Differentiating technical and biological variation in hippocampal gene expression

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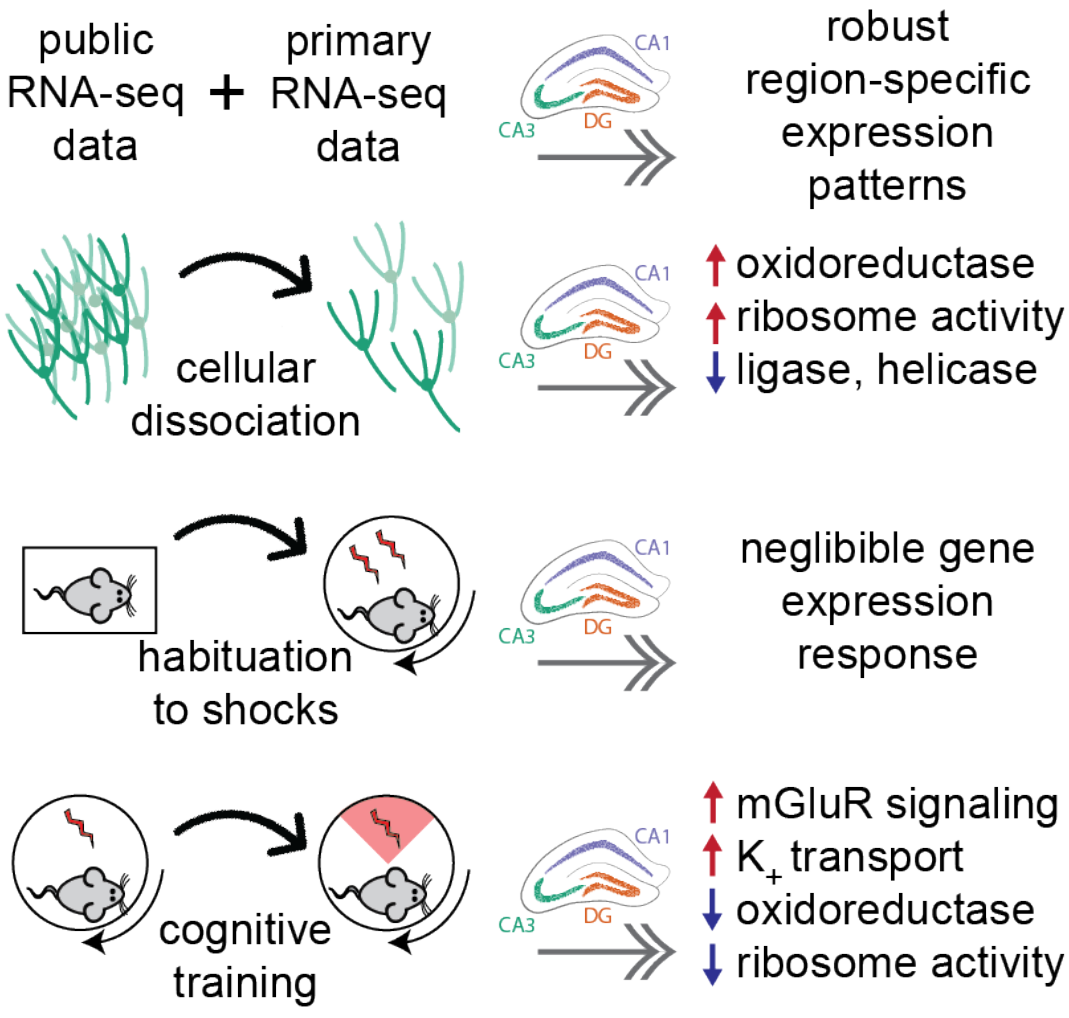
Graphical Abstract



