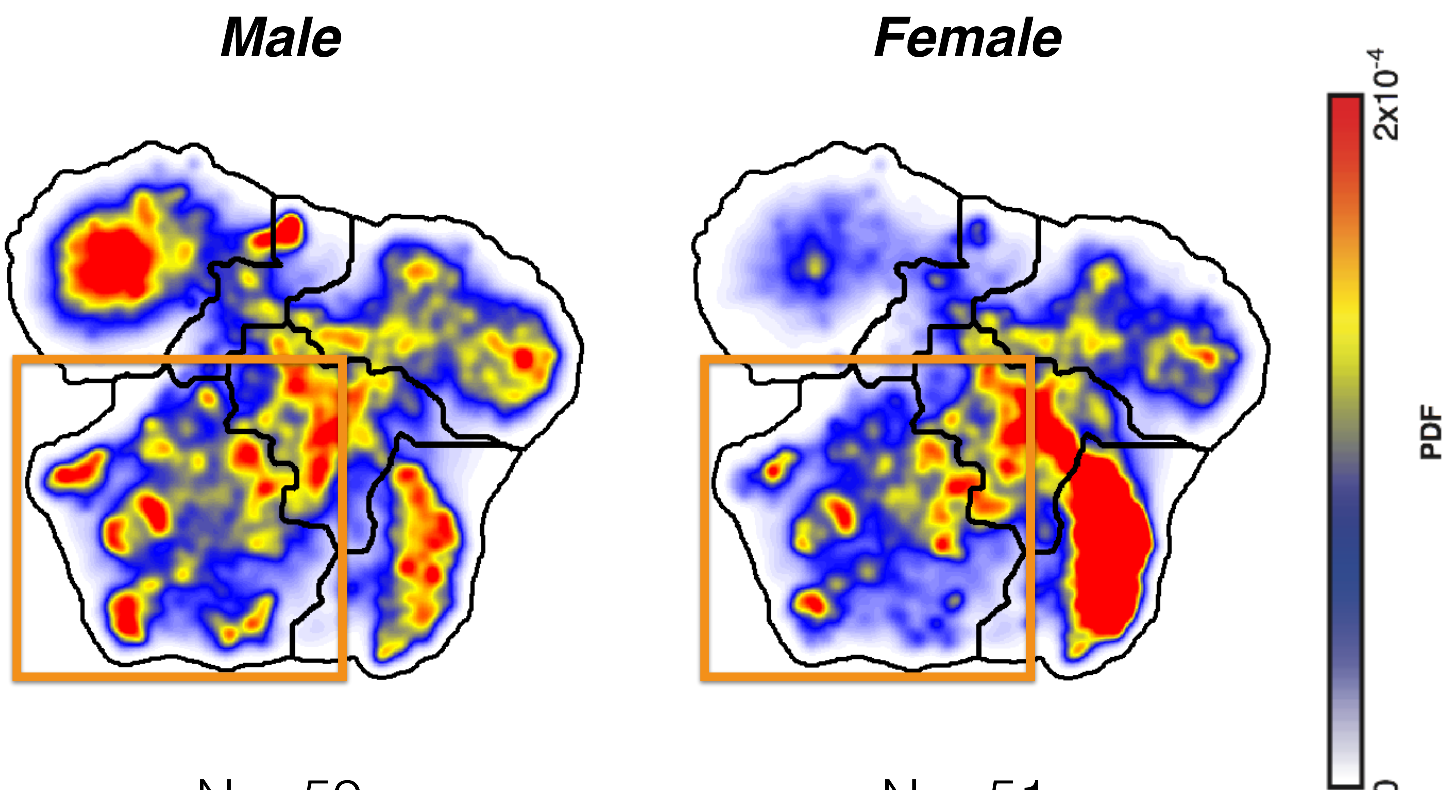


Mode 2
Mode 3
Mode 4
Mode 12
Mode 13
Mode 14
Projection
Phase
0
2π
15
-15
25
-25
20
-20
50
-50
Frequency (Hz)
13
0
Slower
Faster

