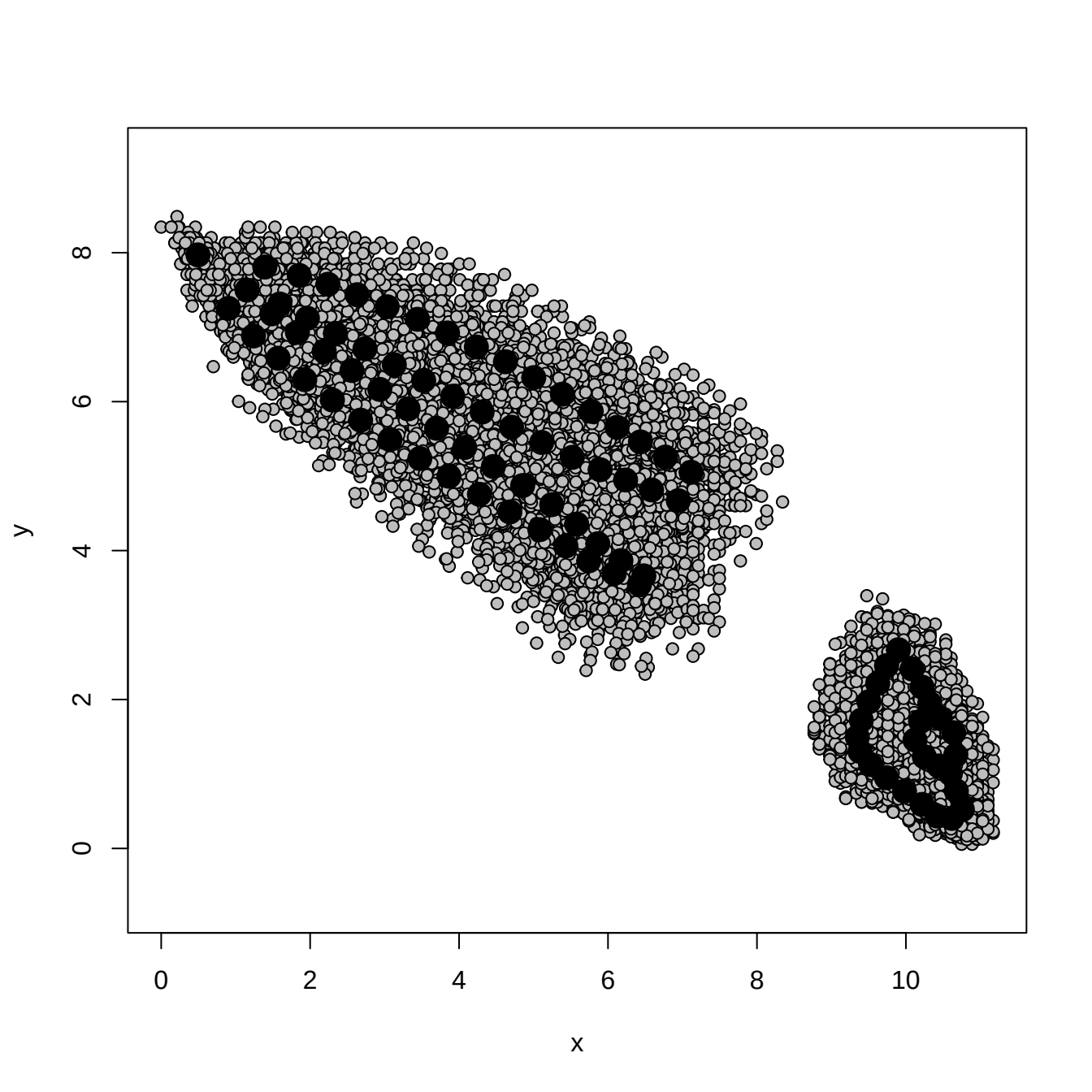
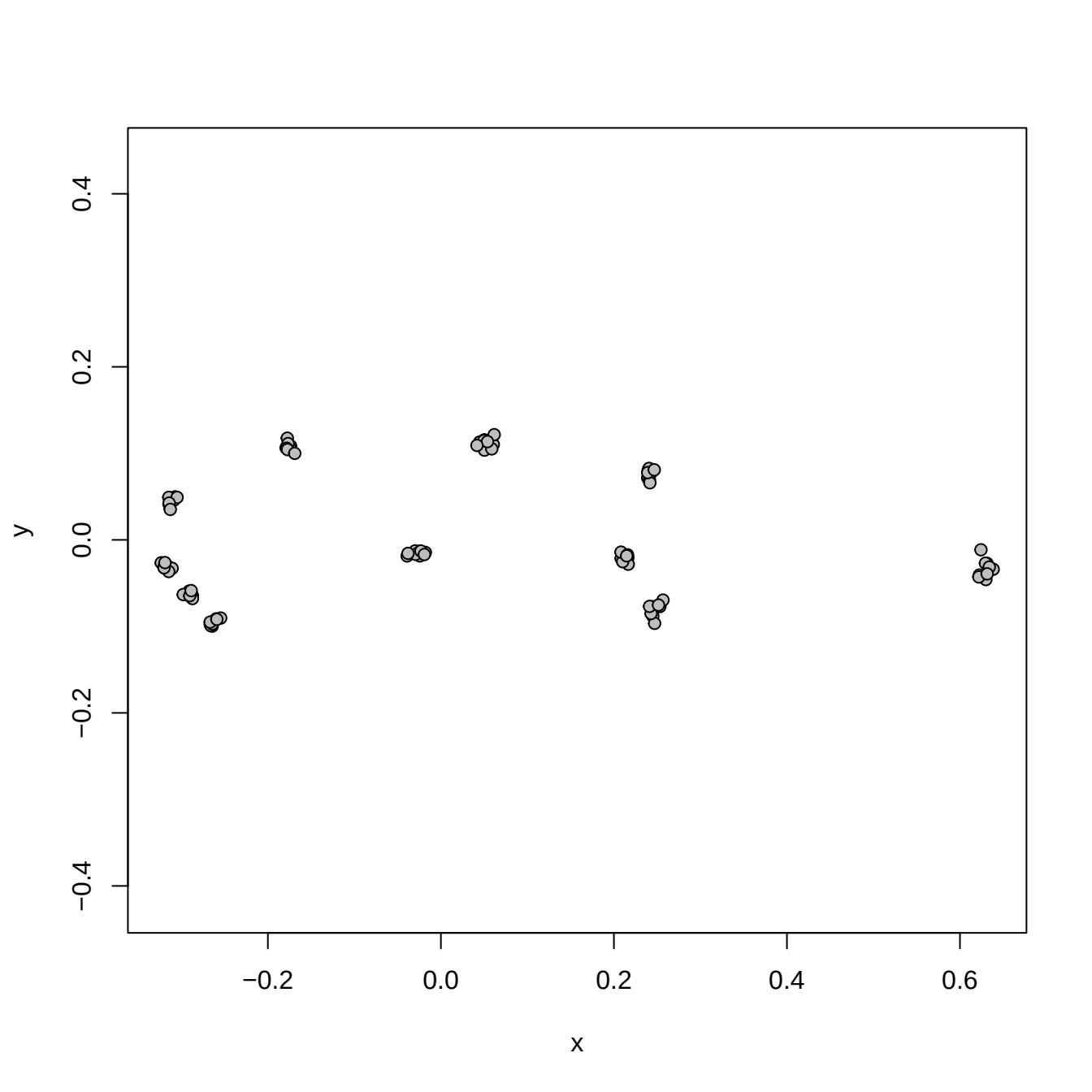
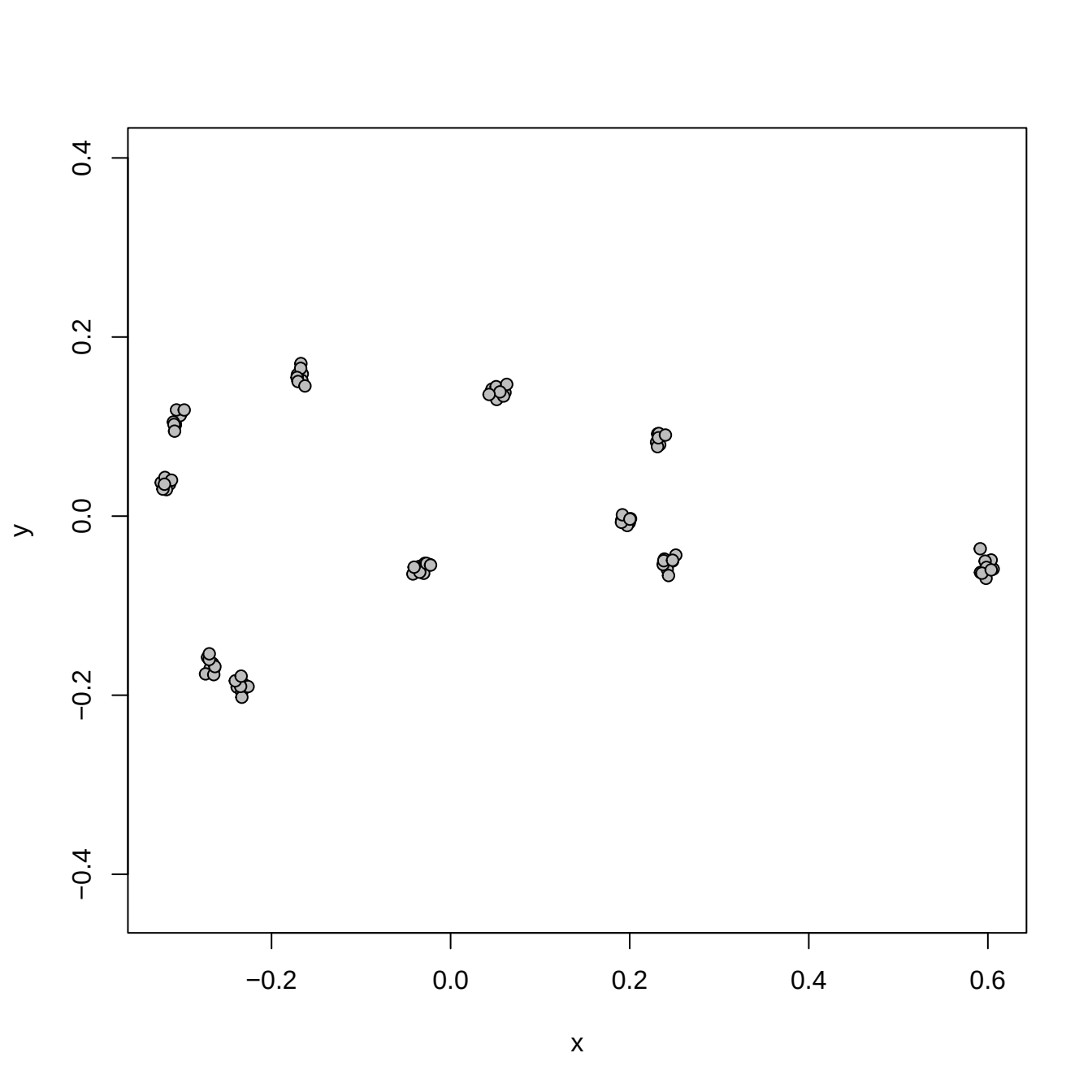
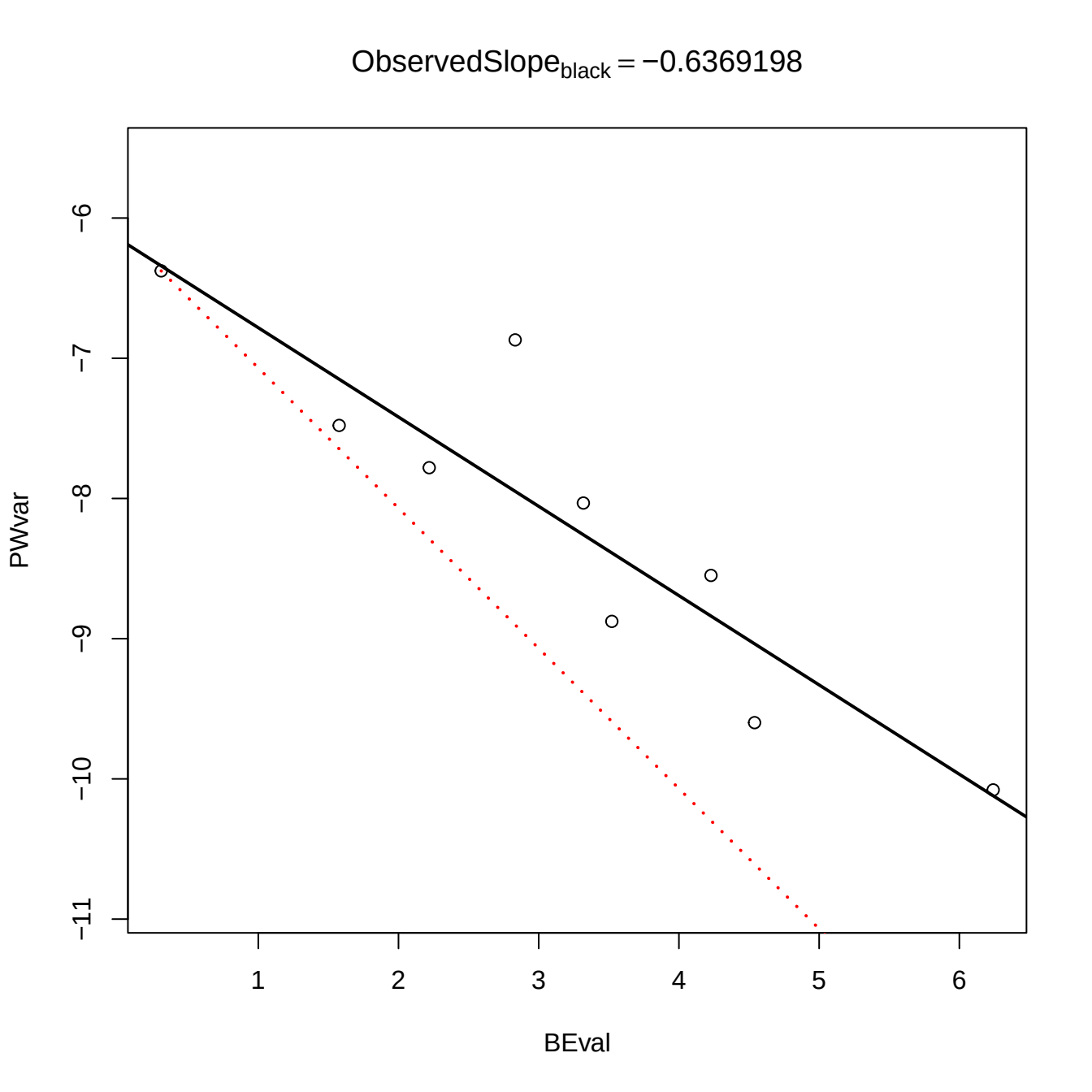
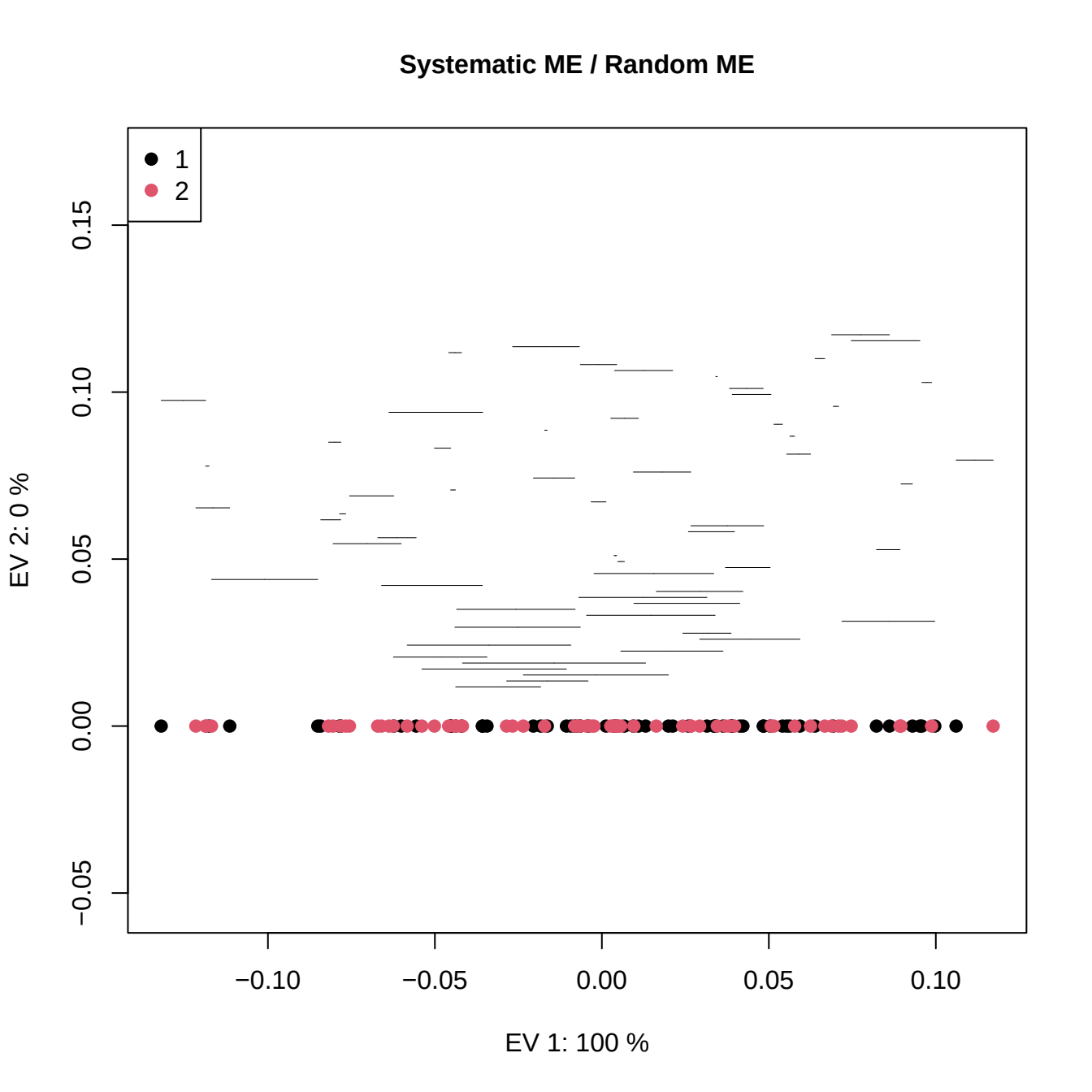
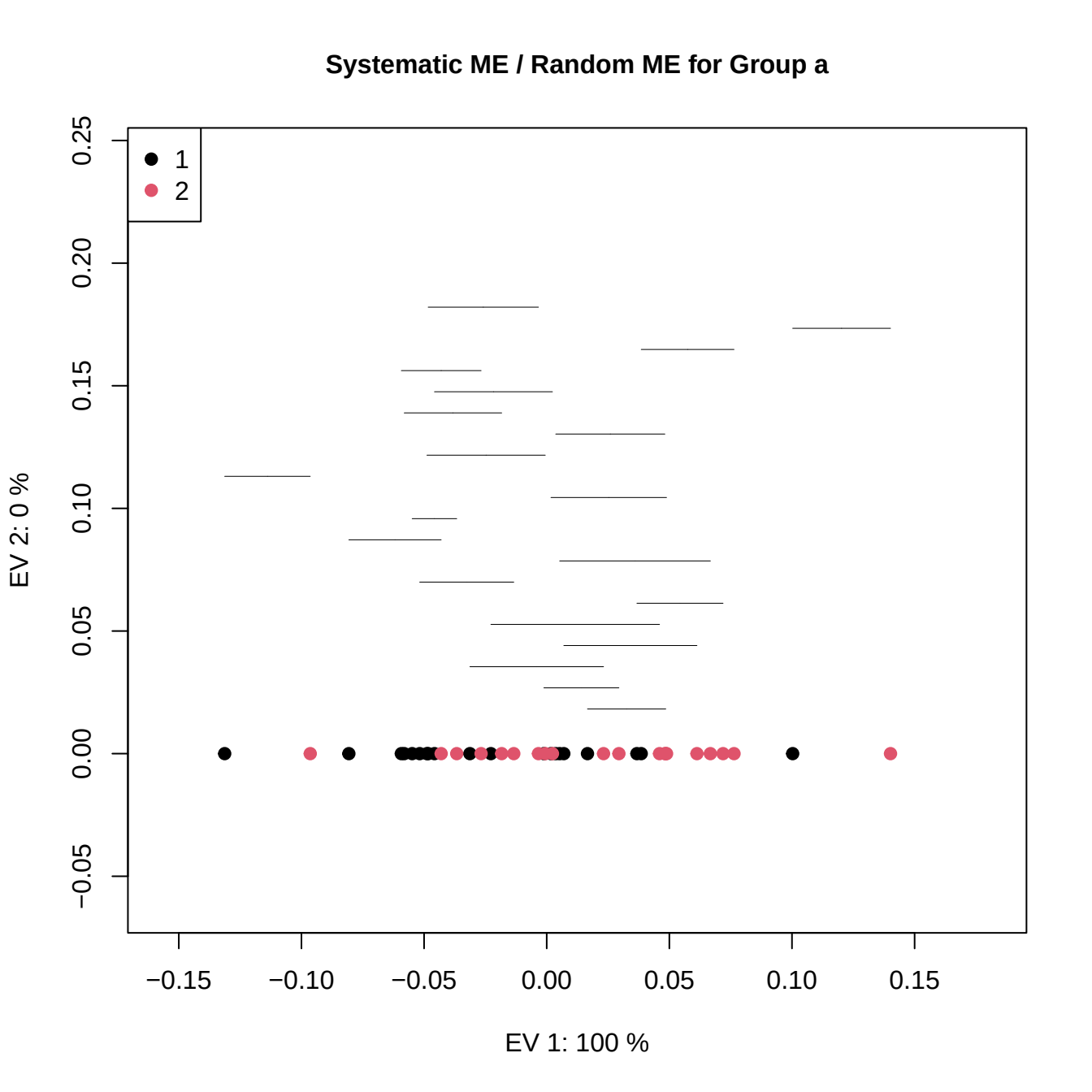