Materials & Methods

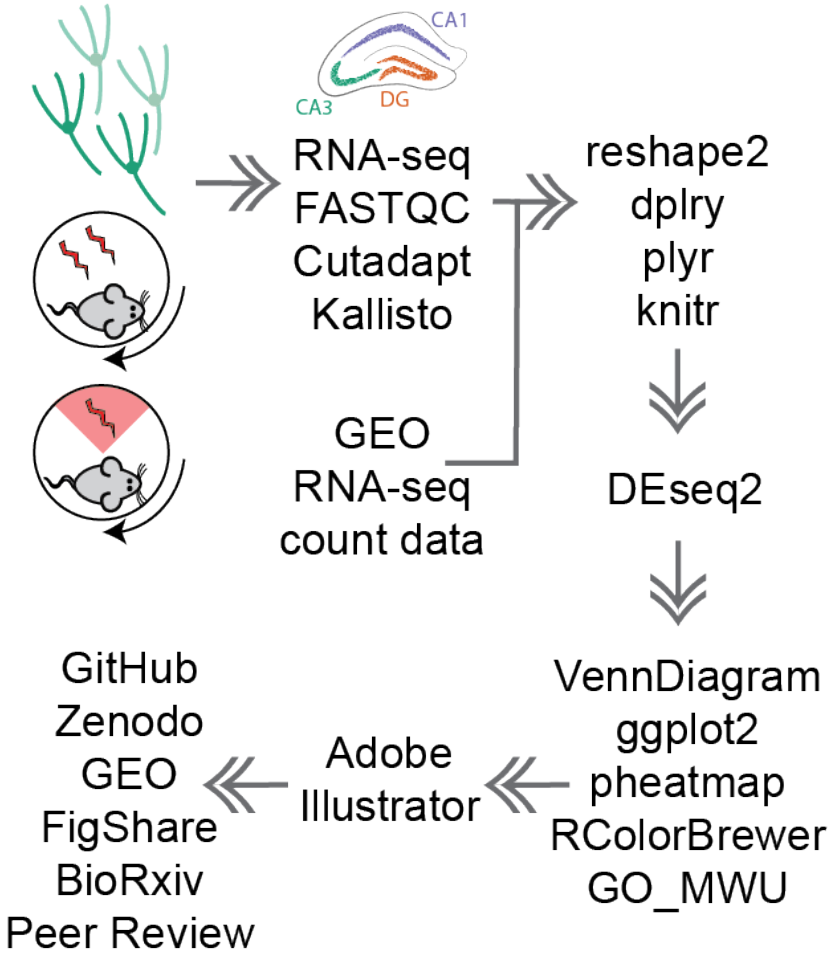


Figure 1

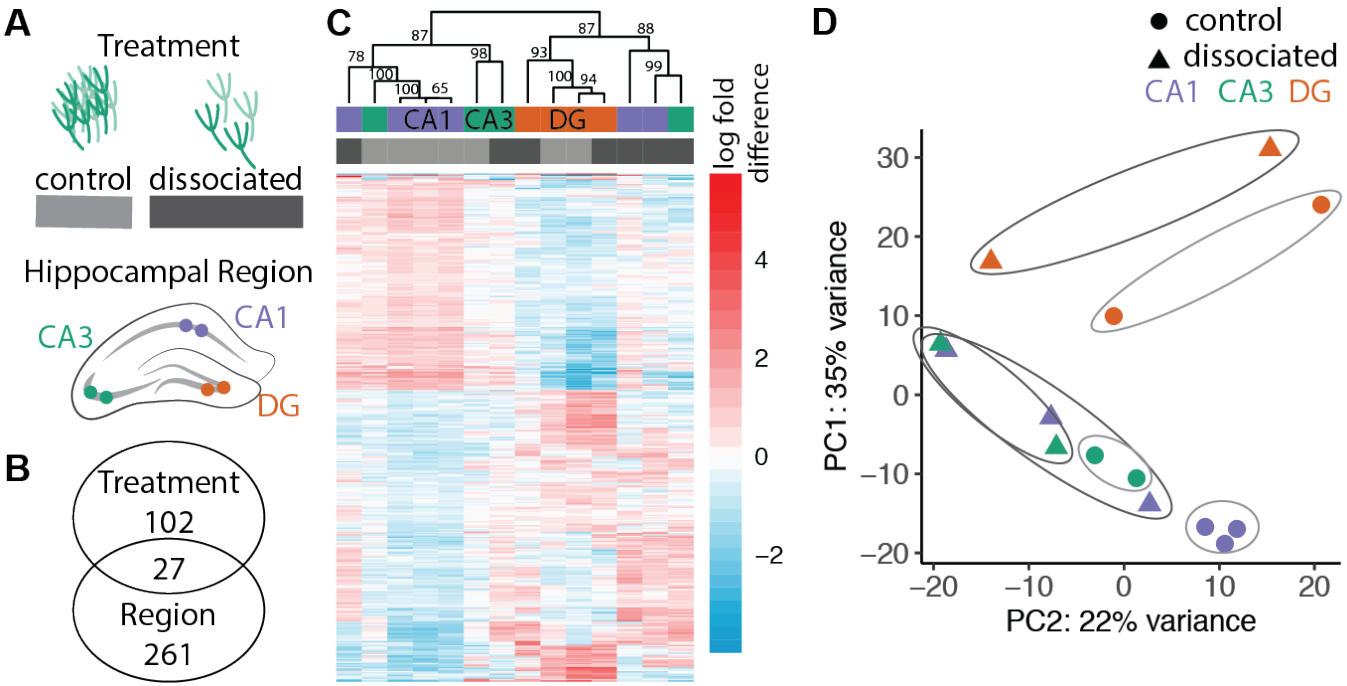

A
Treatment
control
dissociated
Hippocampal Region
CA3
CA1
DG
B
Treatment
102
27
Region
261
C
CA1
CA3
DG
log fold
difference
4
2
0
−2
D
control
dissociated
CA1 CA3 DG
PC1: 35% variance
PC2: 22% variance
30
20
10
0
−10
−20