Transitions Between Periodic Orbits

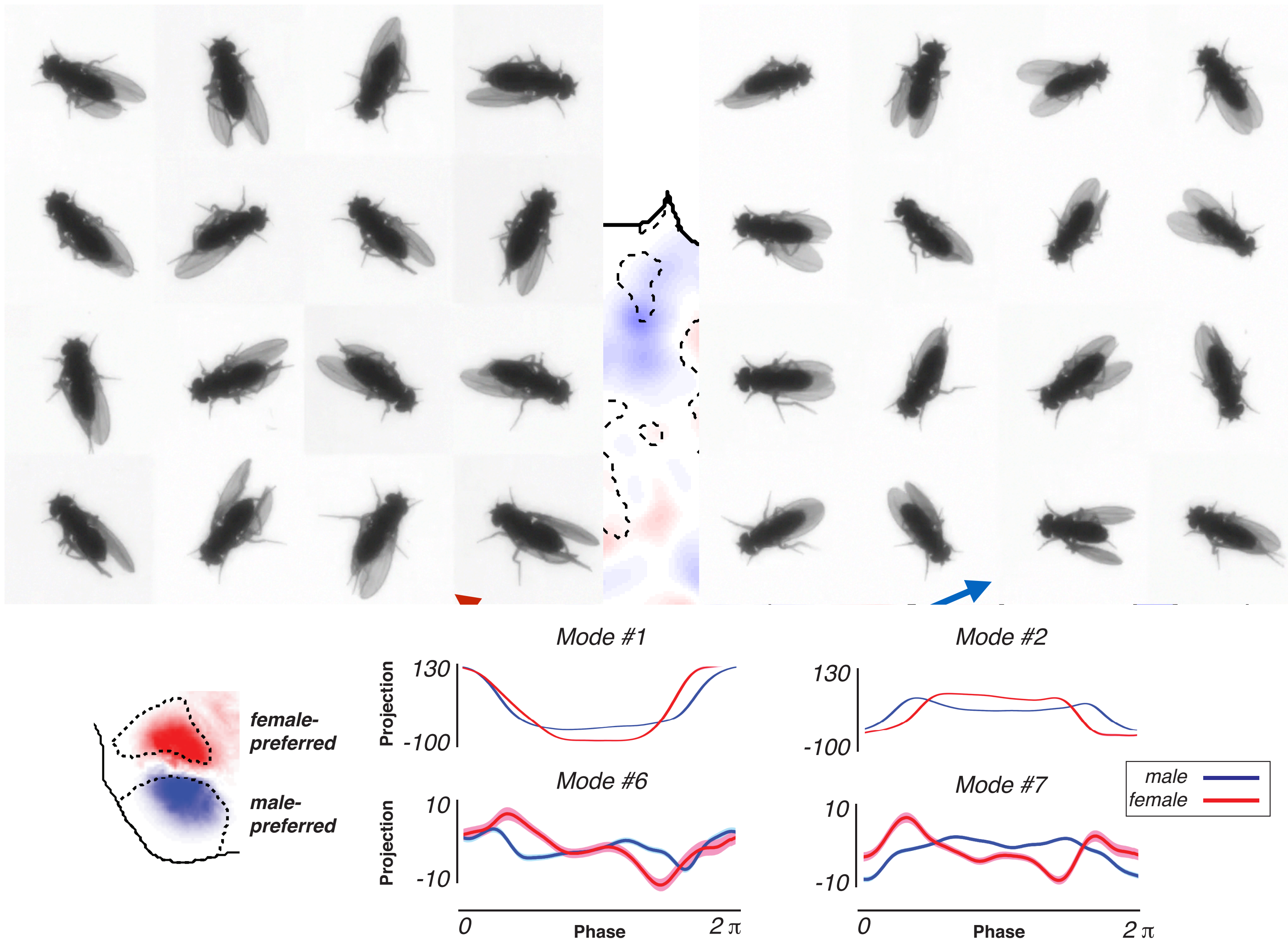




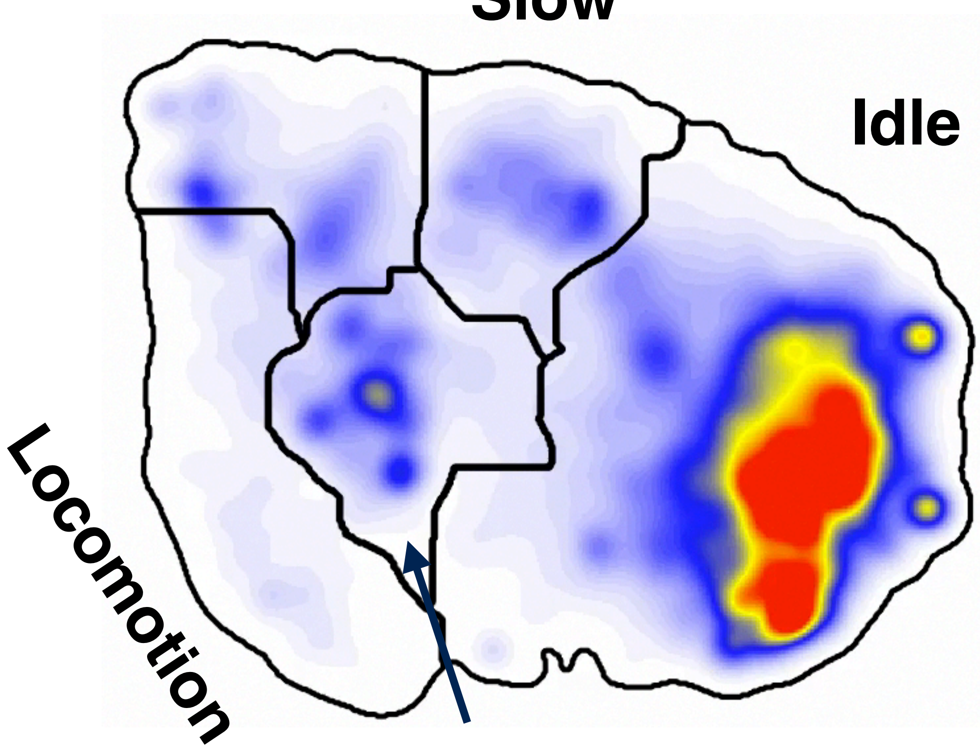


N = 59
~21 *x* 10^6 data points

N = 51