y
0
2
4
6
8
x
0
2
4
6
8
10

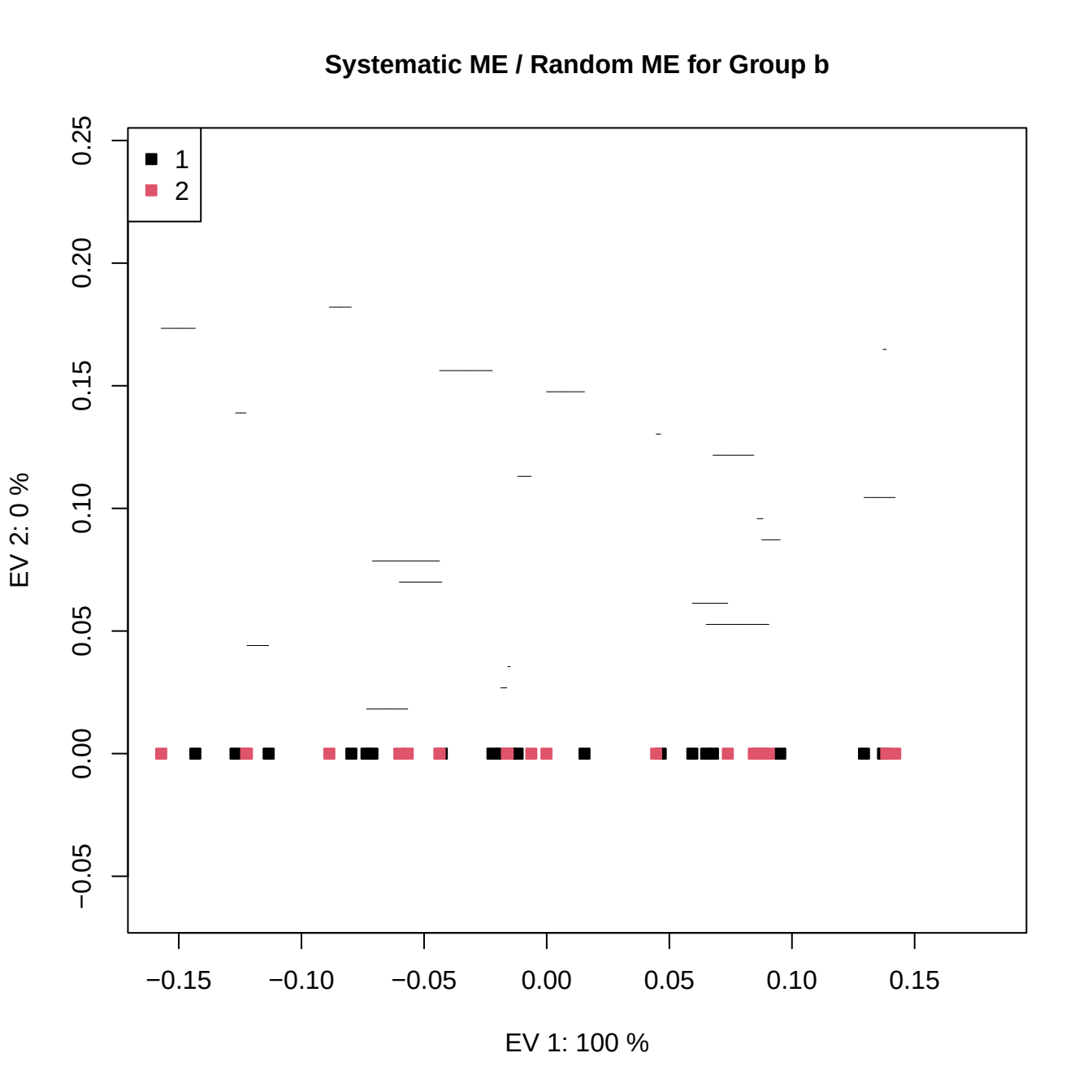

0.4
0.2
0.0
−0.2
−0.4
y
−0.2
0.0
0.2
0.4
0.6
x

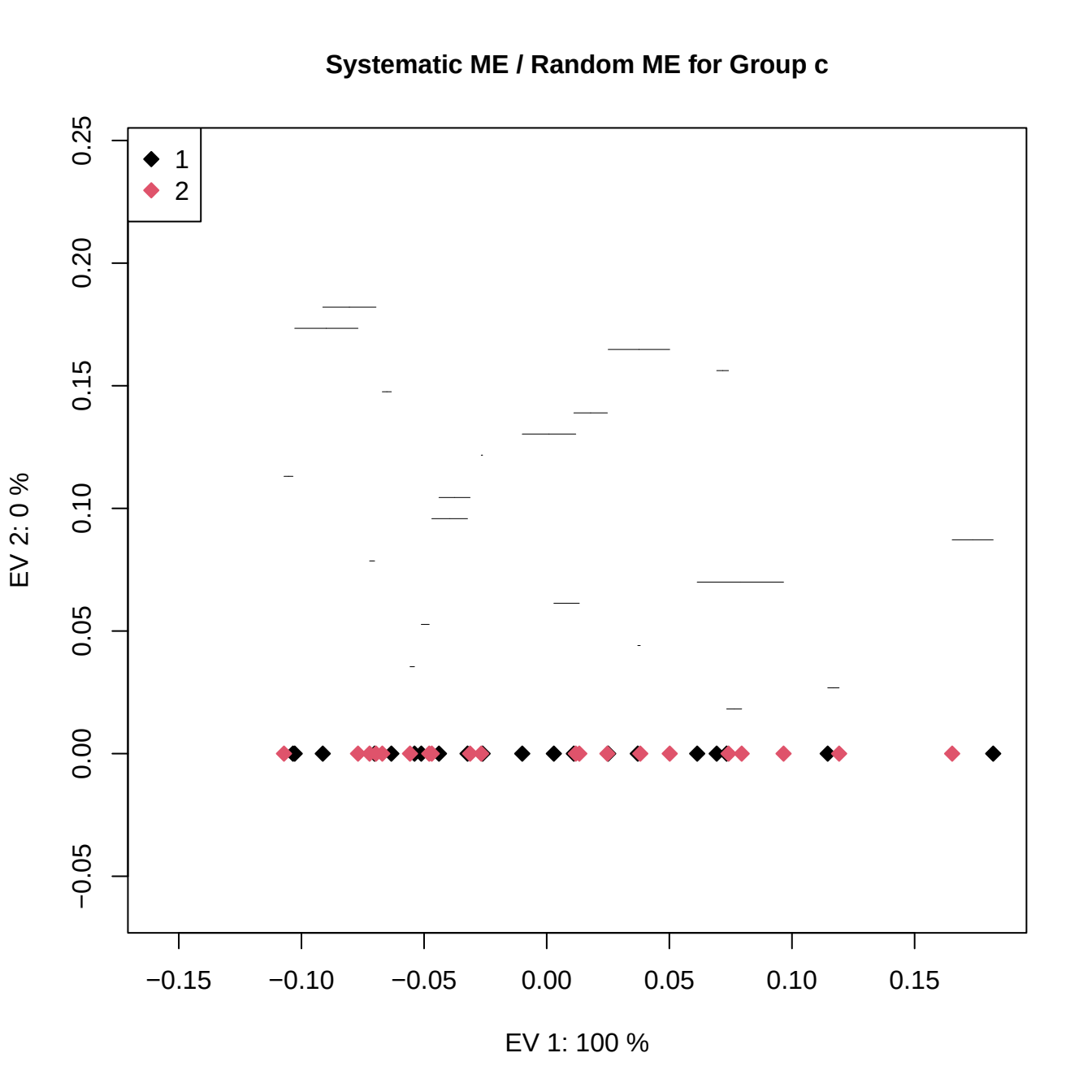

0.4
0.2
0.0
−0.2
−0.4
y
−0.2
0.0
0.2
0.4
0.6
x

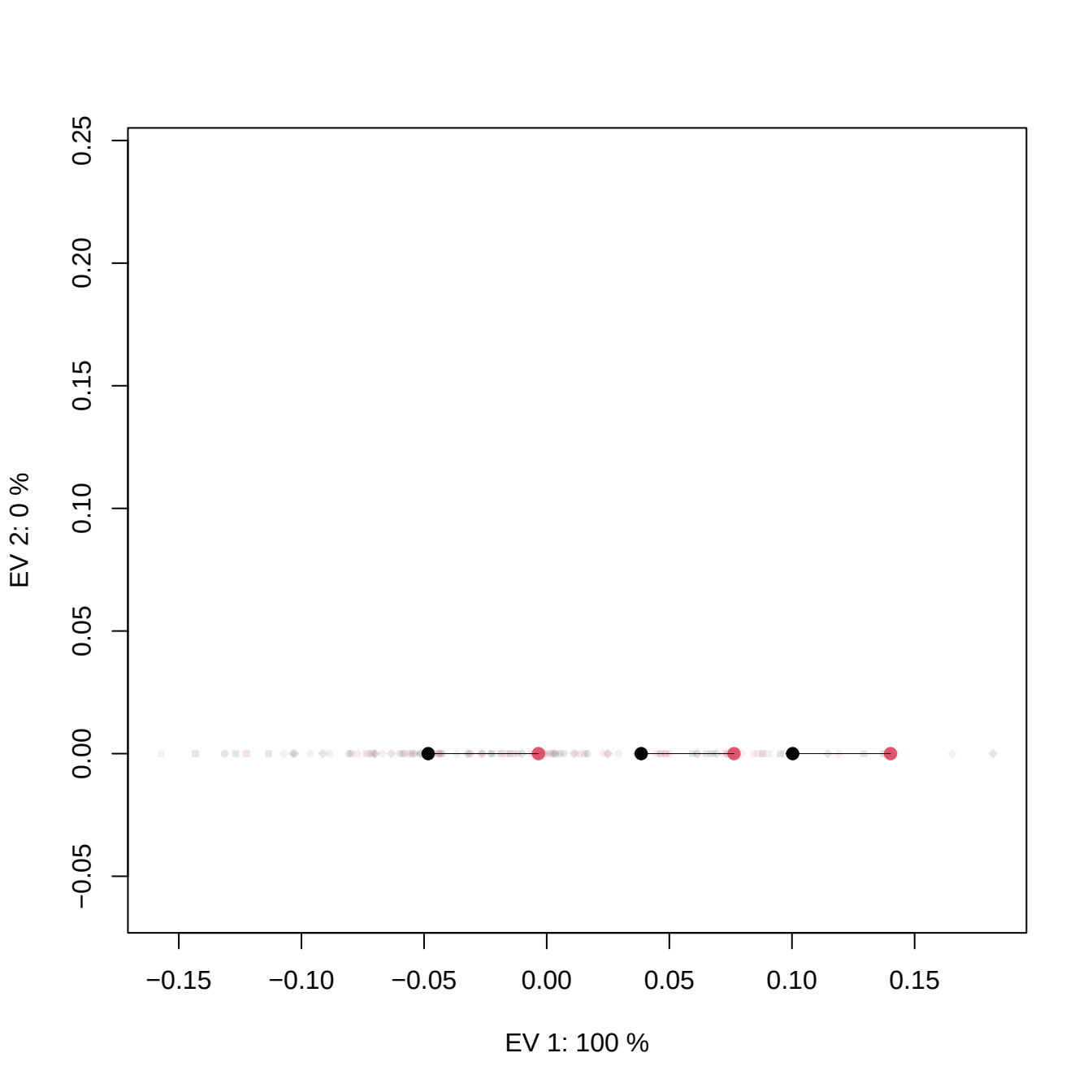

ObservedSlope$_{black}$ = −0.6369198
PWvar
−6
−7
−8
−9
−10
−11
1
2
3
4
5
6
BEval

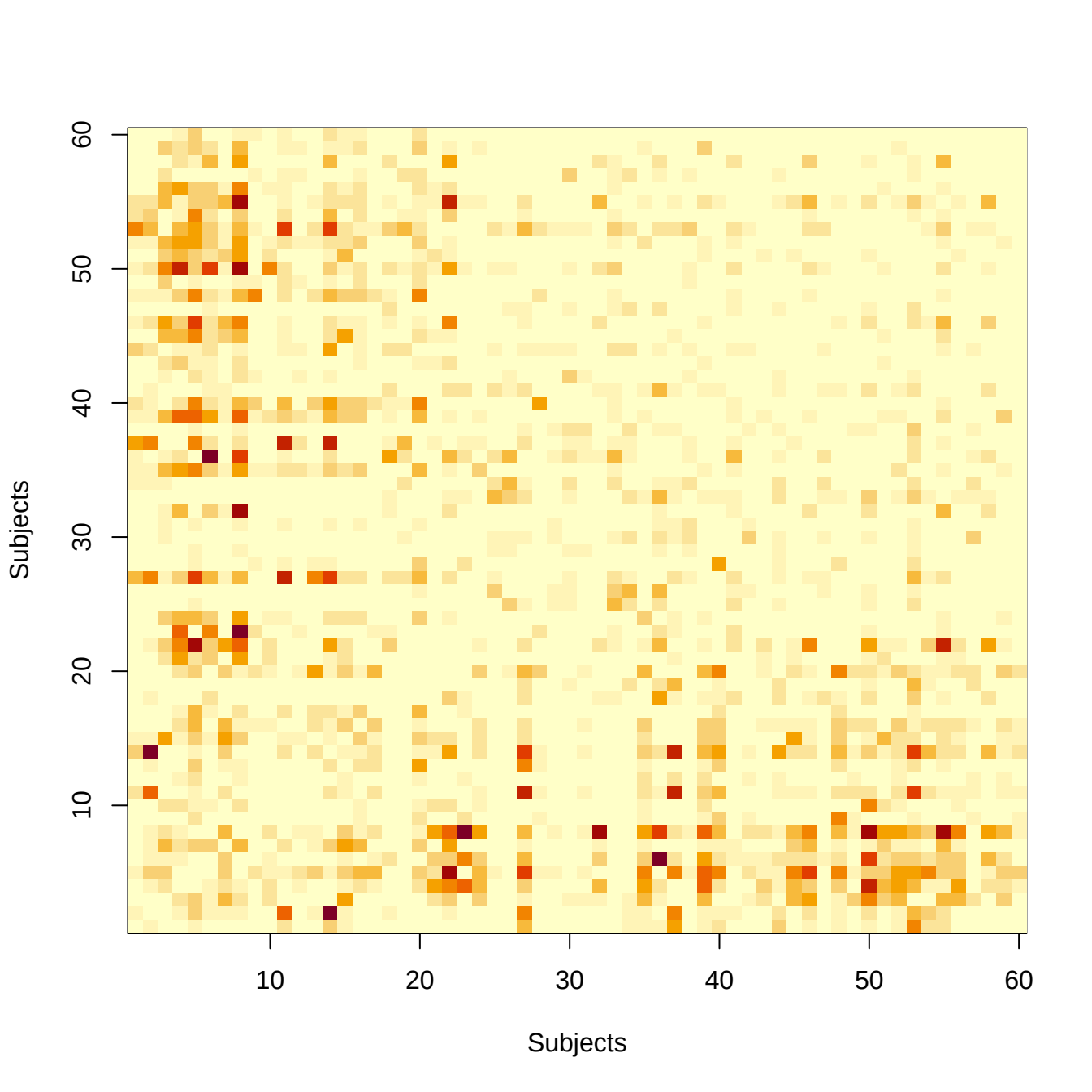

Systematic ME / Random ME
1
2
0.15
0.10
0.05
0.00
−0.05
EV 2: 0 %
−0.10
−0.05
0.00
0.05
0.10
EV 1: 100 %

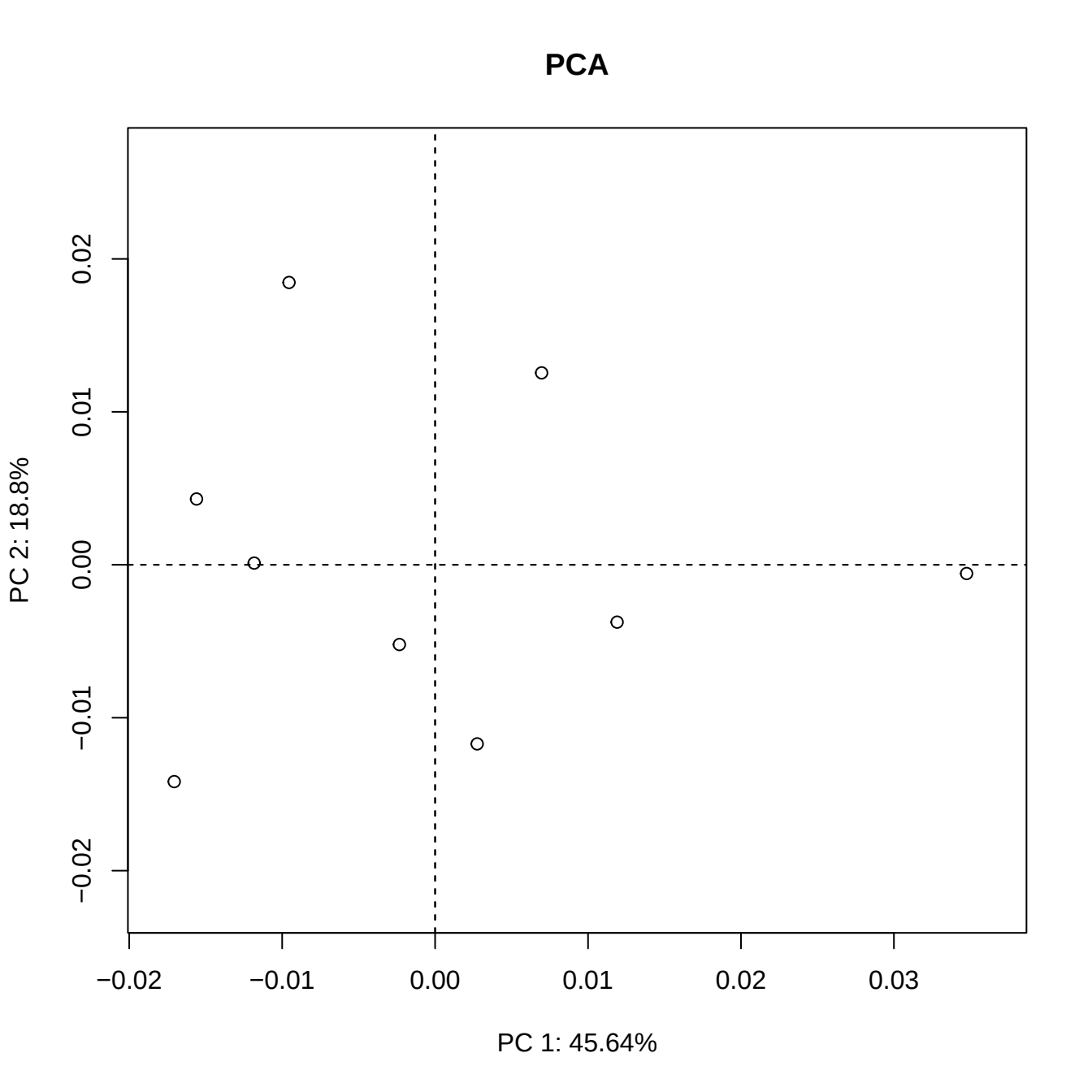

Systematic ME / Random ME for Group a
1
2
0.25
0.20
0.15
0.10
0.05
0.00
−0.05
EV 2: 0 %
−0.15
−0.10
−0.05
0.00
0.05
0.10
0.15
EV 1: 100 %