Figure 2

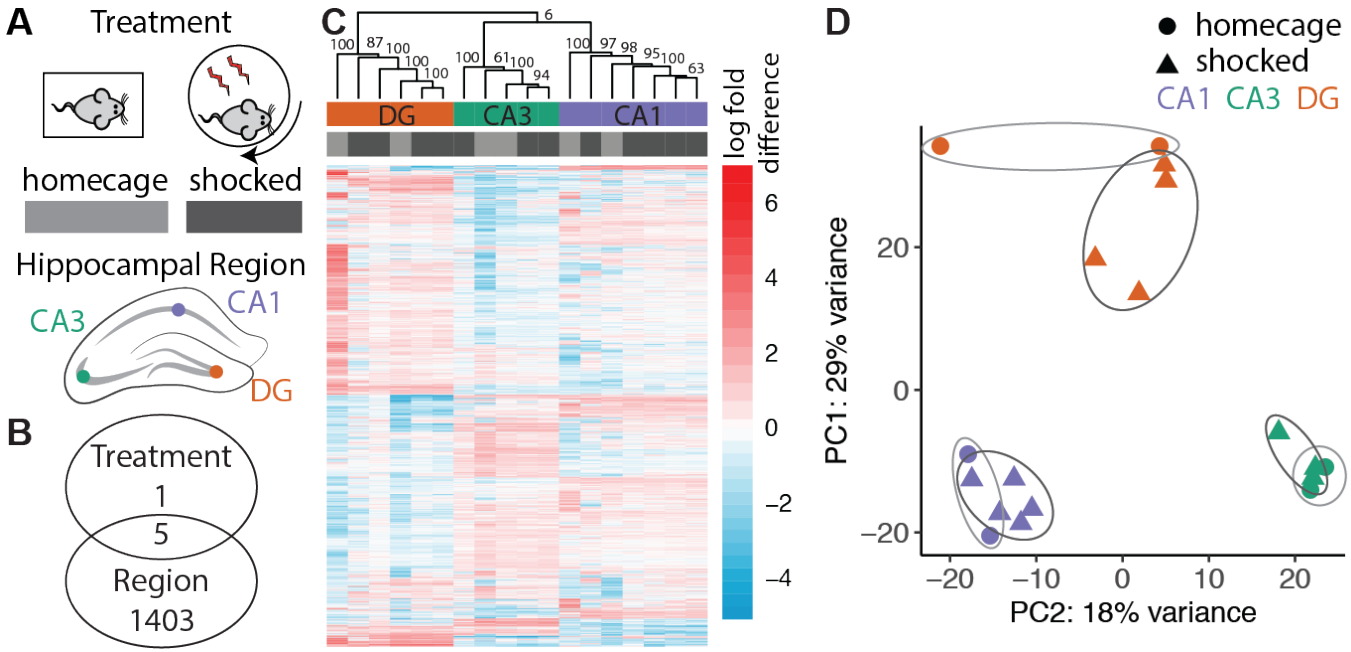

A
Treatment
homecage
shocked
Hippocampal Region
CA3
CA1
DG
B
Treatment
1
5
Region
1403
C
DG
CA3
CA1
log fold
difference
6
4
2
0
−2
−4