~18 *x* 10^6 data points



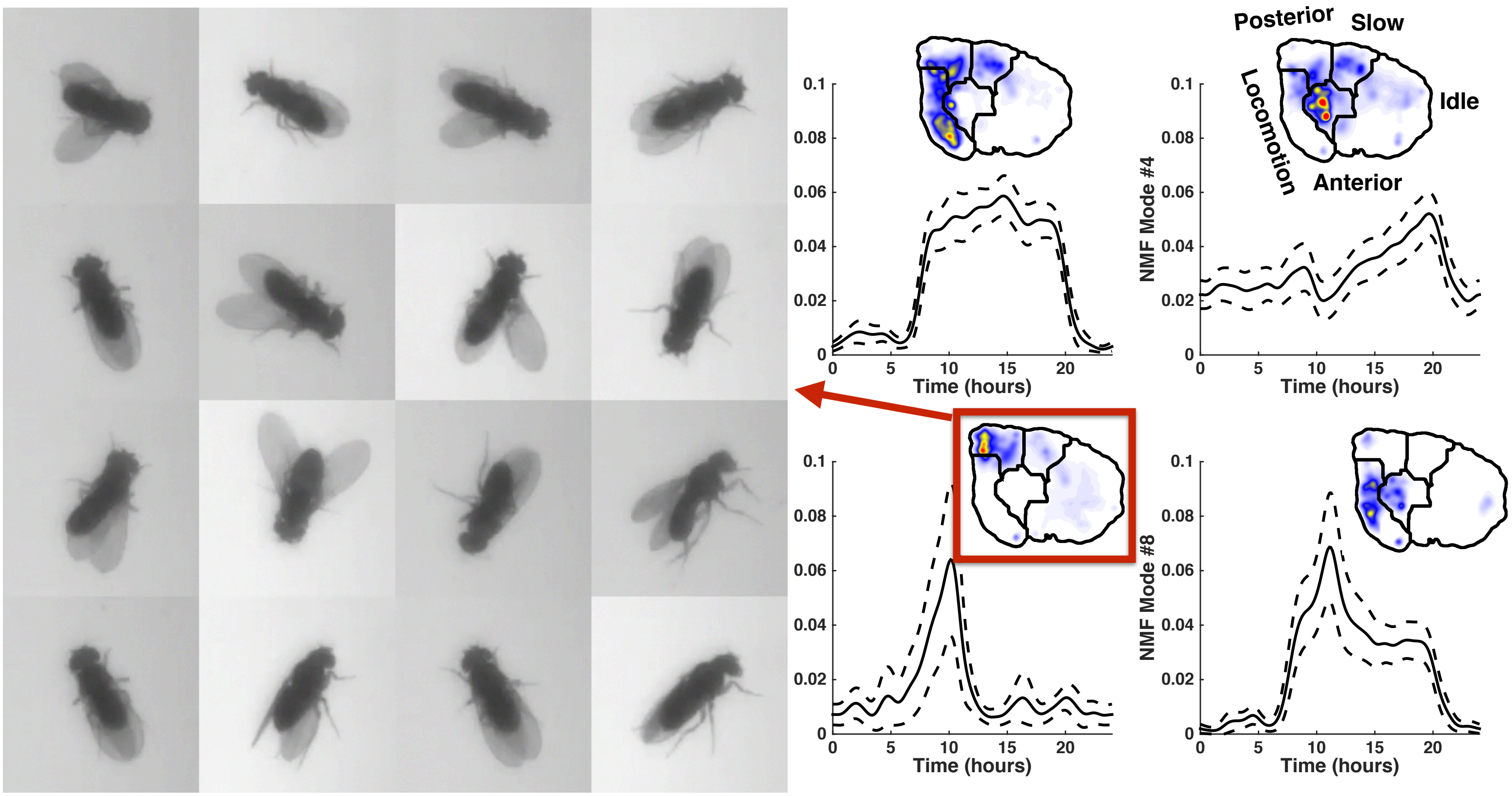
female-
preferred
male-
preferred
Mode #1
Mode #2
Projection
130
-100
Mode #6
Mode #7
10
-10
male
female
0
Phase
2 π