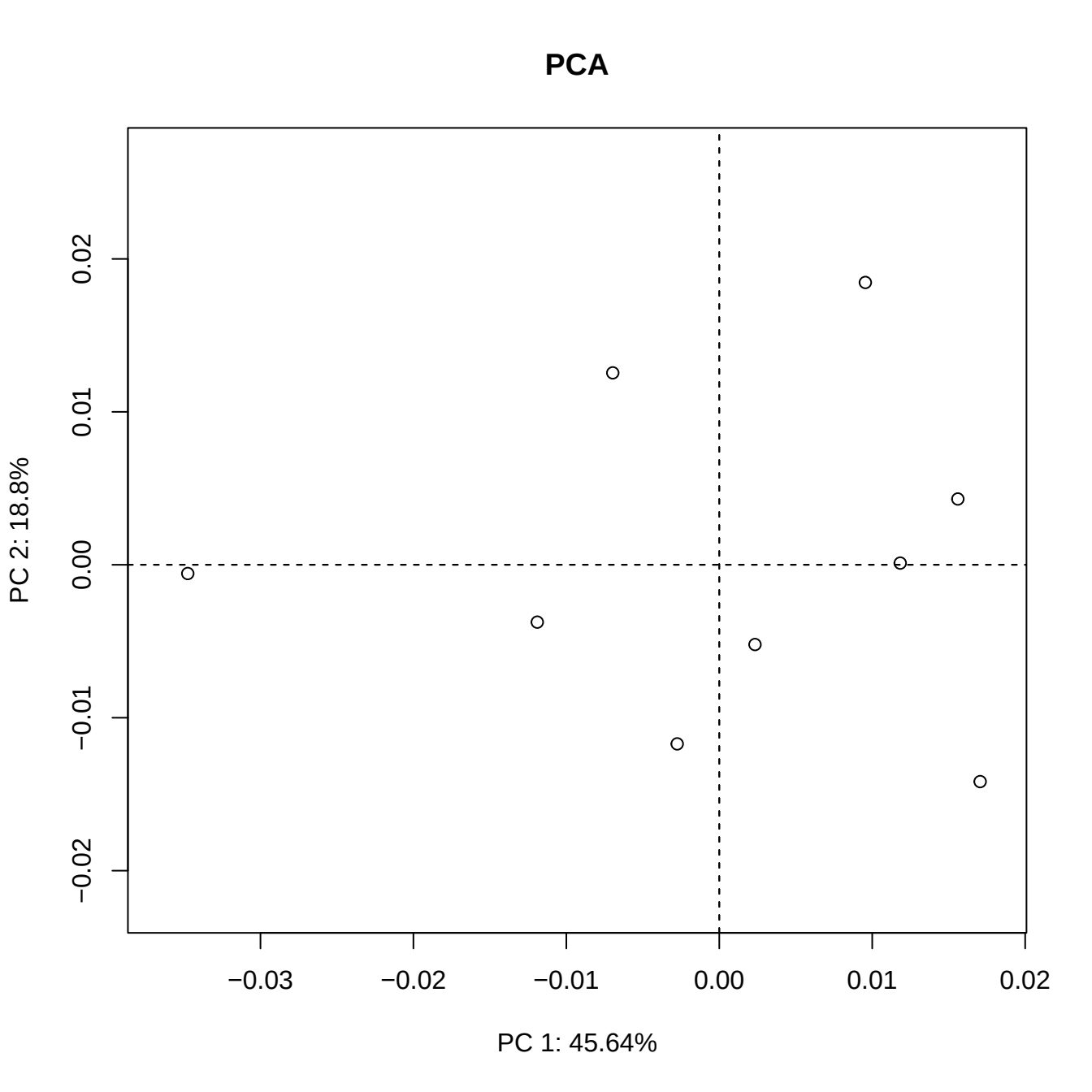

Systematic ME / Random ME for Group b
1
2
0.25
0.20
0.15
0.10
0.05
0.00
−0.05
EV 2: 0 %
−0.15
−0.10
−0.05
0.00
0.05
0.10
0.15
EV 1: 100 %

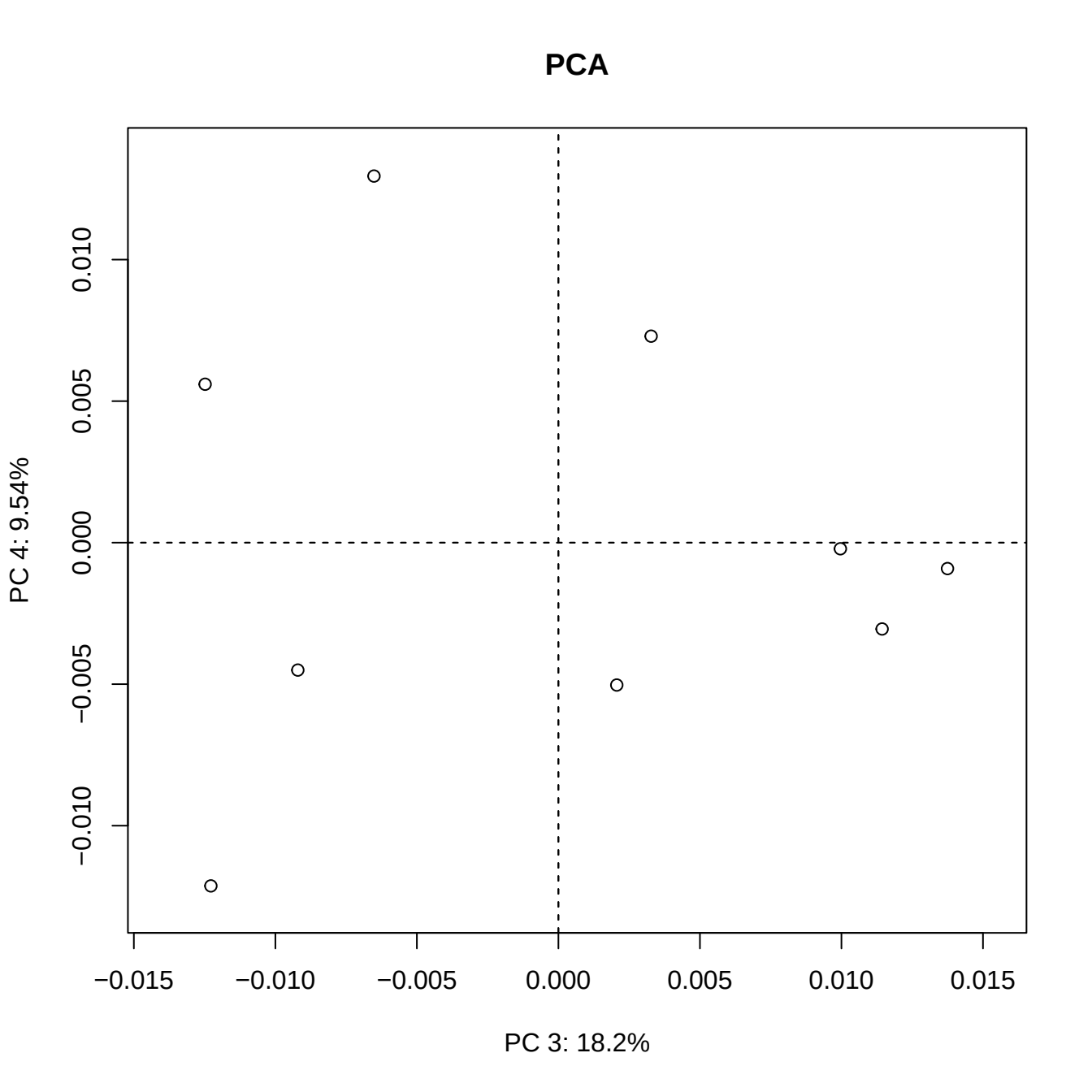

Systematic ME / Random ME for Group c
1
2
0.25
0.20
0.15
0.10
0.05
0.00
−0.05
EV 2: 0 %
−0.15
−0.10
−0.05
0.00
0.05
0.10
0.15
EV 1: 100 %

