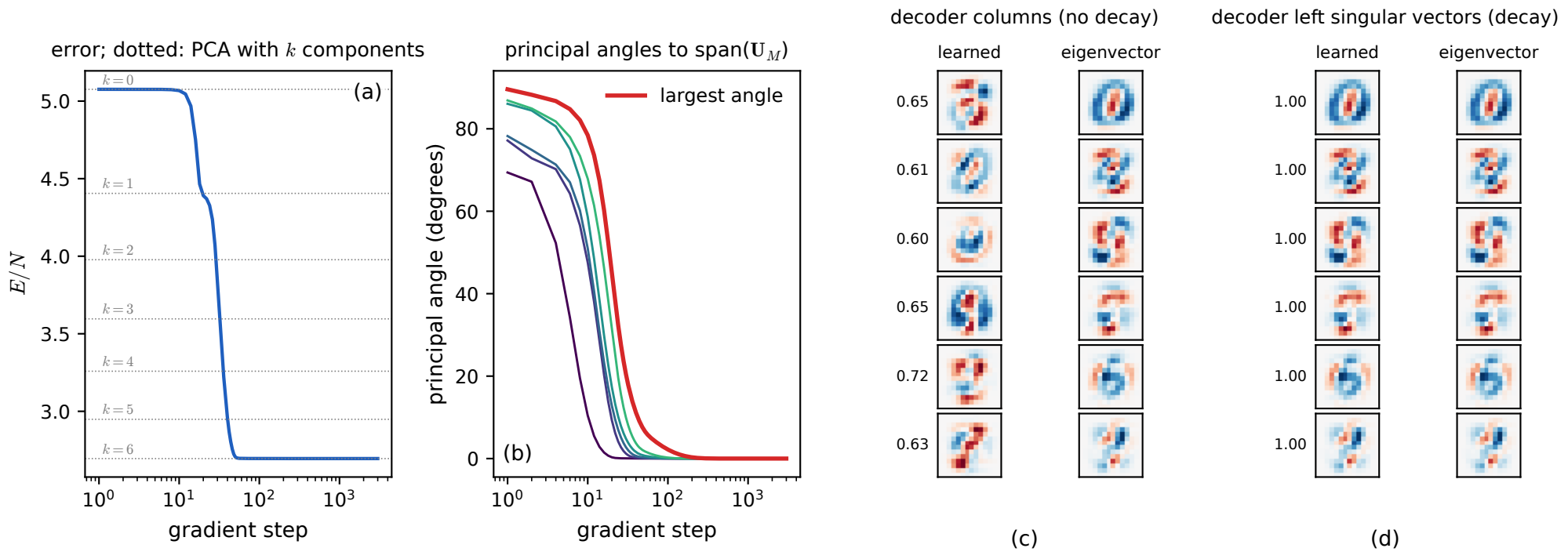

error; dotted: PCA with k components
E/N
5.0
4.5
4.0
3.5
3.0
$k=0$
$k=1$
$k=2$
$k=3$
$k=4$
$k=5$
$k=6$
(a)
10^0
10^1
10^2
10^3
gradient step
principal angles to span($\mathbf{U}_M$)
principal angle (degrees)
80
60
40
20
0
largest angle
(b)
10^0
10^1
10^2
10^3
gradient step
decoder columns (no decay)
learned
eigenvector
0.65
0.61
0.60
0.65
0.72
0.63
(c)
decoder left singular vectors (decay)
learned
eigenvector
1.00
1.00
1.00
1.00
1.00
1.00
(d)