Time

0:00

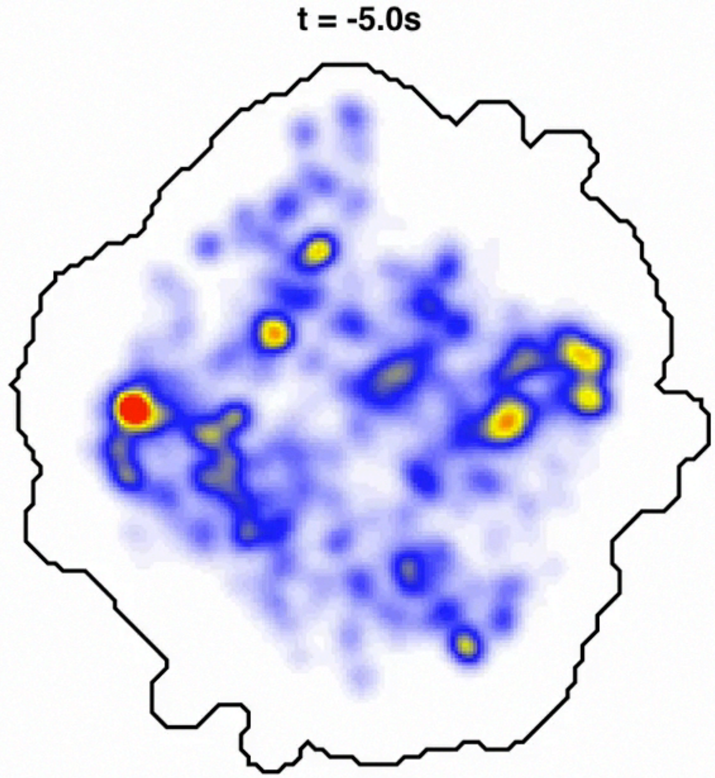
w/ Daniel Mossing



Non-Negative Matrix Factorization

$$X = WH$$
$$X, W, H > 0$$

$$X \in \Re^{N \times d}$$
$$W \in \Re^{N \times r}$$
$$H \in \Re^{r \times d}$$

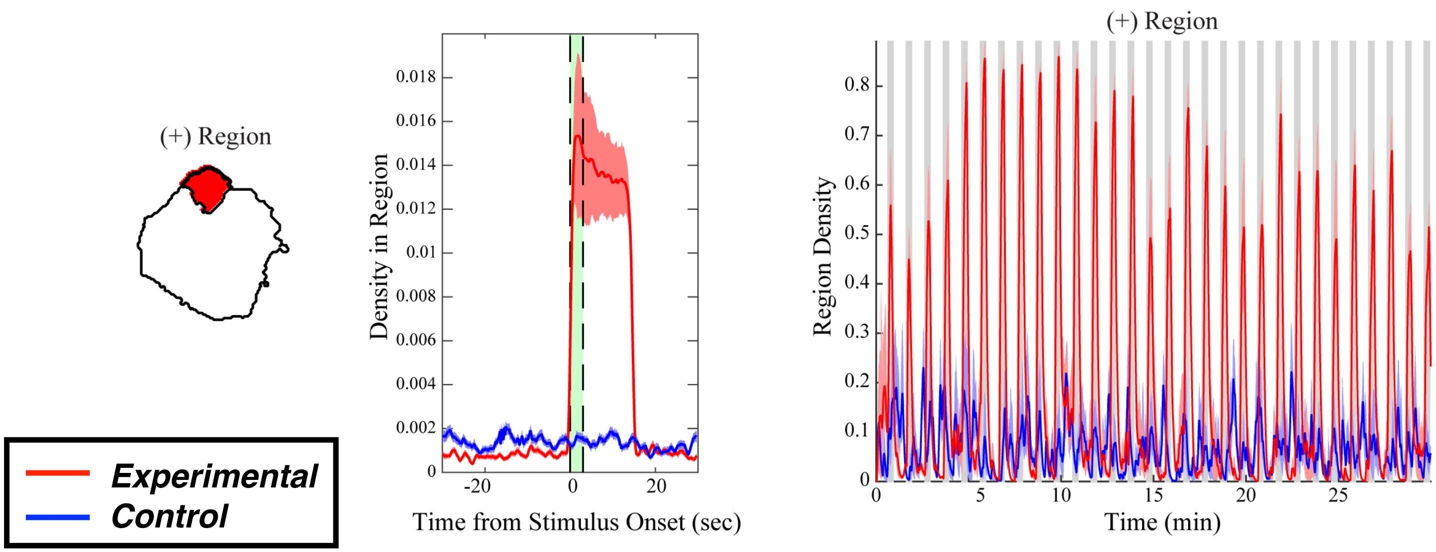


Cande et al, eLife, 2018

Jessica Cande

Gwyneth Card

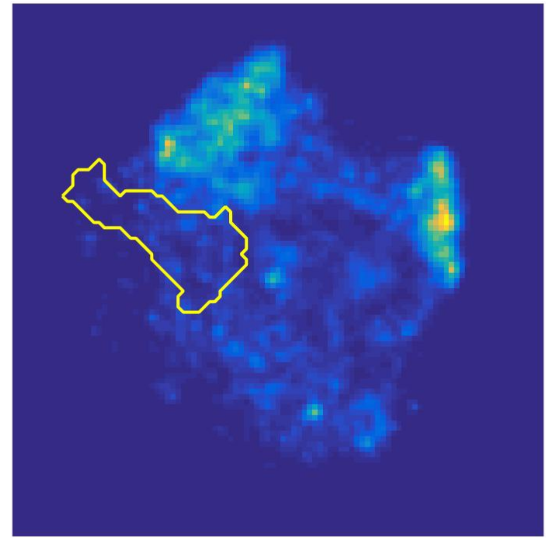
David Stern



Cande et al, eLife, 2018

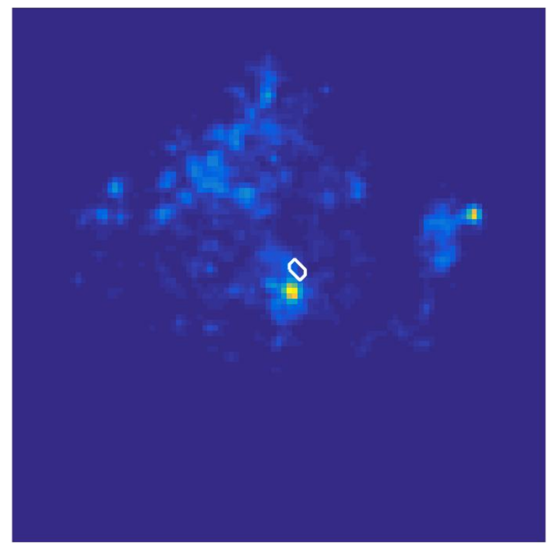
Density before Transitioning to Yellow Region