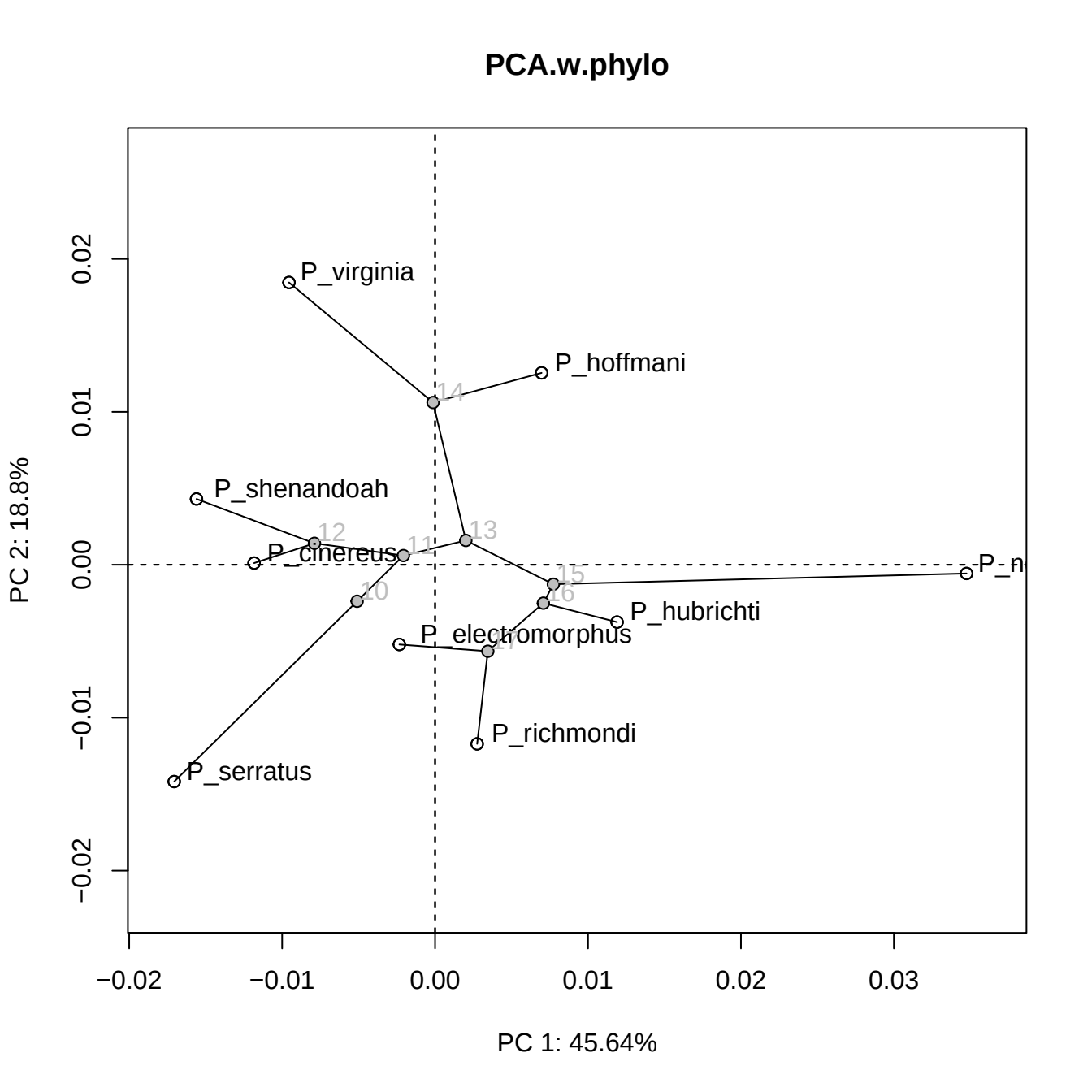

0.25
0.20
0.15
0.10
0.05
0.00
−0.05
EV 2: 0 %
−0.15
−0.10
−0.05
0.00
0.05
0.10
0.15
EV 1: 100 %

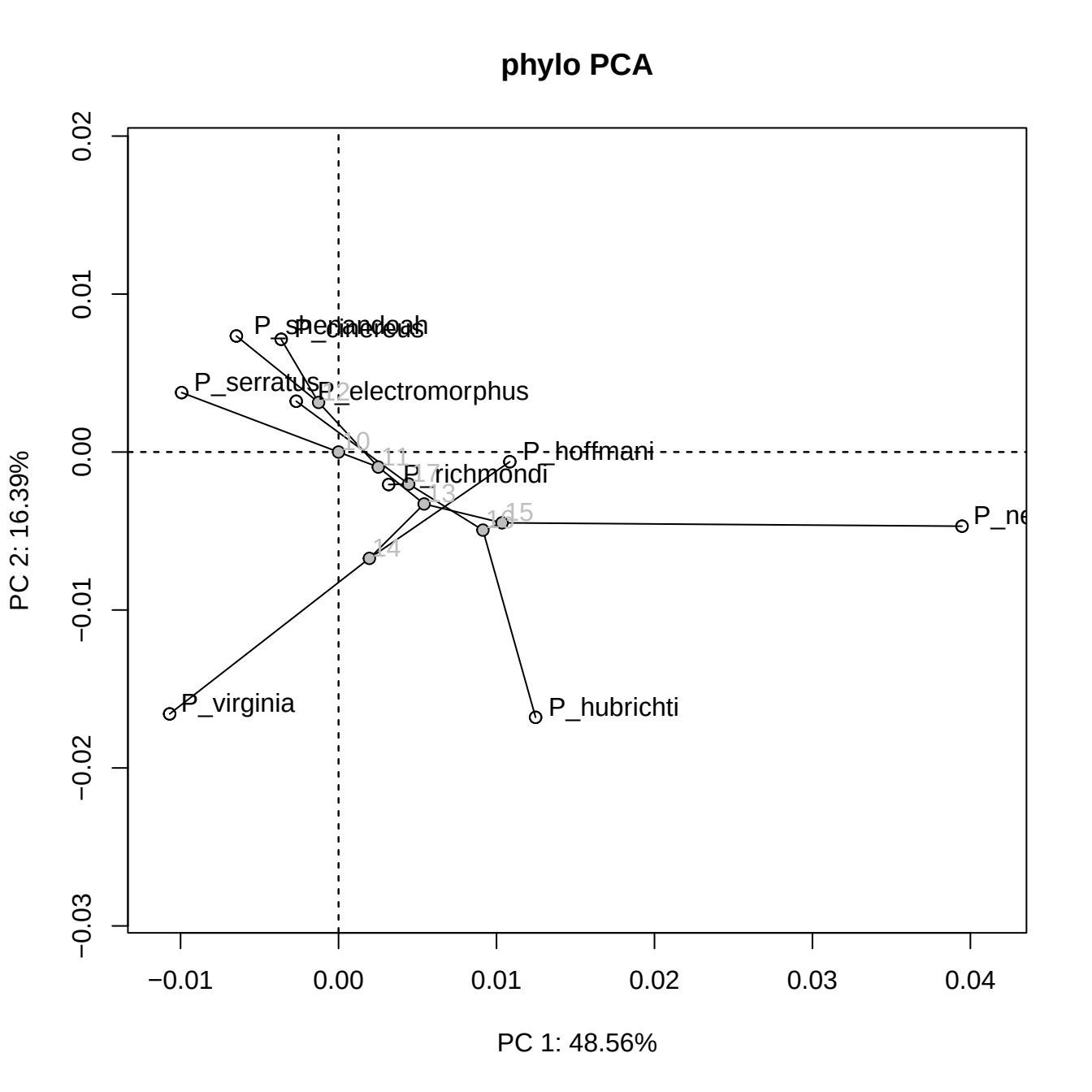

Subjects
Subjects
10
20
30
40
50
60
10
20
30
40
50
60

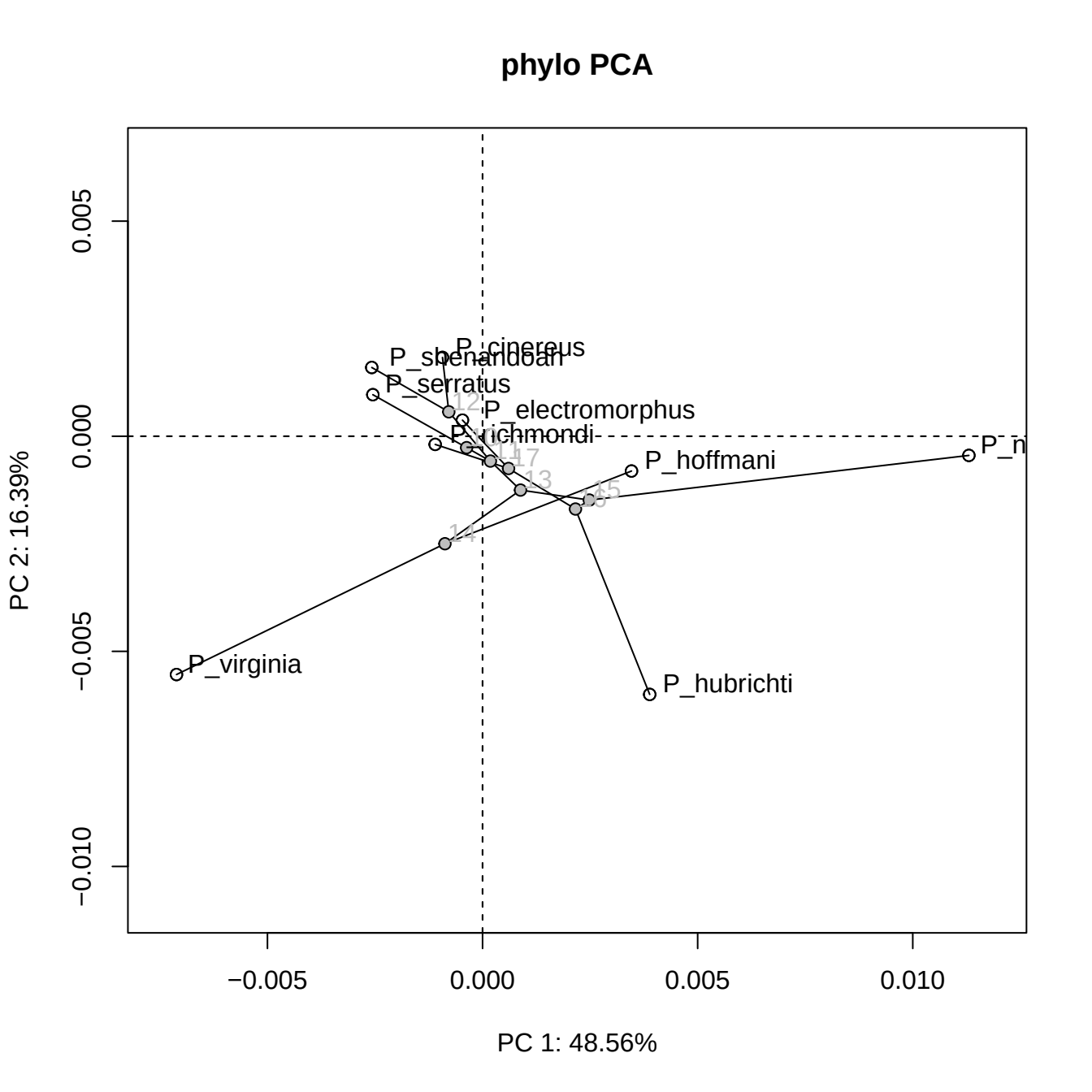

PCA
PC 2: 18.8%
PC 1: 45.64%
0.02
0.01
0.00
−0.01
−0.02
−0.02
−0.01
0.00
0.01
0.02
0.03

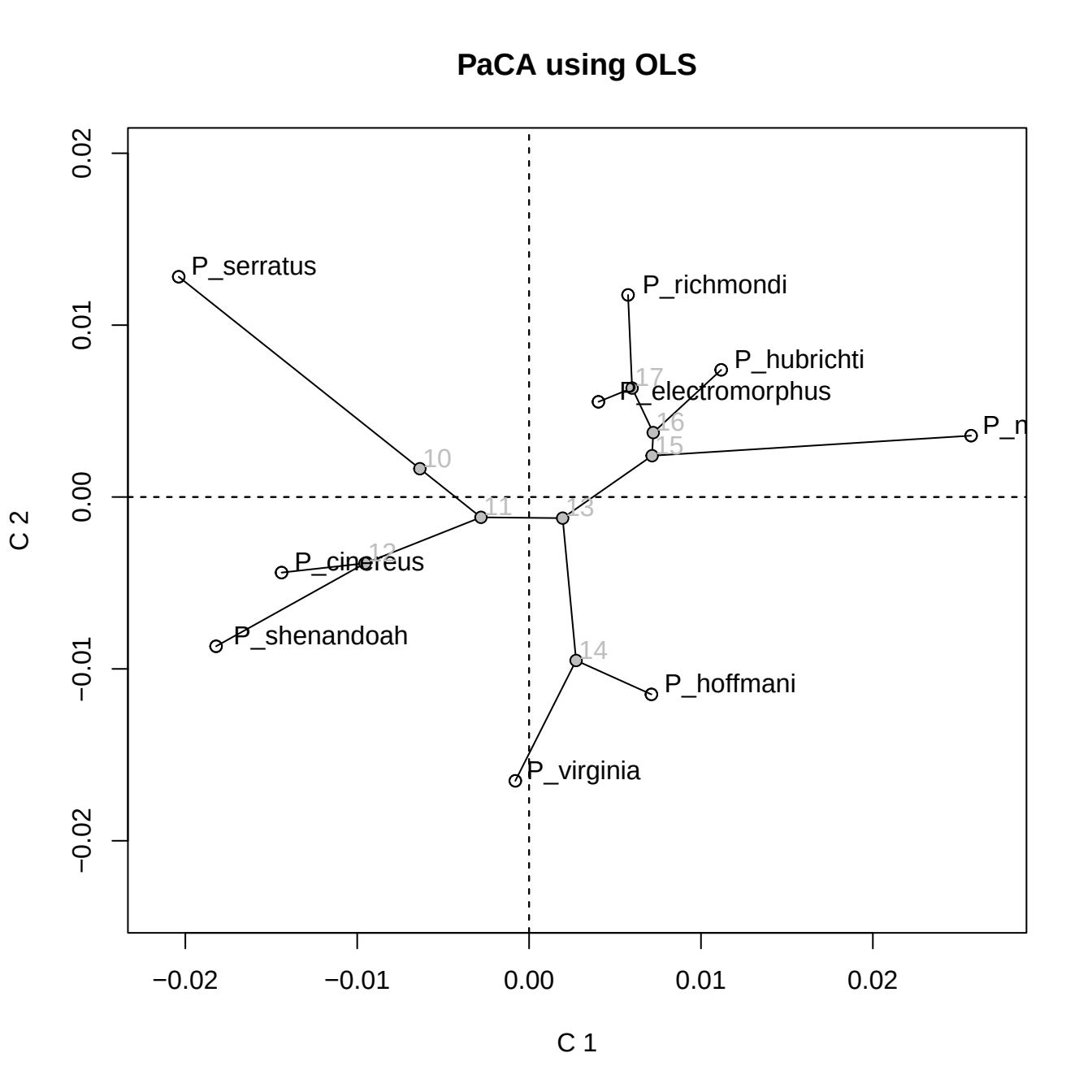

PCA
PC 2: 18.8%
PC 1: 45.64%
0.02
0.01
0.00
−0.01
−0.02
−0.03
−0.02
−0.01
0.00
0.01
0.02

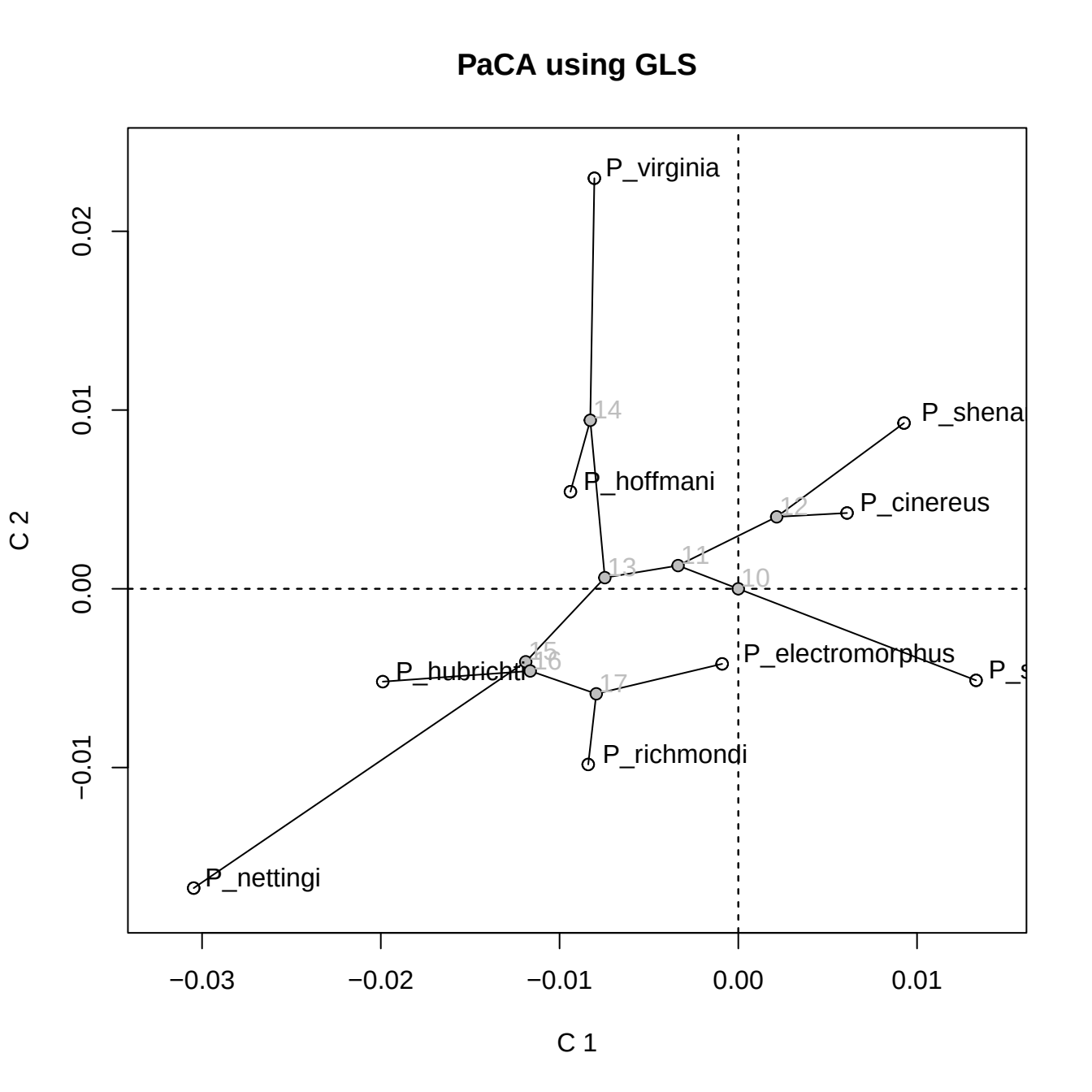

PCA
PC 4: 9.54%
PC 3: 18.2%
0.010
0.005
0.000
−0.005
−0.010
−0.015
−0.010
−0.005
0.000
0.005
0.010
0.015

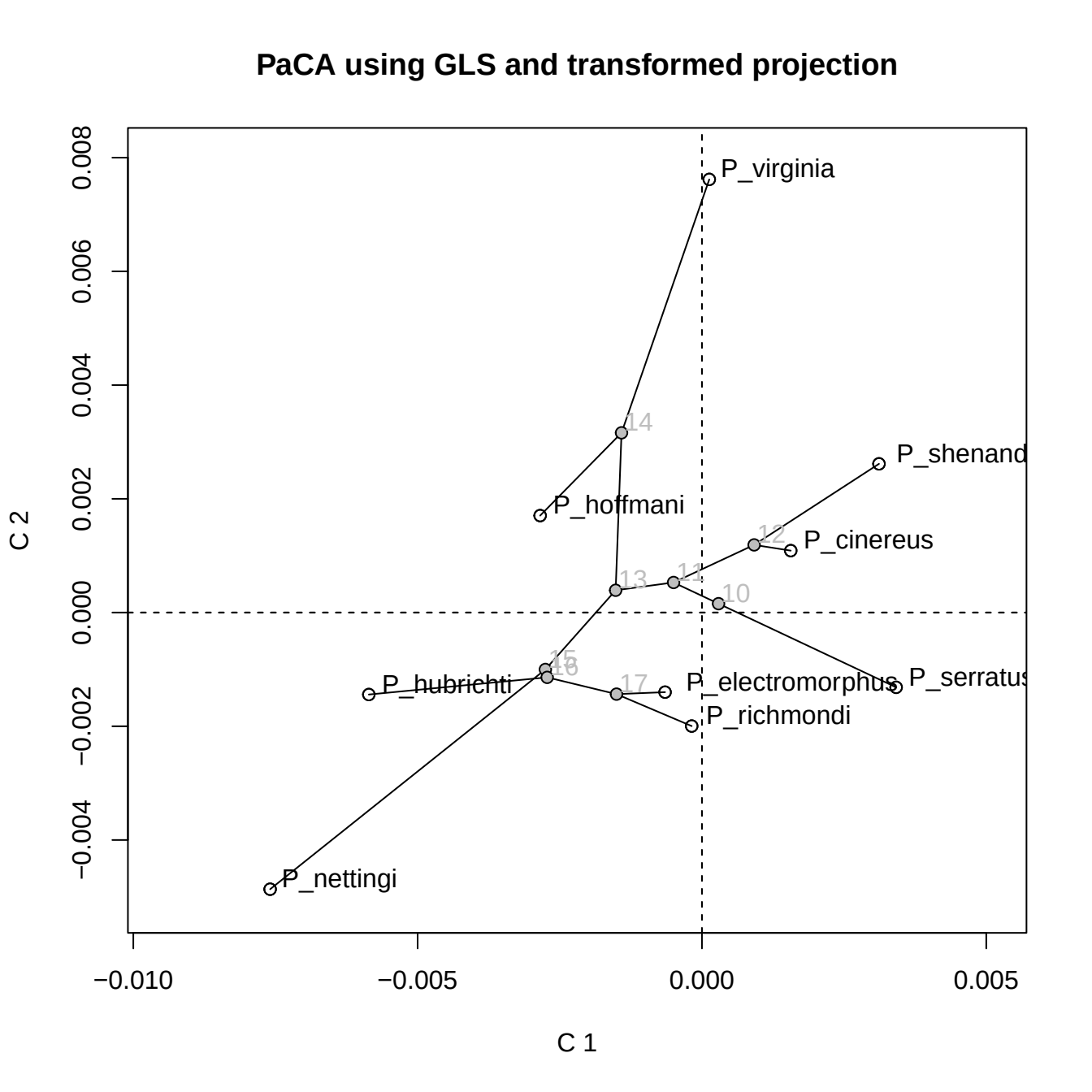

PCA.w.phylo
P_virginia
P_hoffmani
P_shenandoah
P_cinereus
P_hubrichti
P_electromorphus
P_richmondi
P_serratus
14
12
11
13
15
16
10
PC 2: 18.8%
PC 1: 45.64%
0.02
0.01
0.00
−0.01
−0.02
−0.02
−0.01
0.00
0.01
0.02
0.03

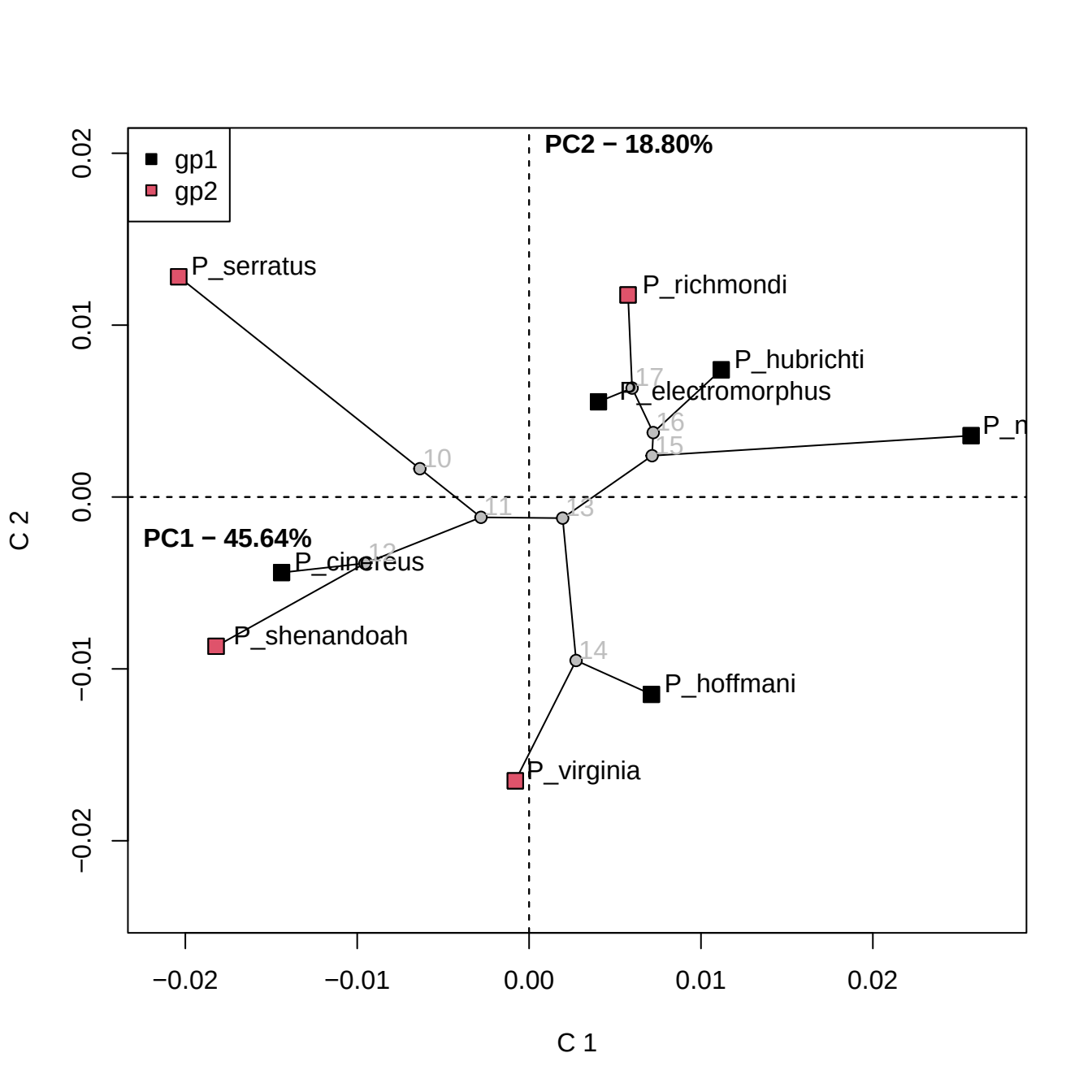

phylo PCA
P_shenandoah
P_cinereus
P_serratus
P_electromorphus
P_hoffmani
P_richmondi
P_ne
P_virginia
P_hubrichti
PC 1: 48.56%
PC 2: 16.39%

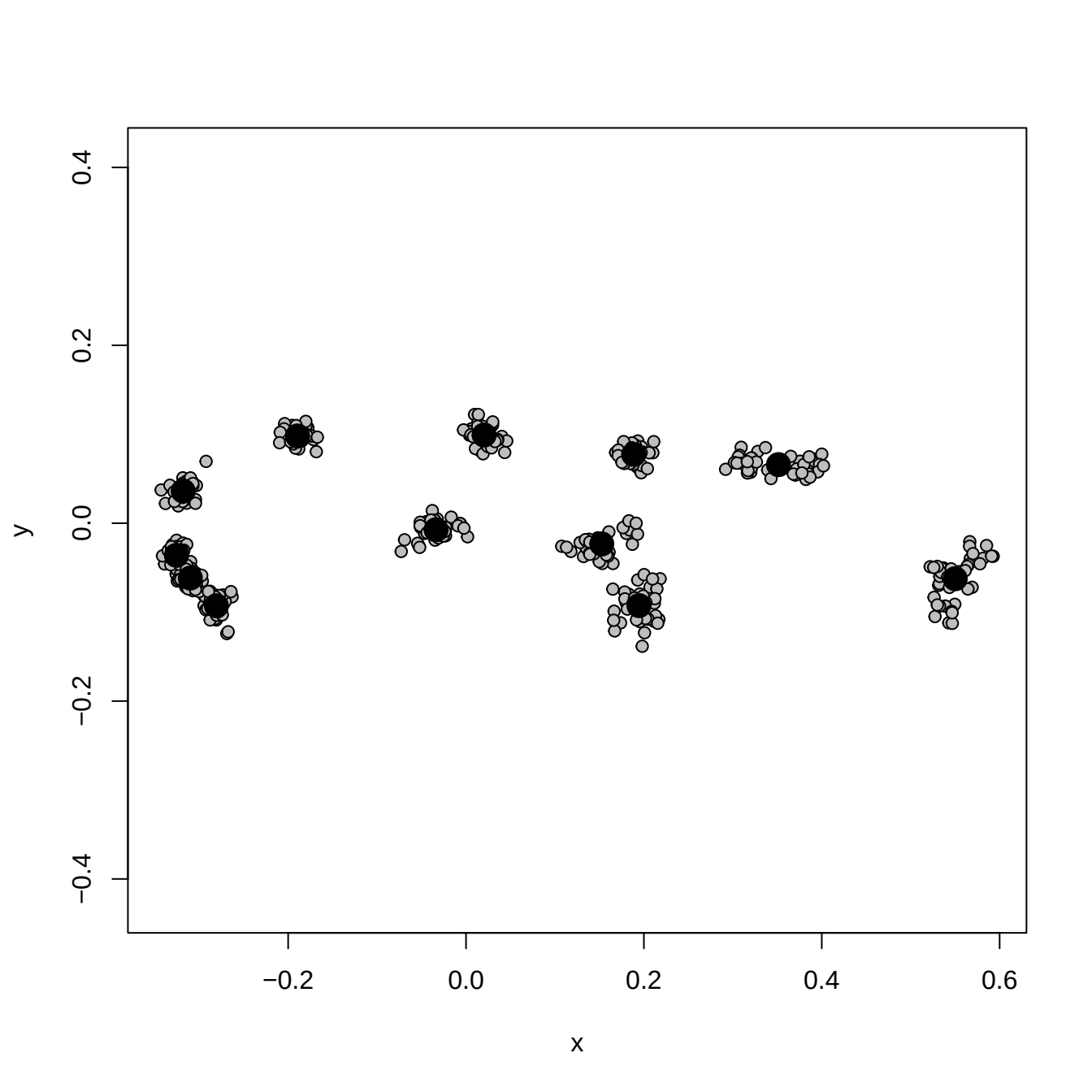

phylo PCA
P_cinereus
P_shenandoah
P_serratus
12
P_electromorphus
P_richmondi
11
17
P_hoffmani
13
15
14
P_virginia
P_hubrichti
0.005
0.000
−0.005
−0.010
PC 2: 16.39%
−0.005
0.000
0.005
0.010
PC 1: 48.56%