D
homecage
shocked
CA1 CA3 DG
PC1: 29% variance
PC2: 18% variance
20
0
−20
−20
−10
0
10
20

Figure 3

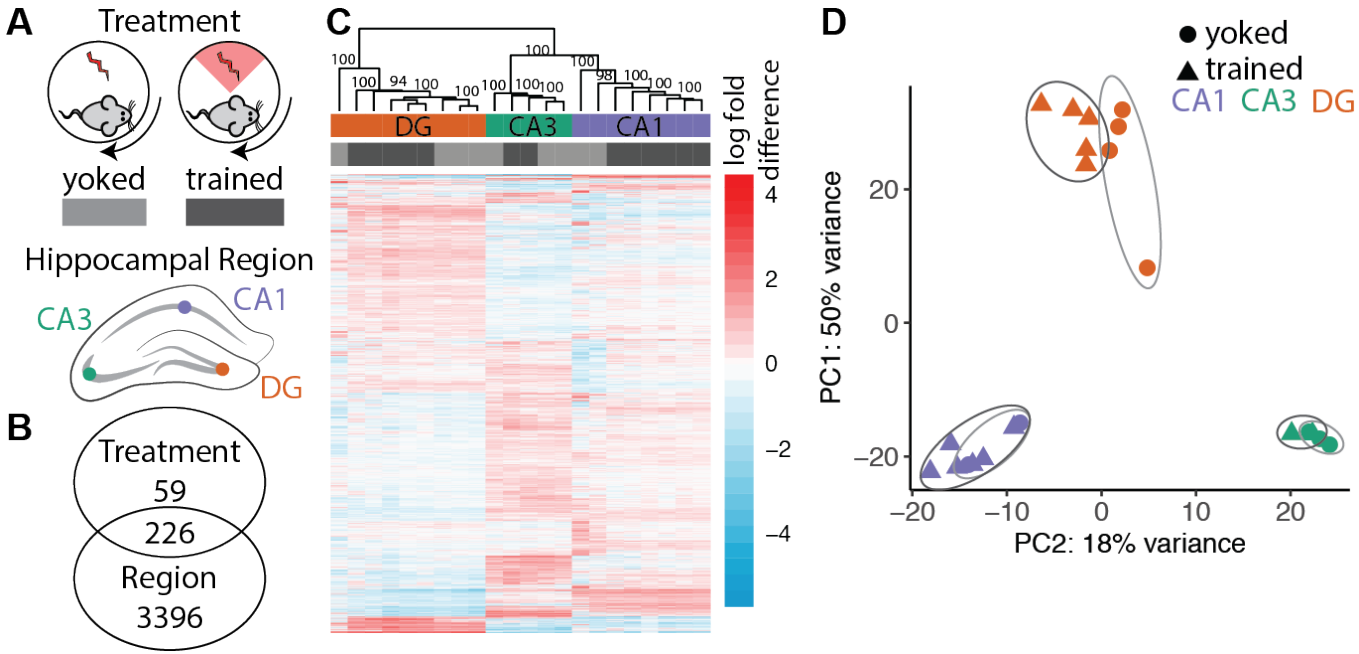
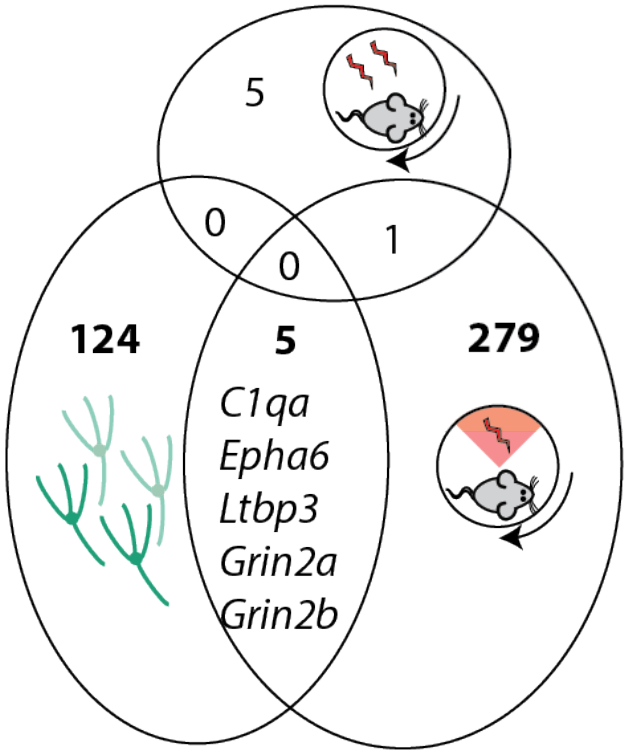