$p(\rho_{-2<t<0}(\vec{x})|\text{Yellow})$



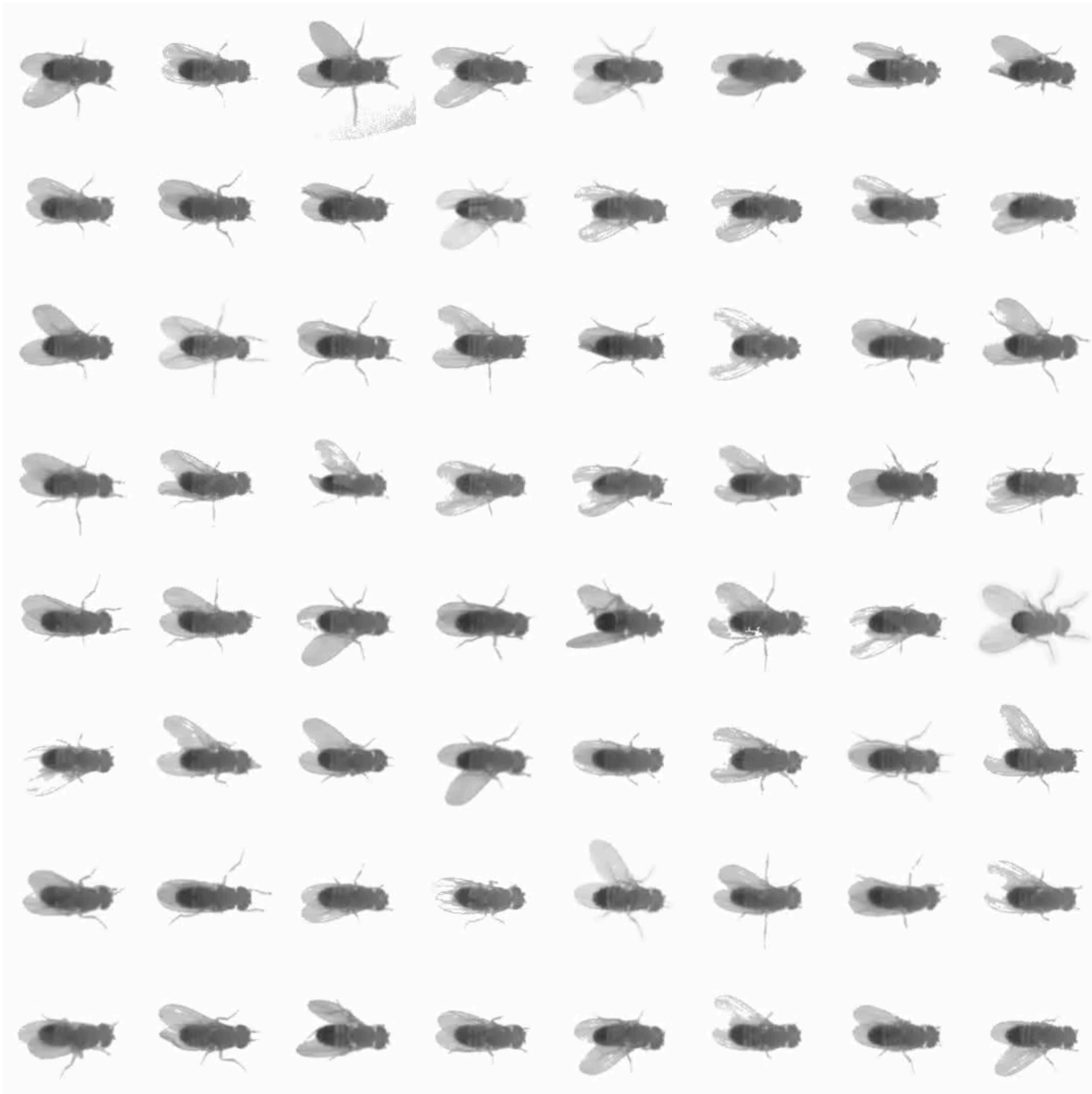
Density before Transitioning to White Region