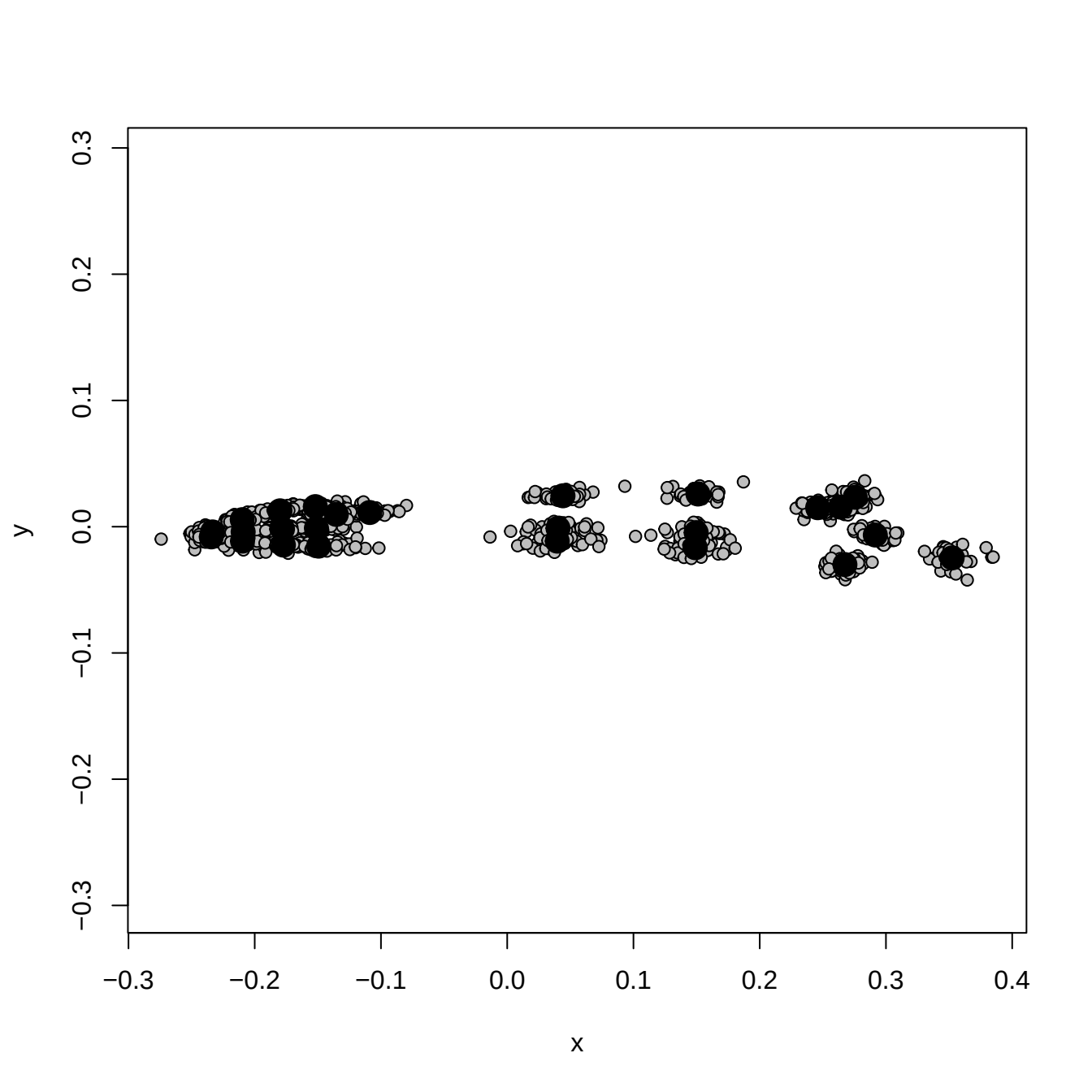

PaCA using OLS
P_serratus
P_richmondi
P_hubrichti
P_electromorphus
P_n
P_cinereus
P_shenandoah
P_hoffmani
P_virginia
10
11
12
13
14
15
16
17
C 1
C 2
−0.02
−0.01
0.00
0.01
0.02

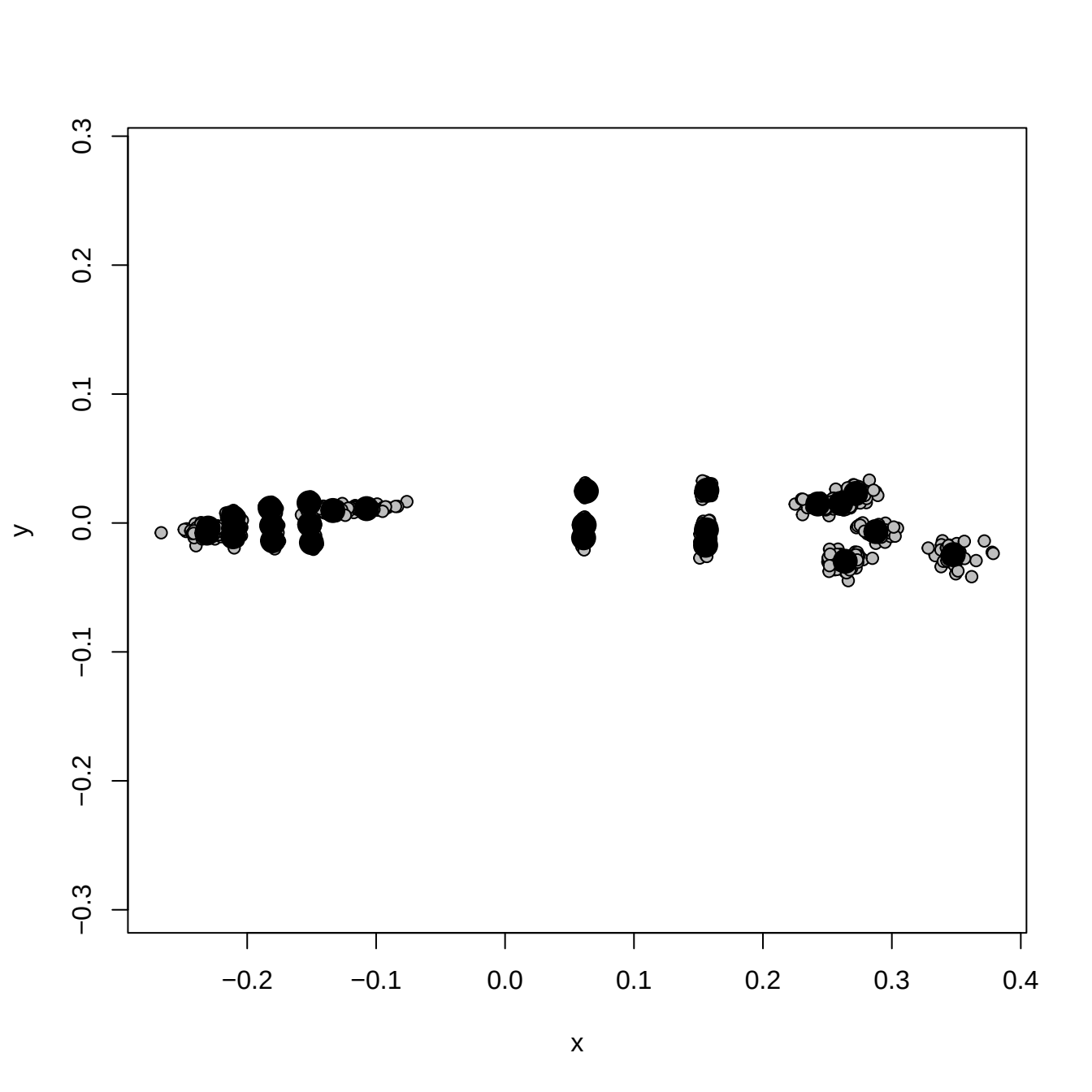

PaCA using GLS
P_virginia
P_shena
P_hoffmani
P_cinereus
P_electromorphus
P_hubrichti
P_richmondi
P_nettingi
14
12
11
13
10
15
16
17
0.02
0.01
0.00
−0.01
−0.03
−0.02
−0.01
0.00
0.01
C 2
C 1

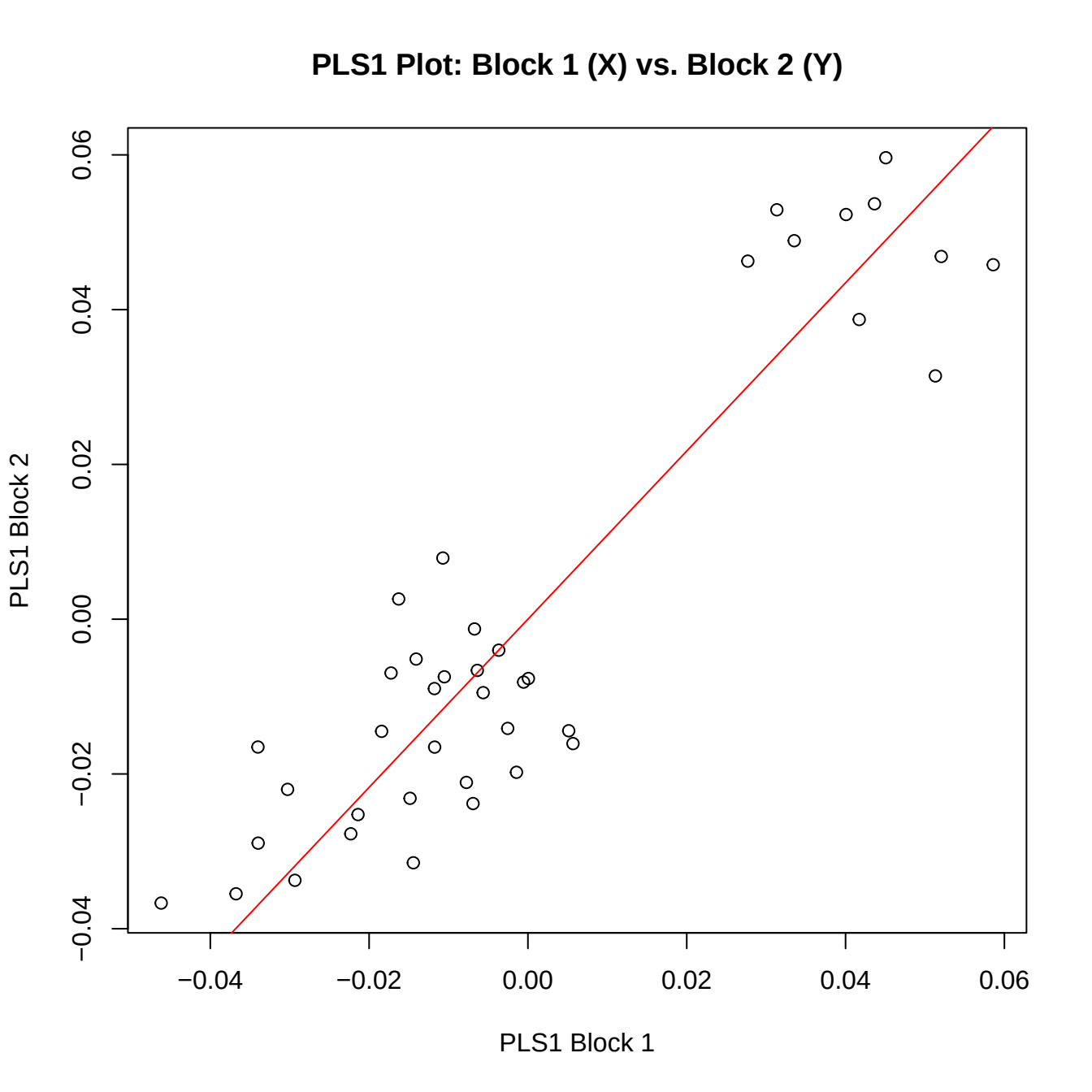

PaCA using GLS and transformed projection
P_virginia
P_shenand
P_hoffmani
P_cinereus
P_serratus
P_electromorphus
P_richmondi
P_hubrichti
P_nettingi
14
12
13
11
10
15
16
17
0.008
0.006
0.004
0.002
0.000
−0.002
−0.004
C 2
−0.010
−0.005
0.000
0.005
C 1

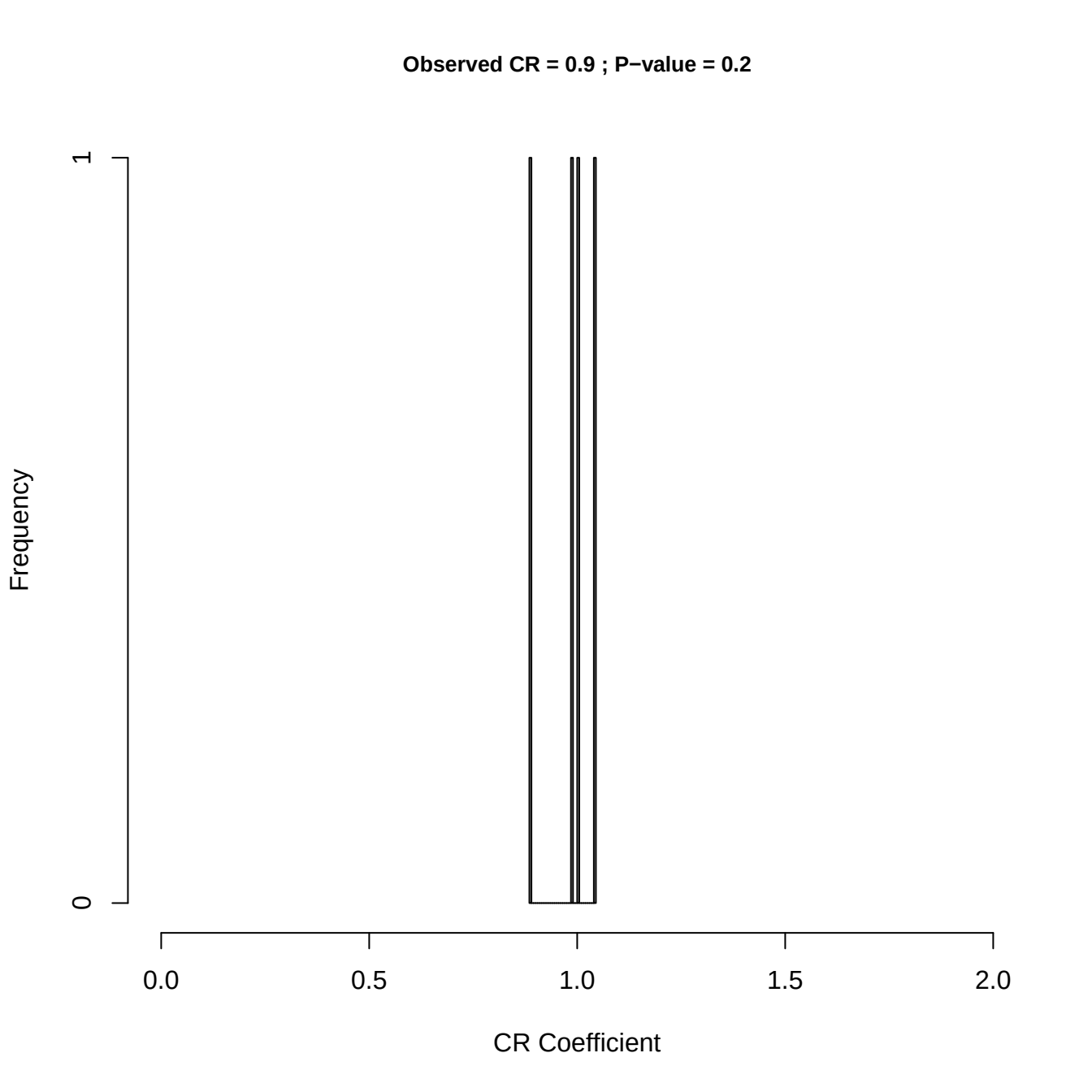

gp1
gp2
PC2 − 18.80%
PC1 − 45.64%
P_serratus
P_richmondi
P_hubrichti
P_electromorphus
P_n
P_cinereus
P_shenandoah
P_hoffmani
P_virginia
10
11
12
13
14
15
16
17
0.02
0.01
0.00
−0.01
−0.02
C 2
C 1