A
Treatment
yoked
trained
Hippocampal Region
CA3
CA1
DG
B
Treatment
59
226
Region
3396
C
DG
CA3
CA1
log fold difference
4
2
0
−2
−4
D
yoked
trained
CA1 CA3 DG
PC1: 50% variance
PC2: 18% variance
20
0
−20
−20
−10
0
10
20

Figure 4

A. Treatment-incuced gene expression changes



B. Dissociation-induced molecular functions

9/244 ligase, forming carbon–nitrogen bonds
16/428 ligase
95/1066 receptor binding
60/318 structural molecule
40/87 structural constituent of ribosome
14/55 rRNA binding
2/84 ATP–dependent helicase
4/126 helicase
12/62 oxidoreductase, acting on NAD(P)H
43/589 oxidoreductase

p < 1e–05
p < 1e–04
p < 3e–04
UP
Down

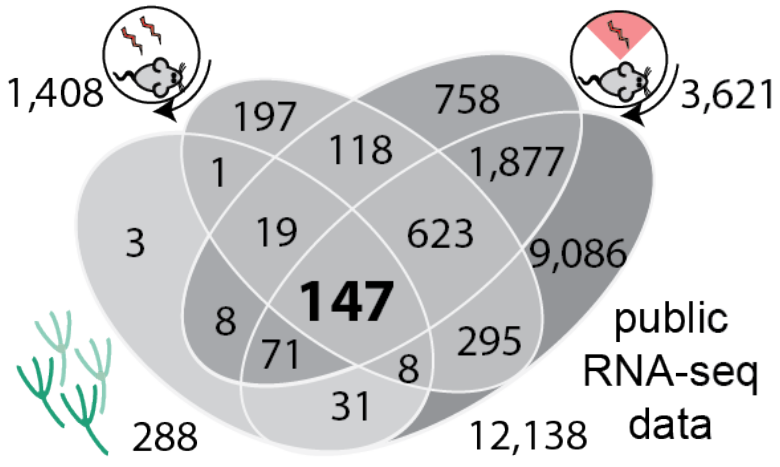
C. Cognitive training -induced molecular functions

122/801 poly(A) RNA binding
14/87 structural constituent of ribosome
6/36 oxidoreductase, acting on NAD(P)H, quinone
9/25 glutamate receptor
94/790 signal transducer
77/666 receptor
29/121 potassium ion transmembrane transporter
125/880 transporter
109/727 transmembrane transporter

p < 1e–05
p < 1e–04
p < 0.0011
UP
Down

Figure 5

A. Shared genes with region-specific expression



B. Robust region-specific molecular functions

$p < 0.05$
$p < 0.1$
$p < 0.24$

2/7 calcium:cation antiporter
6/99 calcium ion transmembrane transporter
6/125 divalent inorganic cation transmembrane transp
2/5 calcium, potassium:sodium antiporter
6/120 potassium ion transmembrane transporter
14/361 calcium ion binding
6/112 ligand–gated channel
10/311 passive transmembrane transporter
4/26 calcium channel regulator
3/24 proteoglycan binding
5/74 Rho GTPase binding