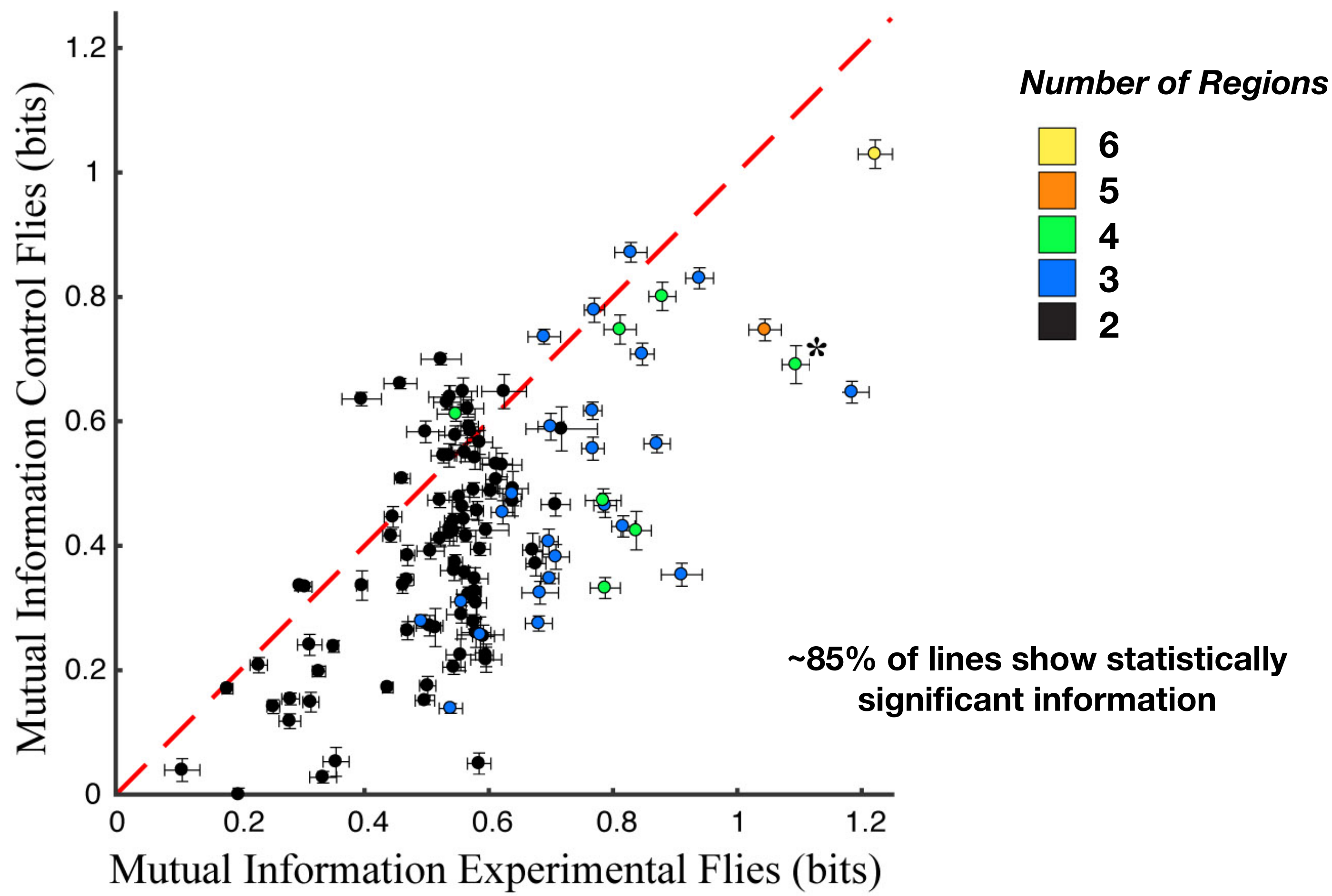
$p(\rho_{-2<t<0}(\vec{x})|\text{White})$



$$I(\rho_{-2<t<0}(\vec{x}); R) = 0.5 \pm 0.1 \text{ bits}$$

with Jirui Qiu





Optogenetic dissection of descending behavioral control in Drosophila

Jessica Cande, Gordon J Berman, Shigehiro Namiki, Jirui Qiu, Wyatt Korff, Gwyneth Card, Joshua W Shaevitz, David L Stern