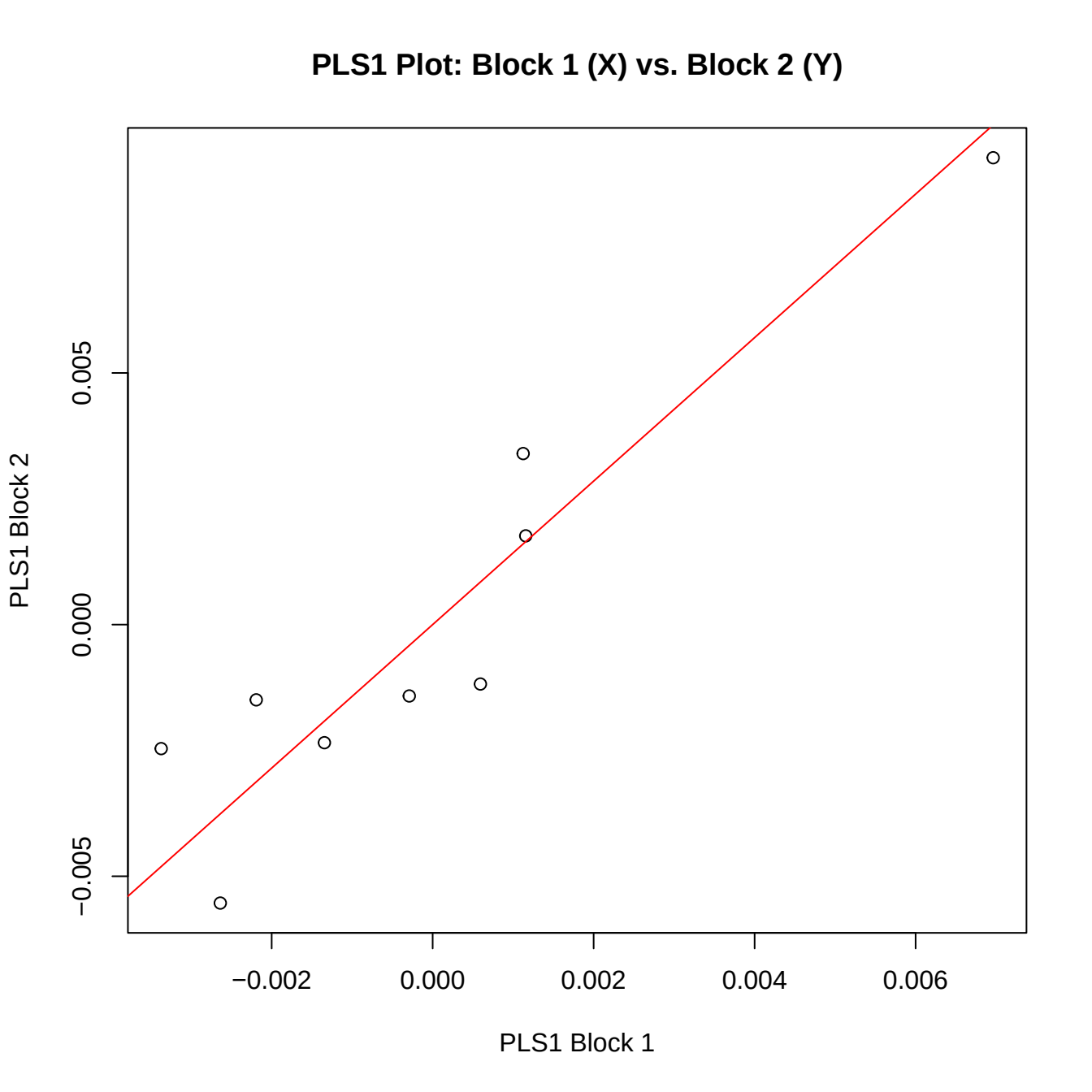

0.4
0.2
0.0
−0.2
−0.4
y
−0.2
0.0
0.2
0.4
0.6
x

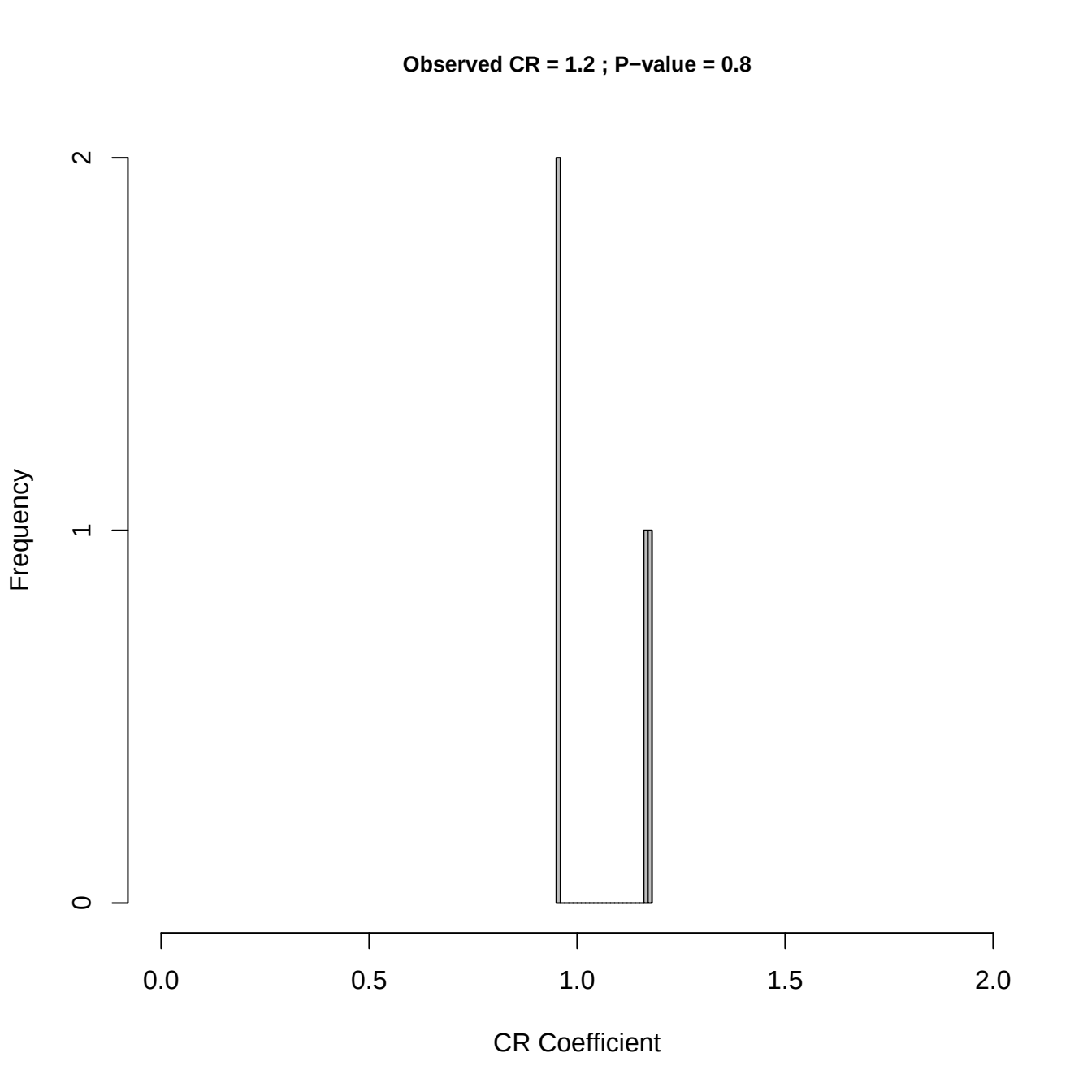

y
0.3
0.2
0.1
0.0
−0.1
−0.2
−0.3
−0.3
−0.2
−0.1
0.0
0.1
0.2
0.3
0.4
x

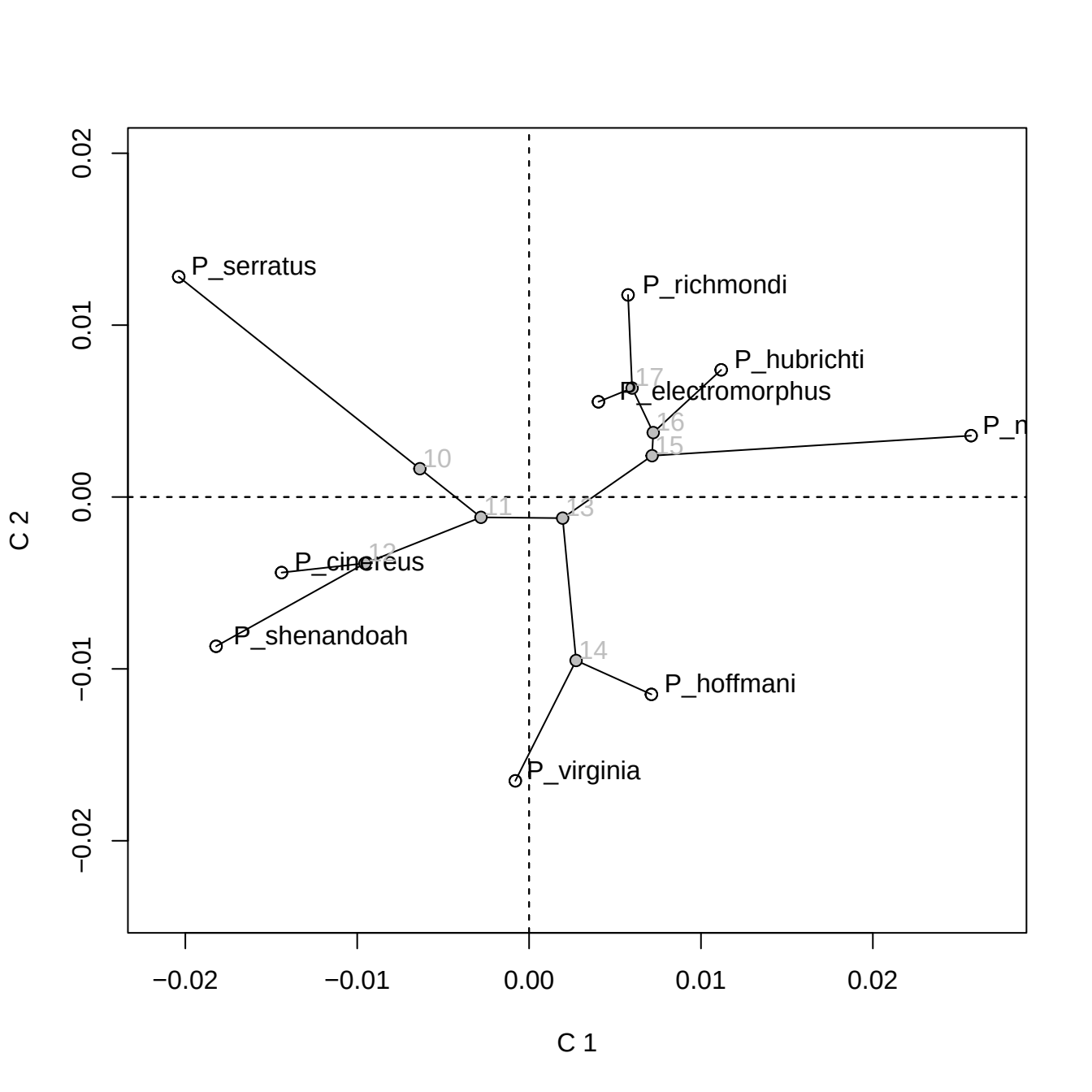

0.3
0.2
0.1
0.0
−0.1
−0.2
−0.3
y
−0.2
−0.1
0.0
0.1
0.2
0.3
0.4
x

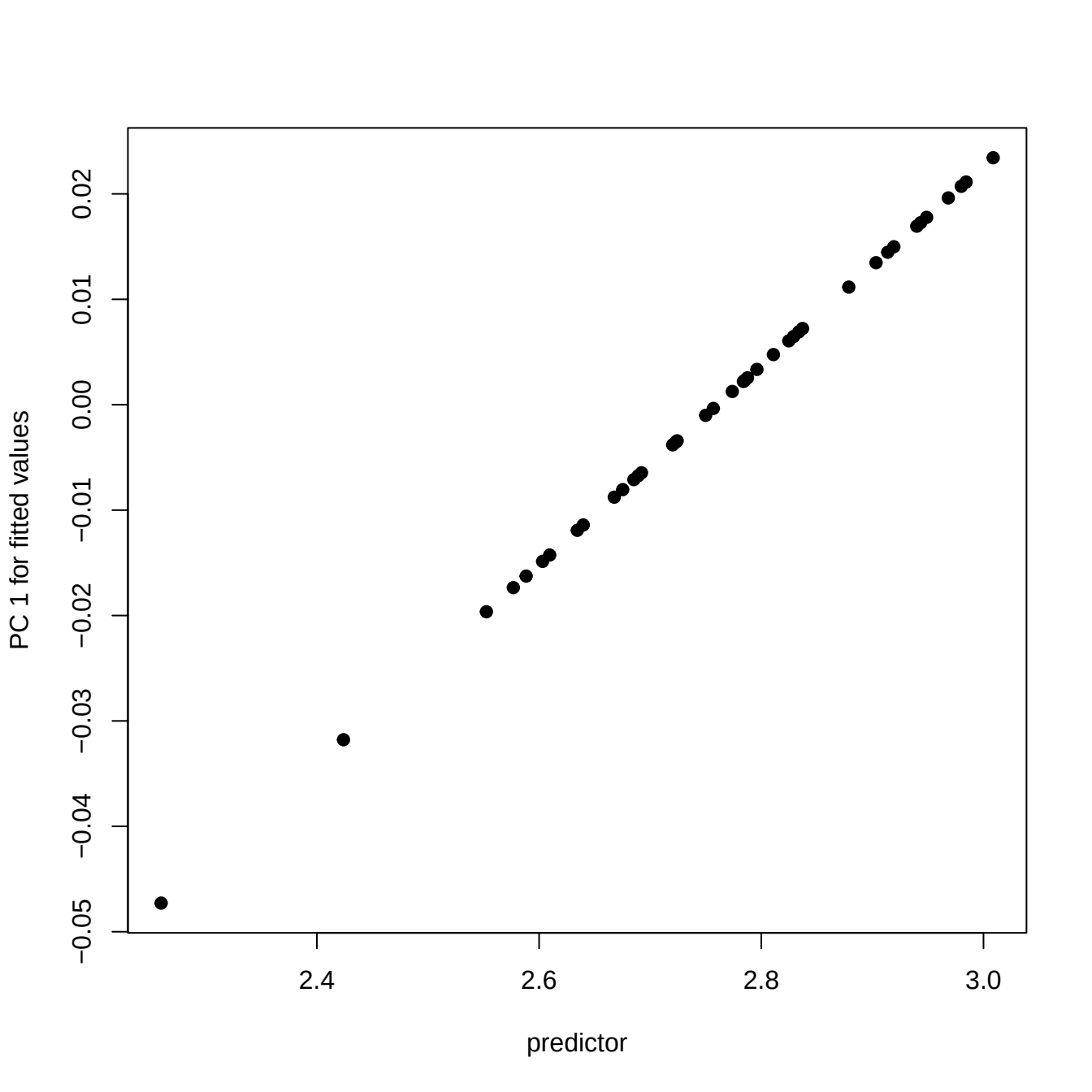

PLS1 Plot: Block 1 (X) vs. Block 2 (Y)
PLS1 Block 2
PLS1 Block 1
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.04
−0.02
0.00
0.02
0.04
0.06

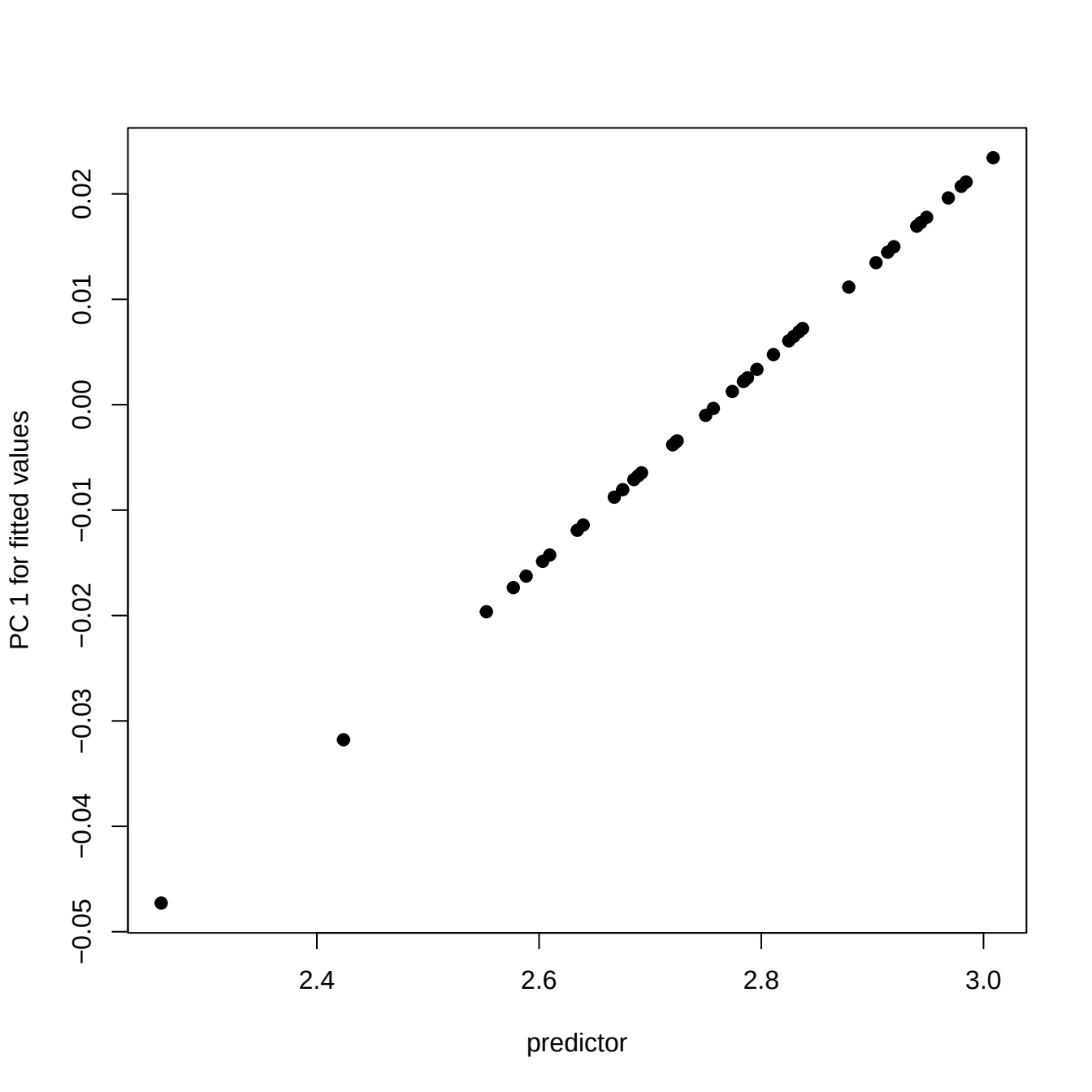

Observed CR = 0.9 ; P−value = 0.2
Frequency
0
1
0.0
0.5
1.0
1.5
2.0
CR Coefficient

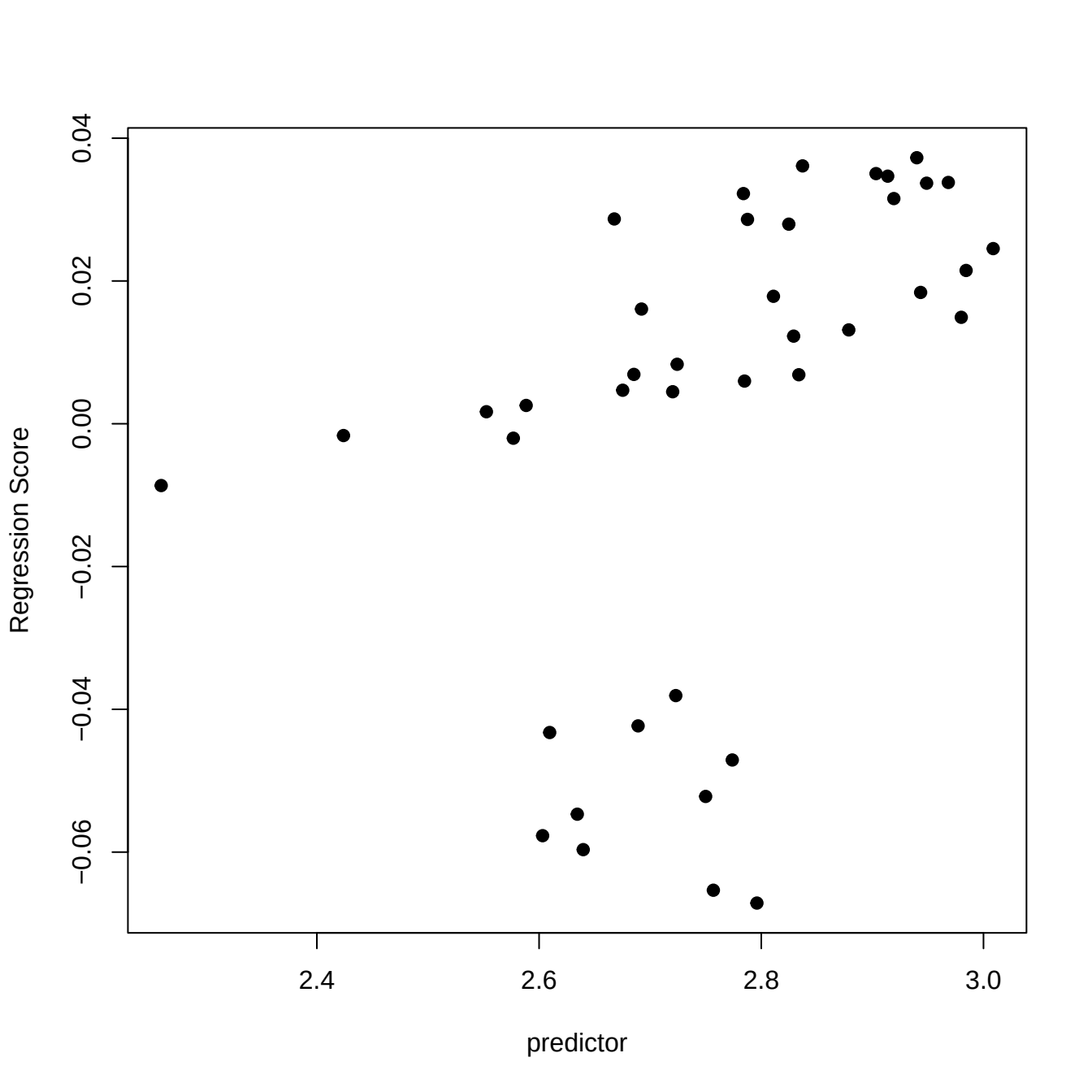

PLS1 Plot: Block 1 (X) vs. Block 2 (Y)
PLS1 Block 2
0.005
0.000
−0.005
−0.002
0.000
0.002
0.004
0.006
PLS1 Block 1

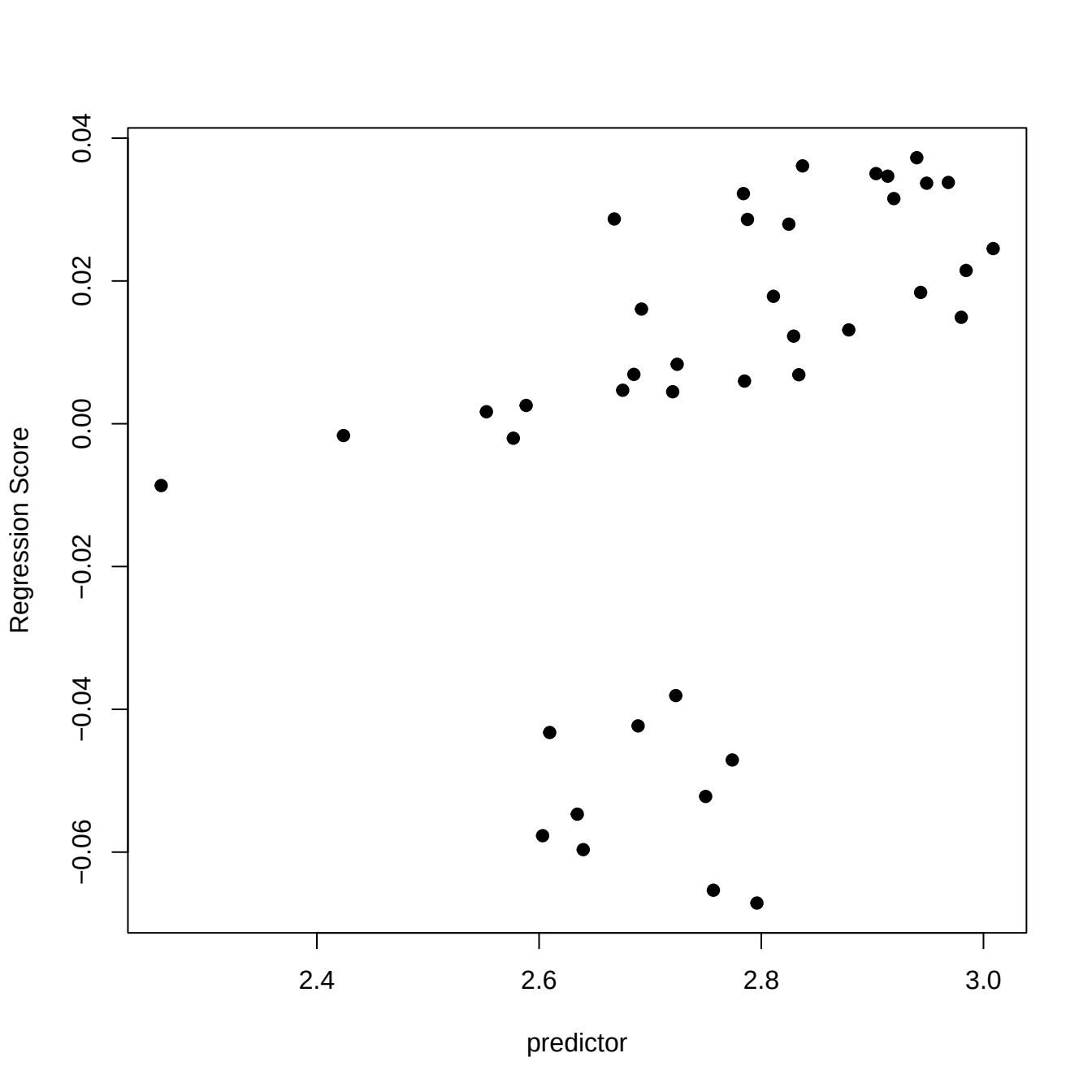

Observed CR = 1.2 ; P−value = 0.8
Frequency
0
1
2
0.0
0.5
1.0
1.5
2.0
CR Coefficient