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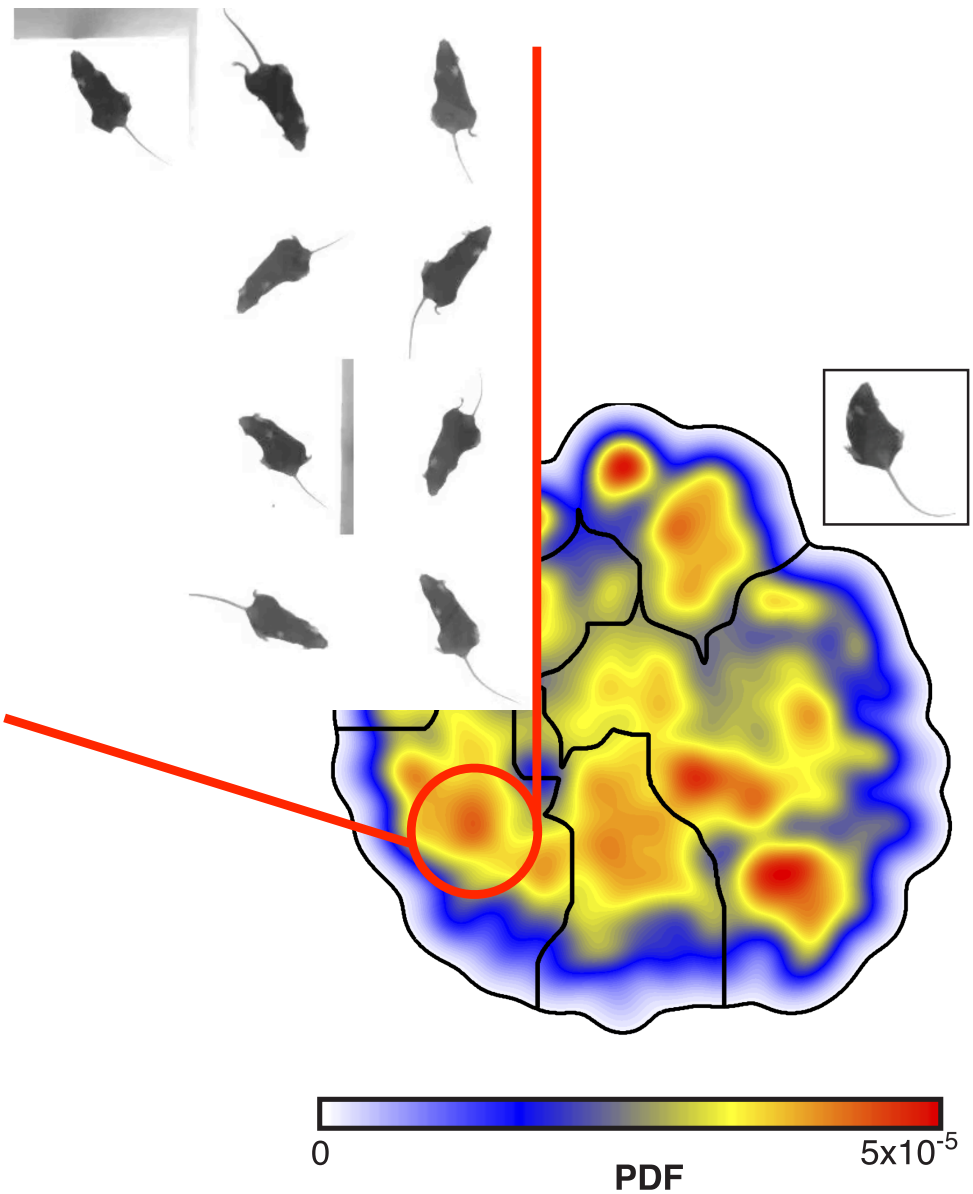
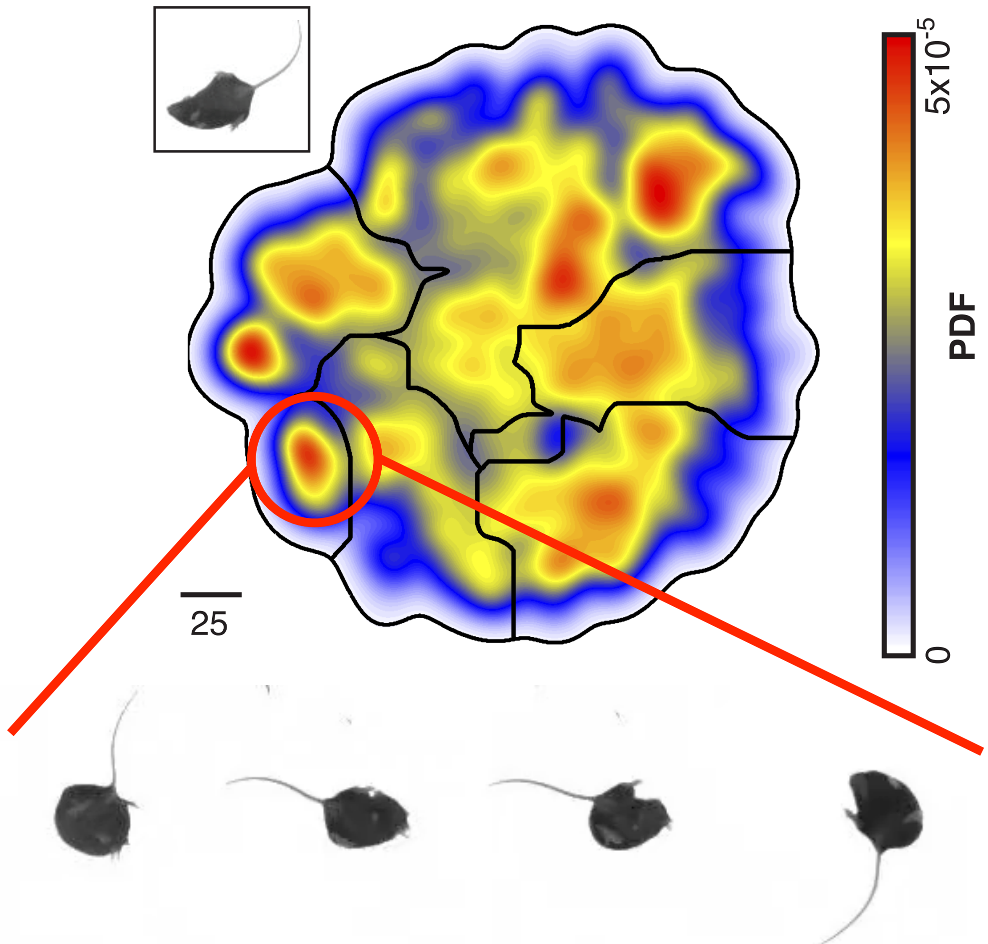
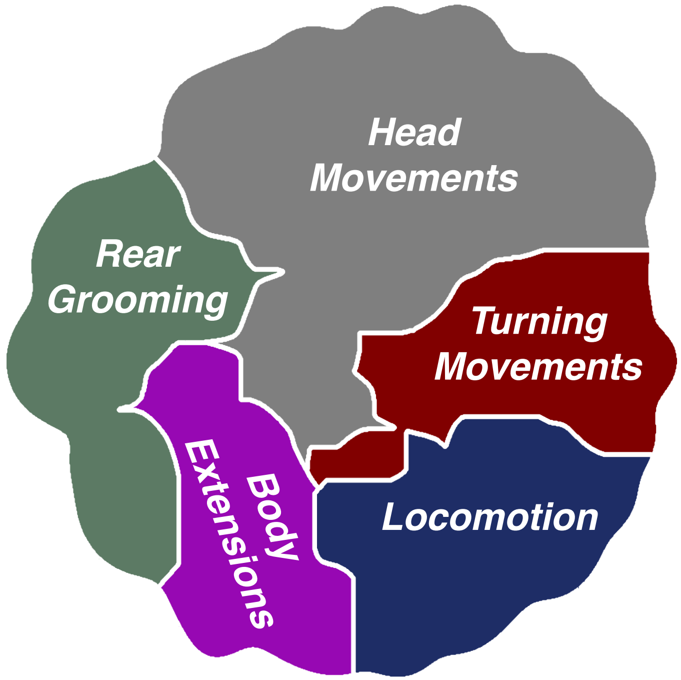
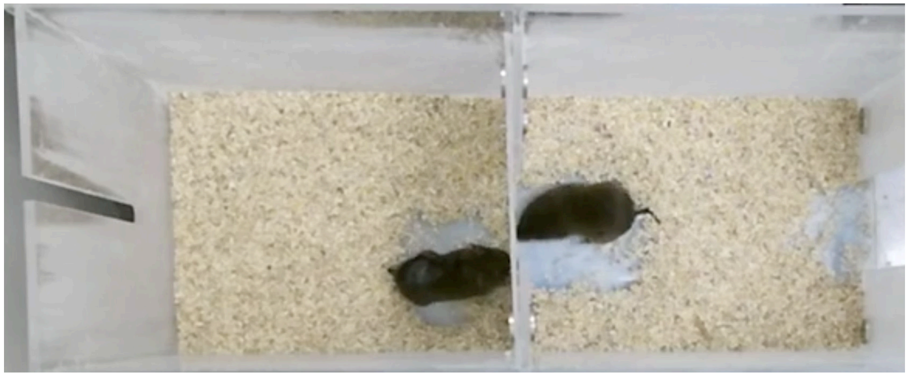