P_serratus
P_richmondi
P_hubrichti
P_electromorphus
P_n
P_cinereus
P_shenandoah
P_hoffmani
P_virginia
10
11
12
13
14
15
16
17
C 1
C 2
0.02
0.01
0.00
−0.01
−0.02
−0.02
−0.01
0.00
0.01
0.02


PC 1 for fitted values
0.02
0.01
0.00
−0.01
−0.02
−0.03
−0.04
−0.05
2.4
2.6
2.8
3.0
predictor

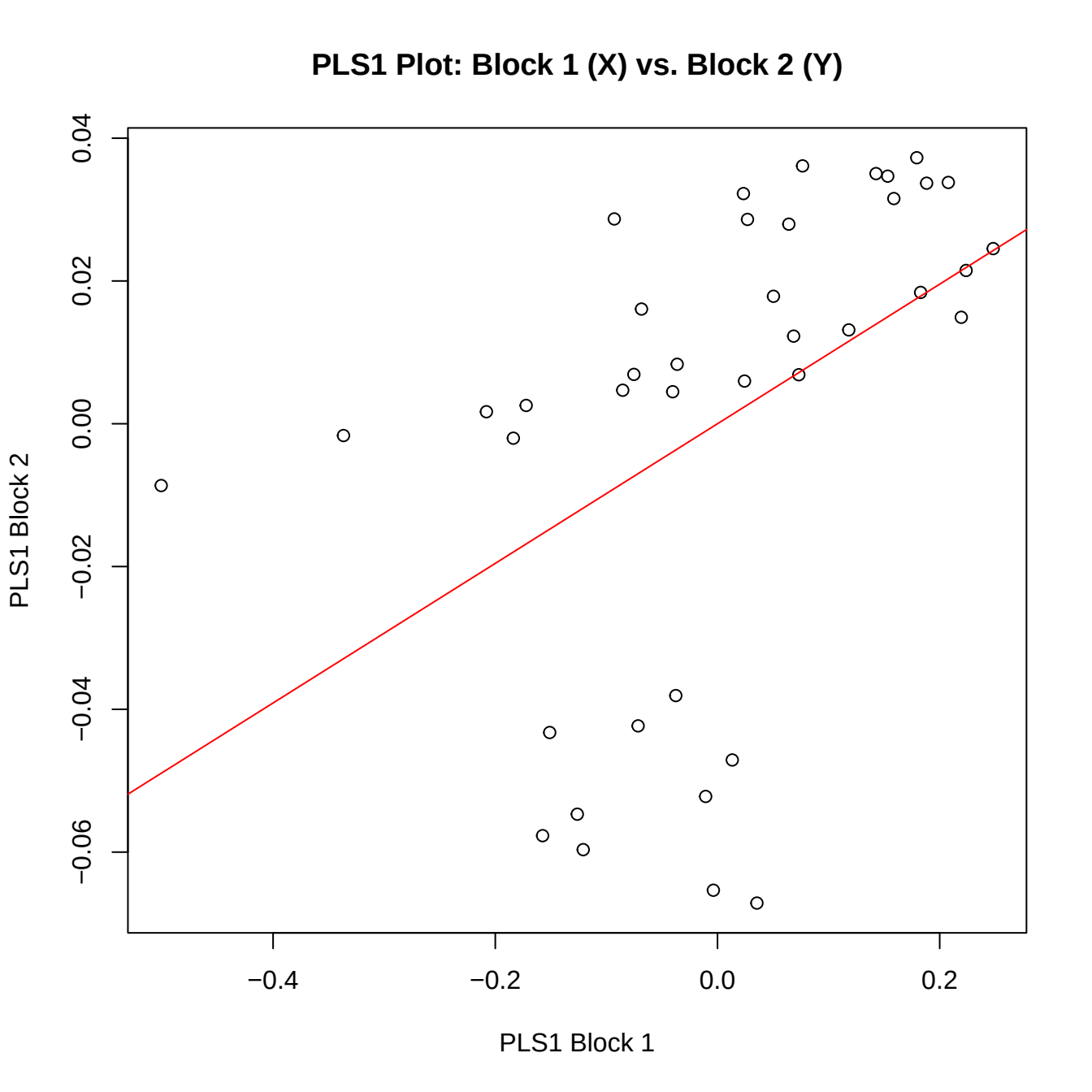

PC 1 for fitted values
0.02
0.01
0.00
−0.01
−0.02
−0.03
−0.04
−0.05
2.4
2.6
2.8
3.0
predictor


Regression Score
0.04
0.02
0.00
−0.02
−0.04
−0.06
2.4
2.6
2.8
3.0
predictor


Regression Score
0.04
0.02
0.00
−0.02
−0.04
−0.06
2.4
2.6
2.8
3.0
predictor

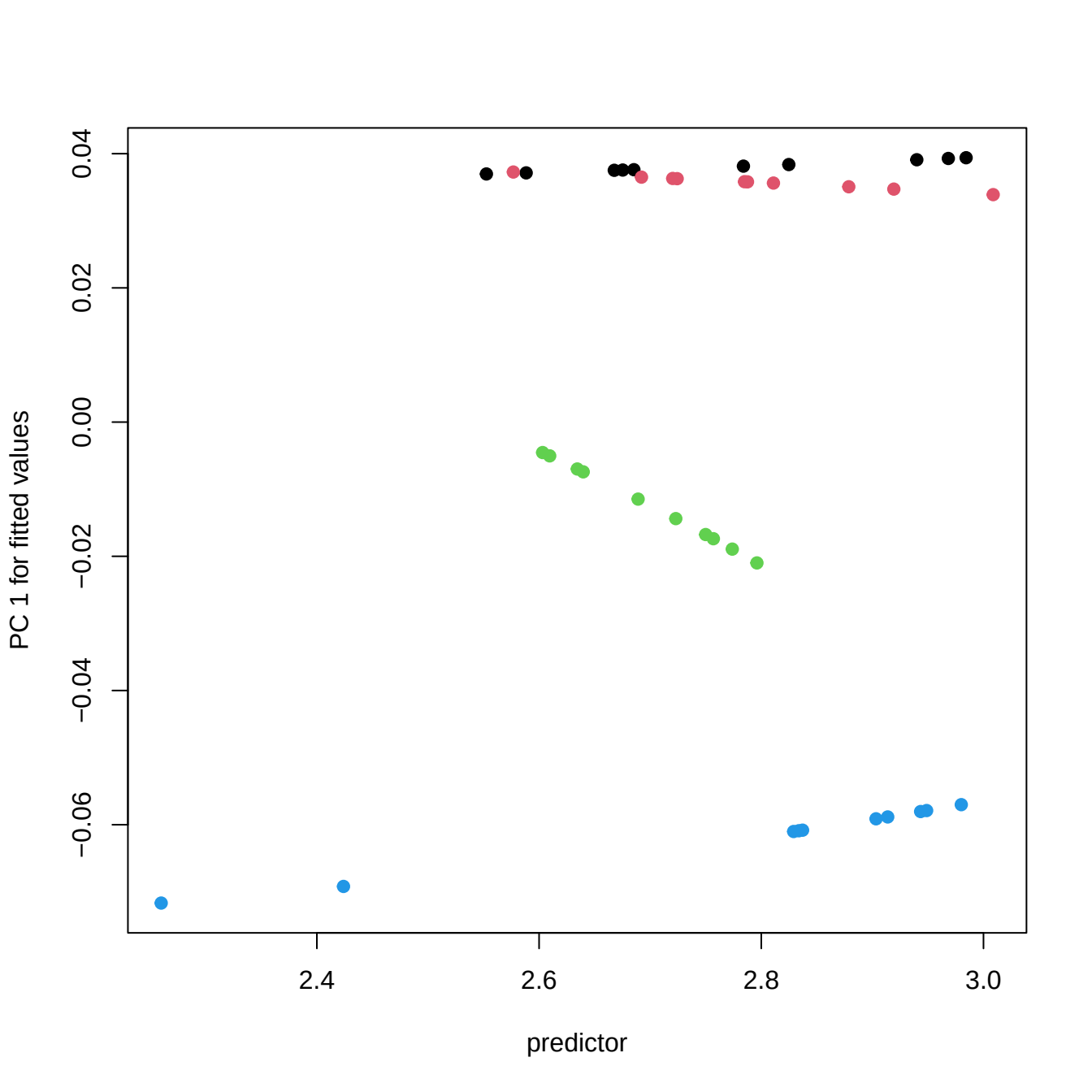
CAC
0.04
0.02
0.00
−0.02
−0.04
−0.06
2.4
2.6
2.8
3.0
log(Size)

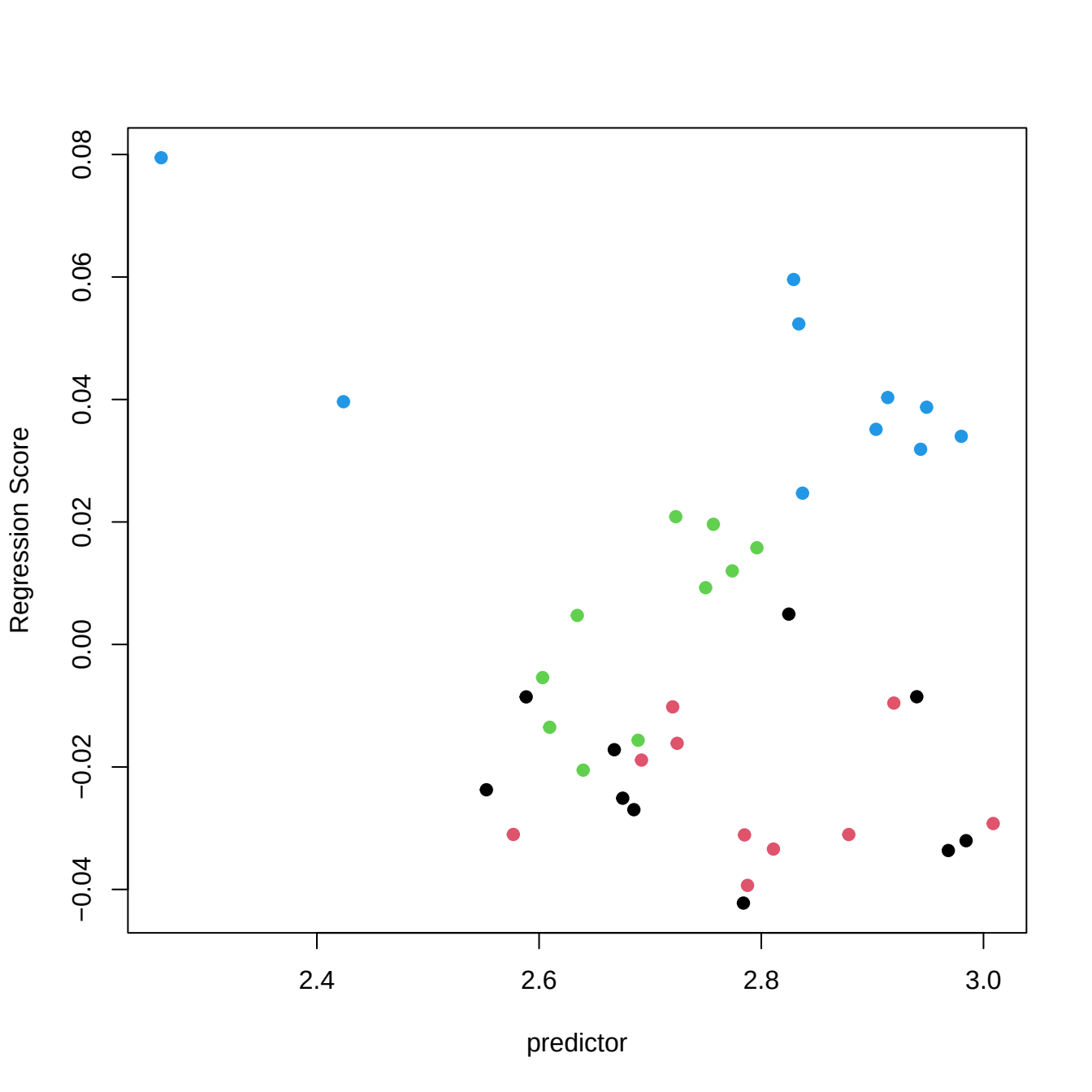
RSC1
0.05
0.00
−0.05
−0.10
−0.06
−0.02
0.02
CAC

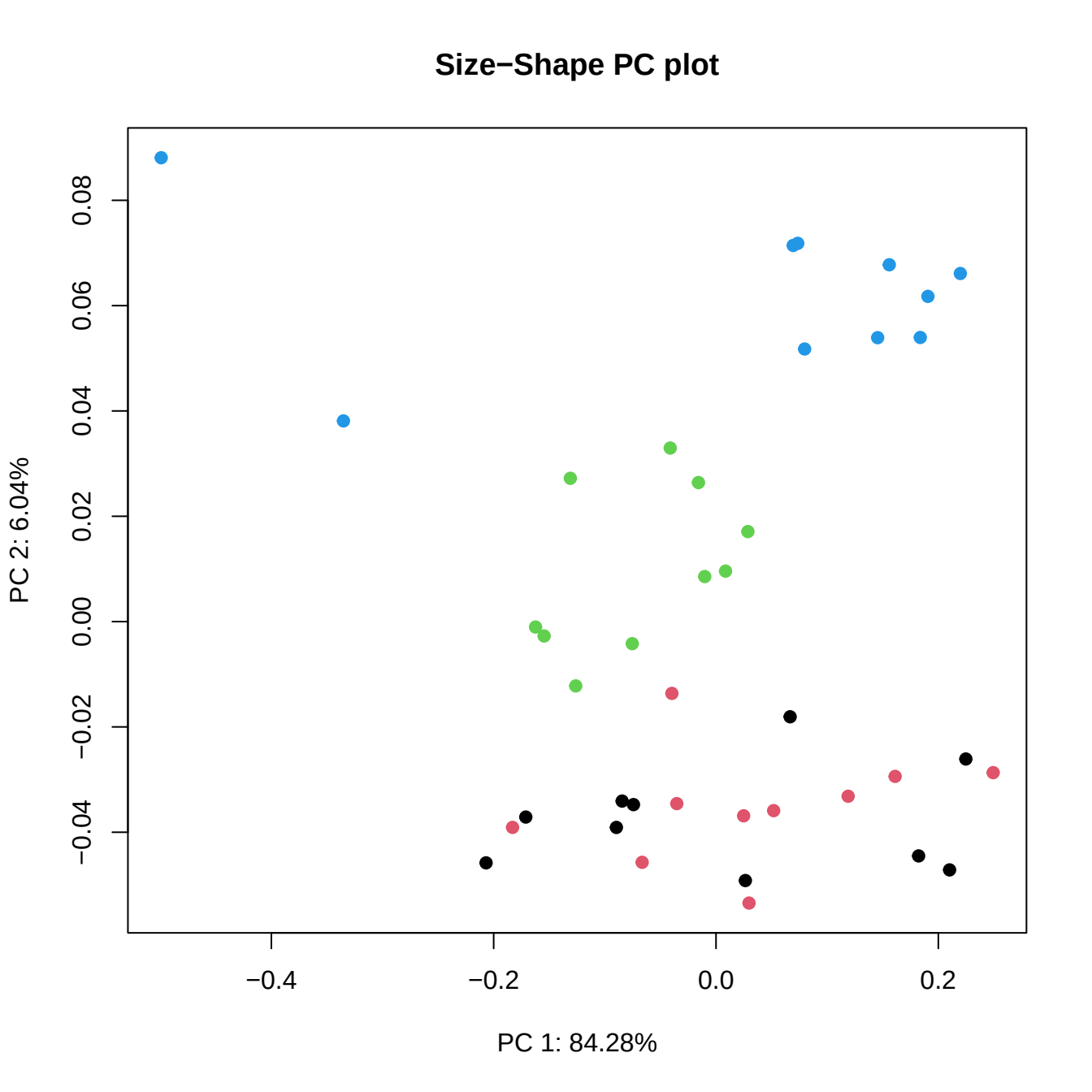

PLS1 Plot: Block 1 (X) vs. Block 2 (Y)
PLS1 Block 2
PLS1 Block 1
0.04
0.02
0.00
−0.02
−0.04
−0.06
−0.4
−0.2
0.0
0.2

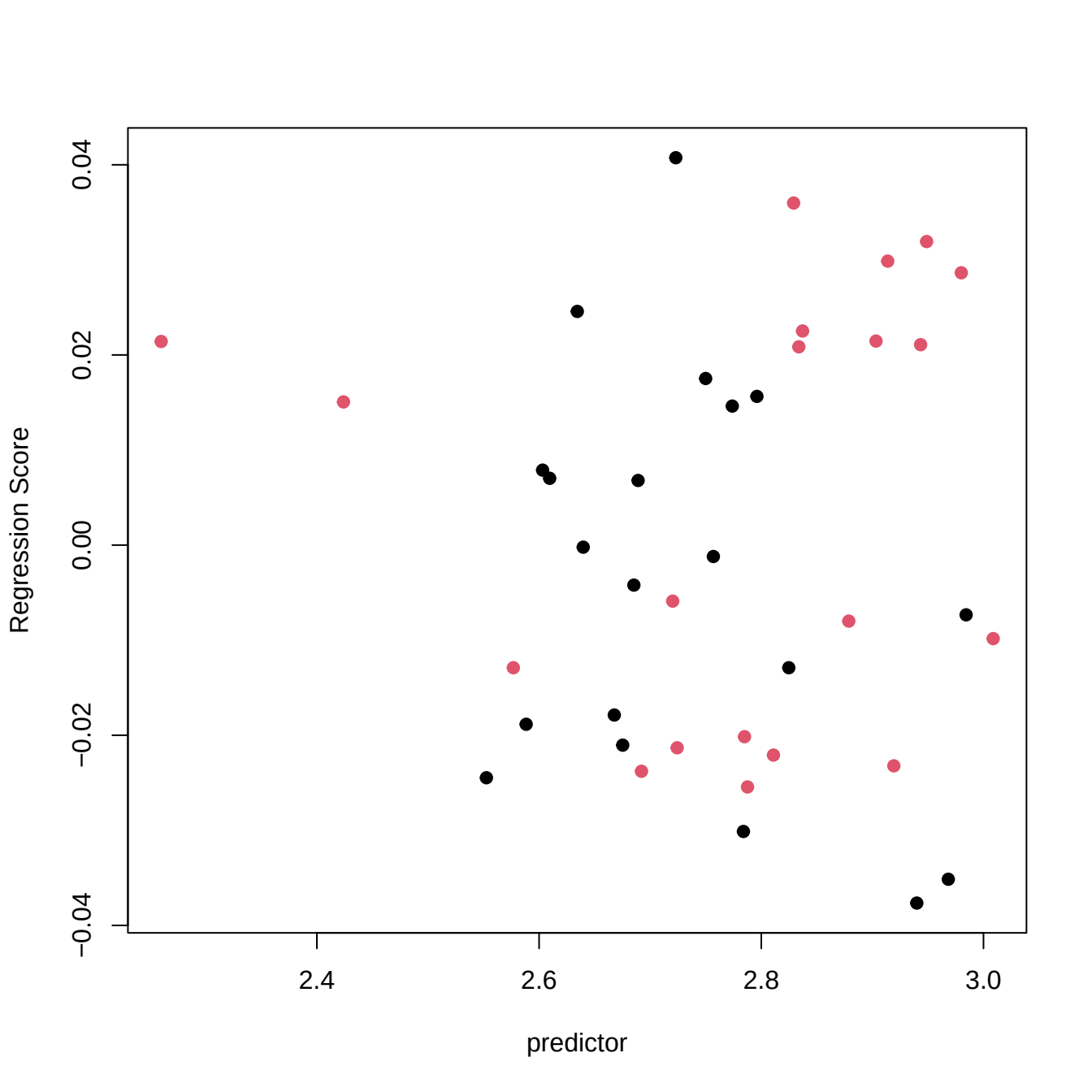
CAC
0.04
0.02
0.00
−0.02
−0.04
−0.06
2.4
2.6
2.8
3.0
log(Size)