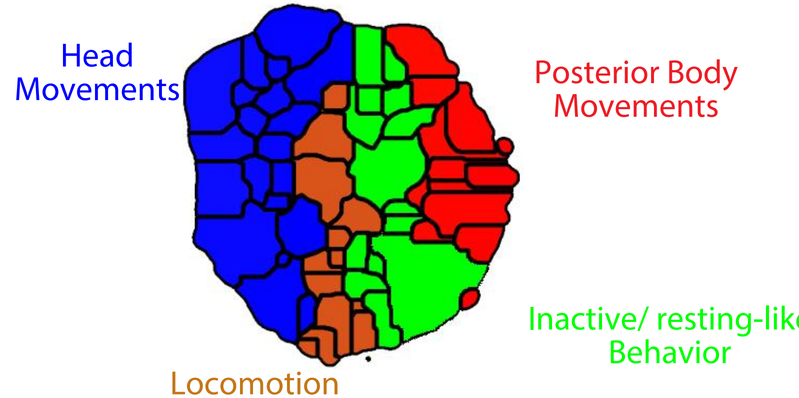
0
5x10^{-5}
PDF

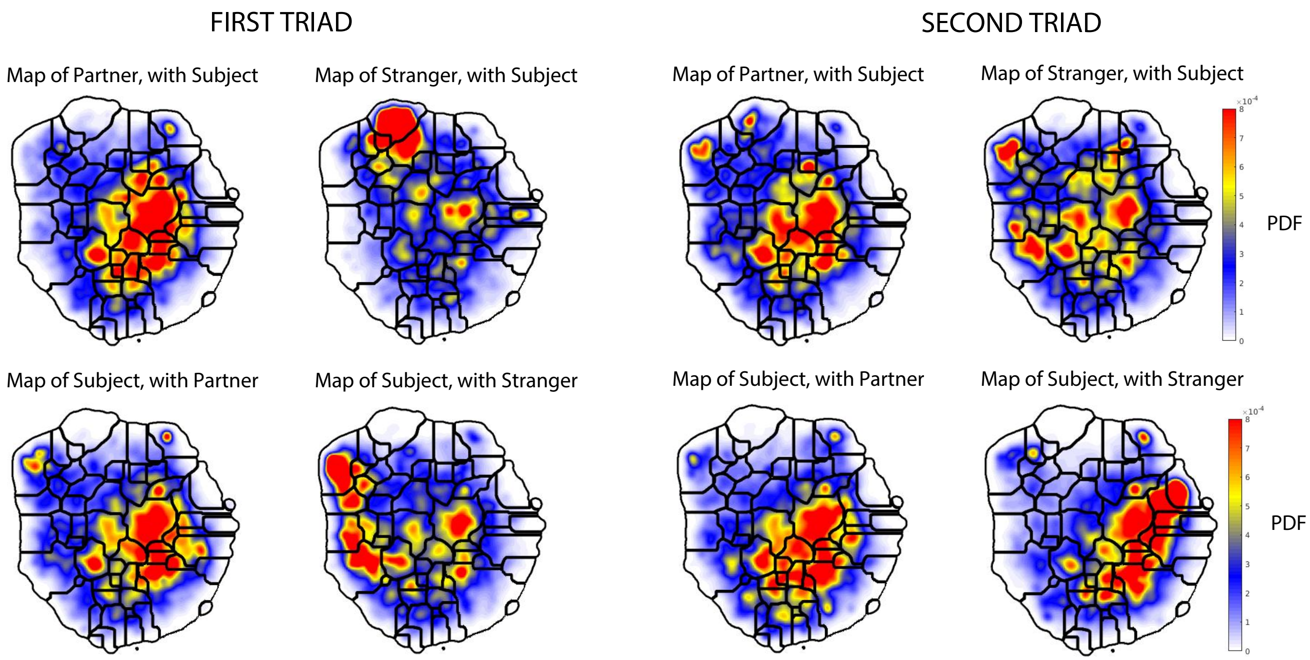


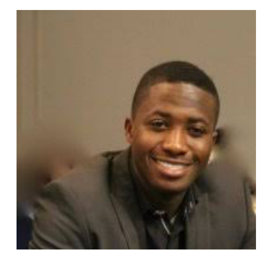
25
PDF
0
5x10^-5


Head Movements
Rear Grooming
Turning Movements
Body Extensions
Locomotion









Sena Agezo
Robert Liu