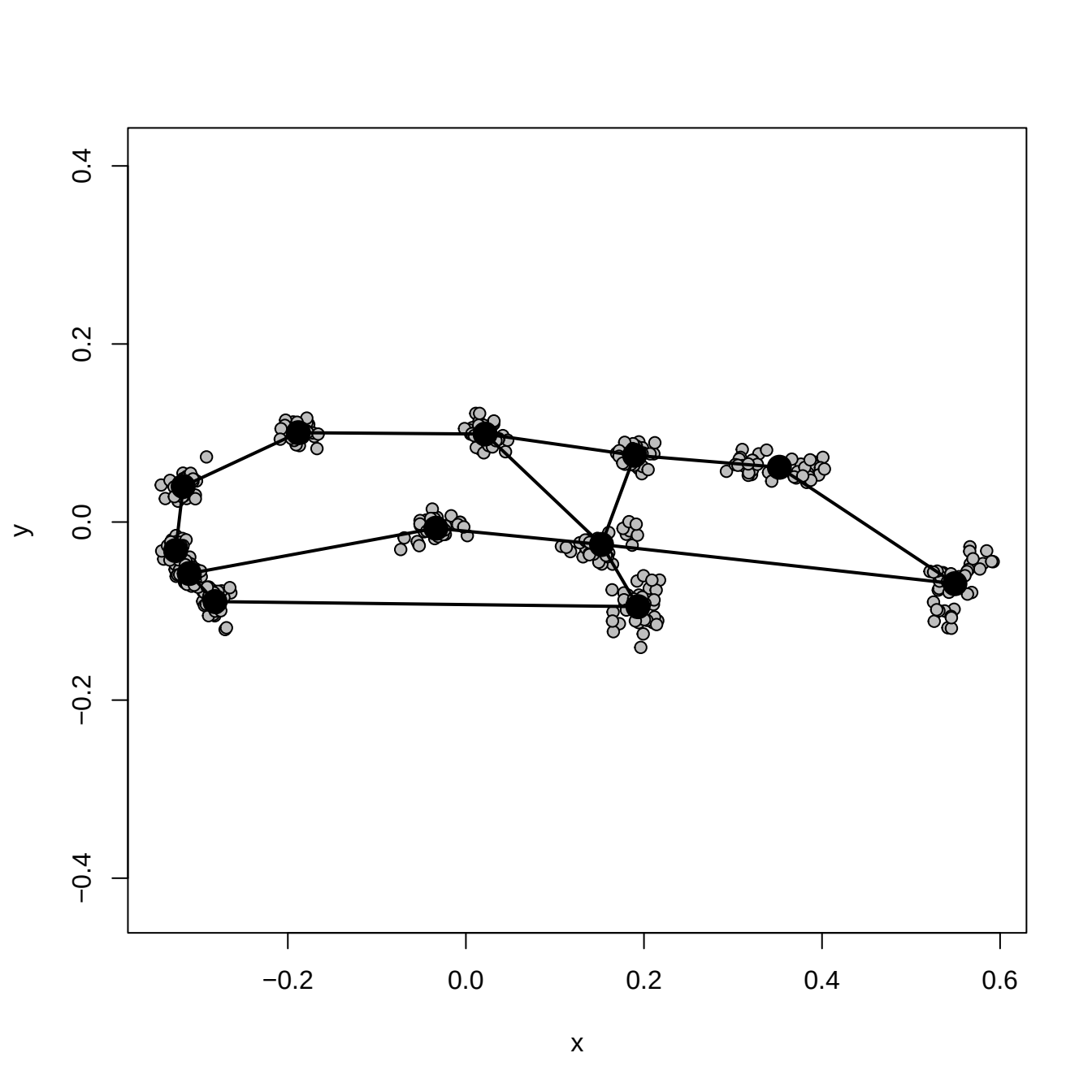
RSC1
0.05
0.00
−0.05
−0.10
−0.06
−0.02
0.02
CAC

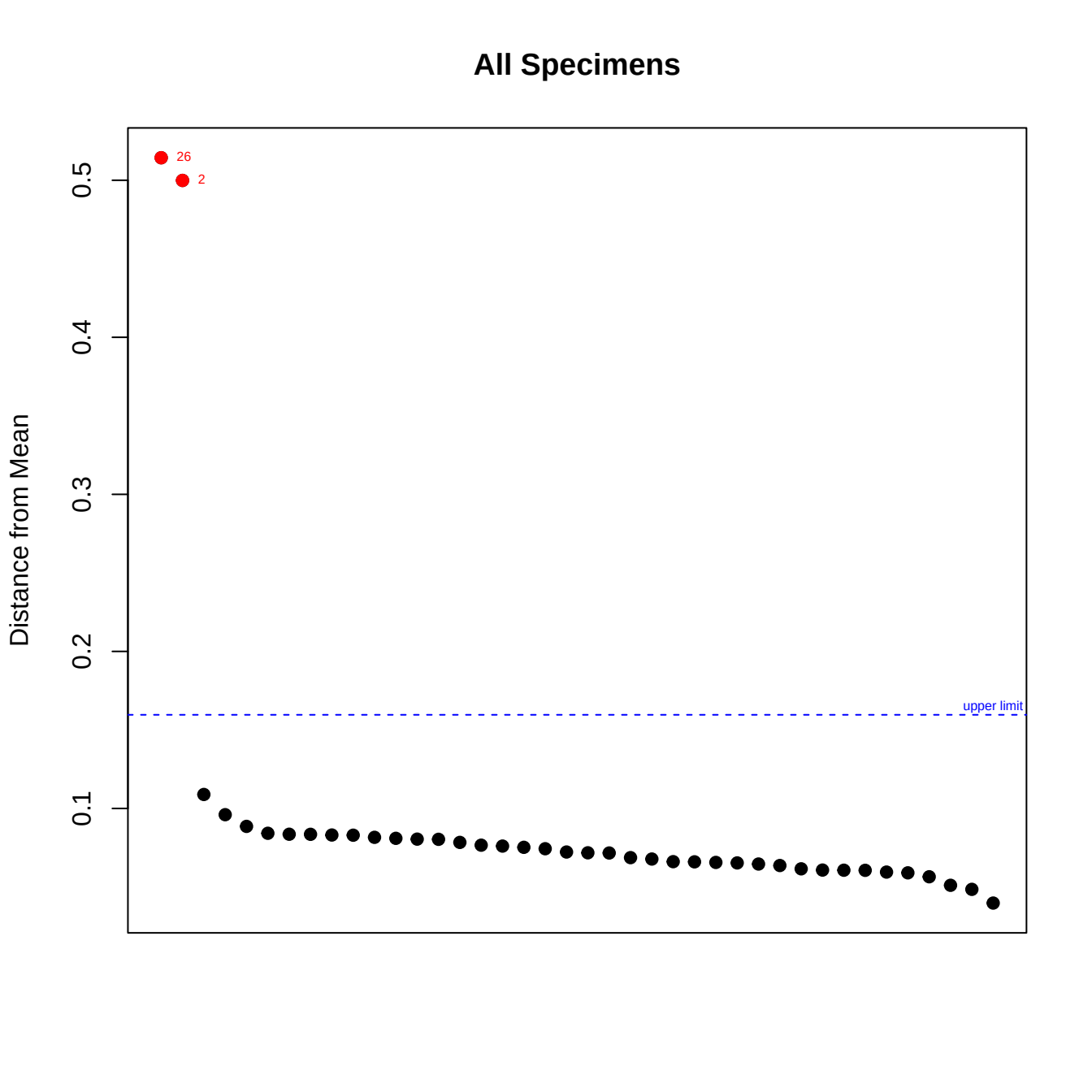

PC 1 for fitted values
0.04
0.02
0.00
−0.02
−0.04
−0.06
2.4
2.6
2.8
3.0
predictor

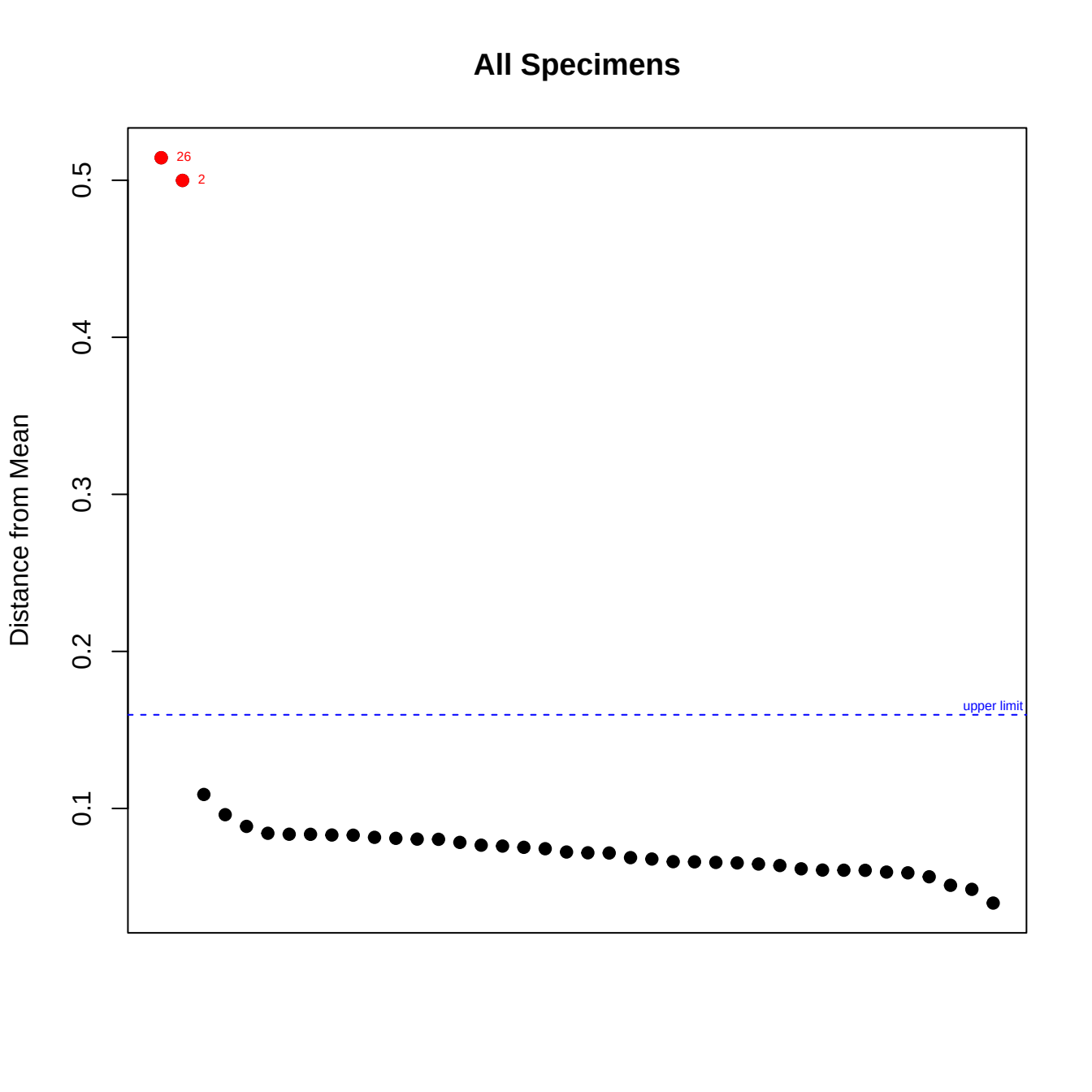

Regression Score
0.08
0.06
0.04
0.02
0.00
−0.02
−0.04
2.4
2.6
2.8
3.0
predictor


Size−Shape PC plot
PC 2: 6.04%
0.08
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.4
−0.2
0.0
0.2
PC 1: 84.28%

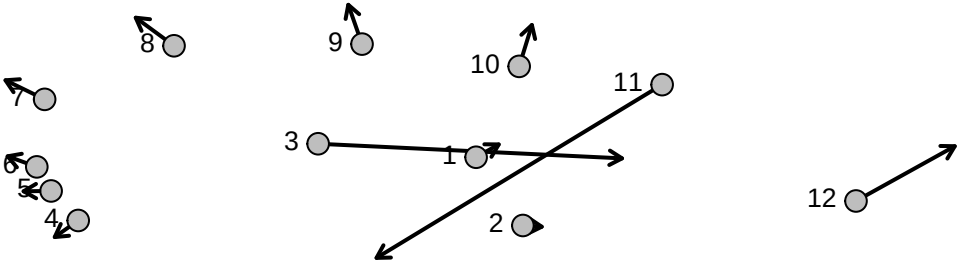

Regression Score
0.04
0.02
0.00
−0.02
−0.04
2.4
2.6
2.8
3.0
predictor


0.4
0.2
0.0
−0.2
−0.4
y
−0.2
0.0
0.2
0.4
0.6
x

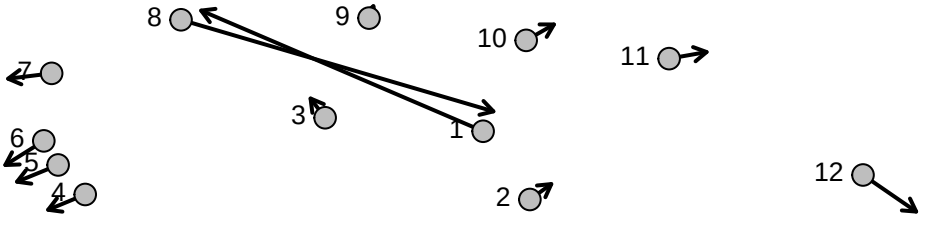

All Specimens
Distance from Mean
0.1
0.2
0.3
0.4
0.5
26
2
upper limit

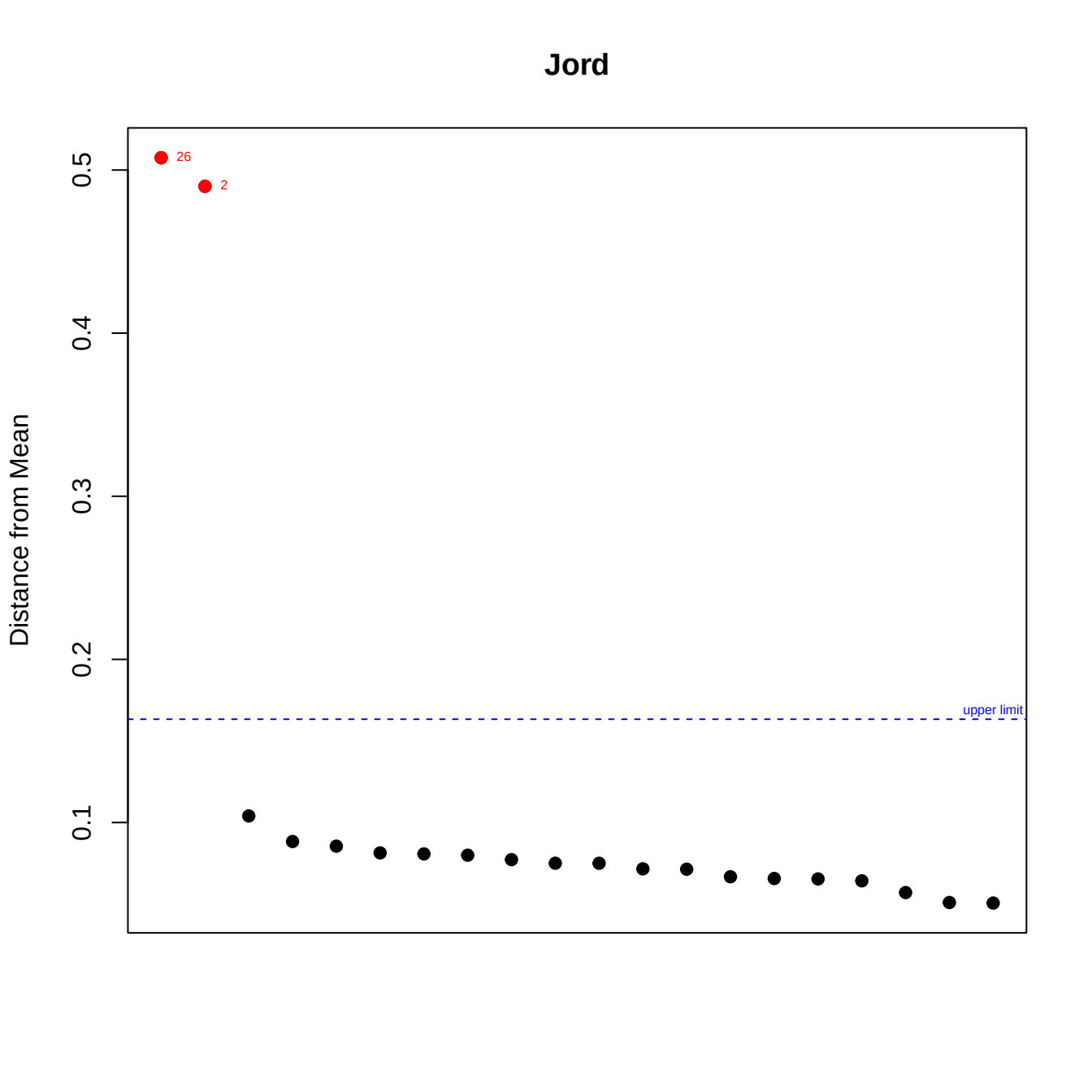

All Specimens
Distance from Mean
0.1
0.2
0.3
0.4
0.5
26
2
upper limit

group: All Specimens , specimen: 26

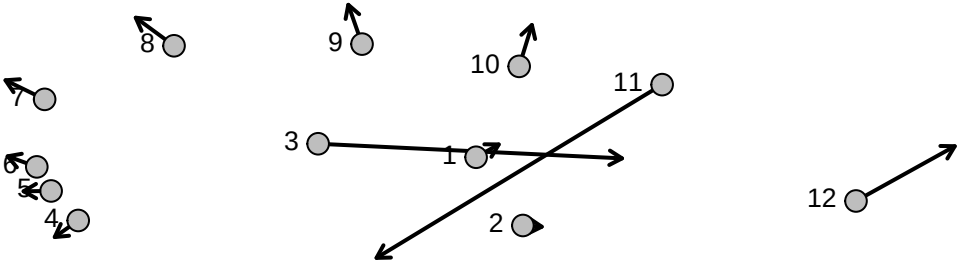


group: All Specimens , specimen: 2

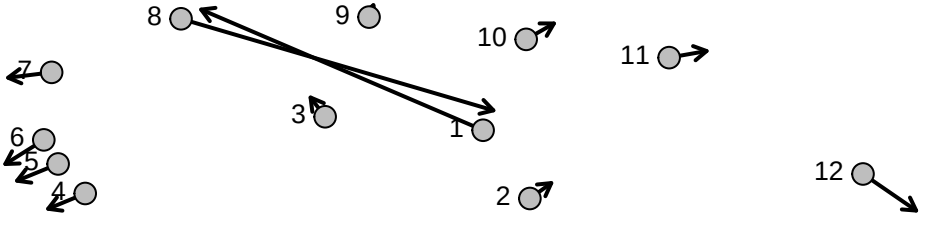


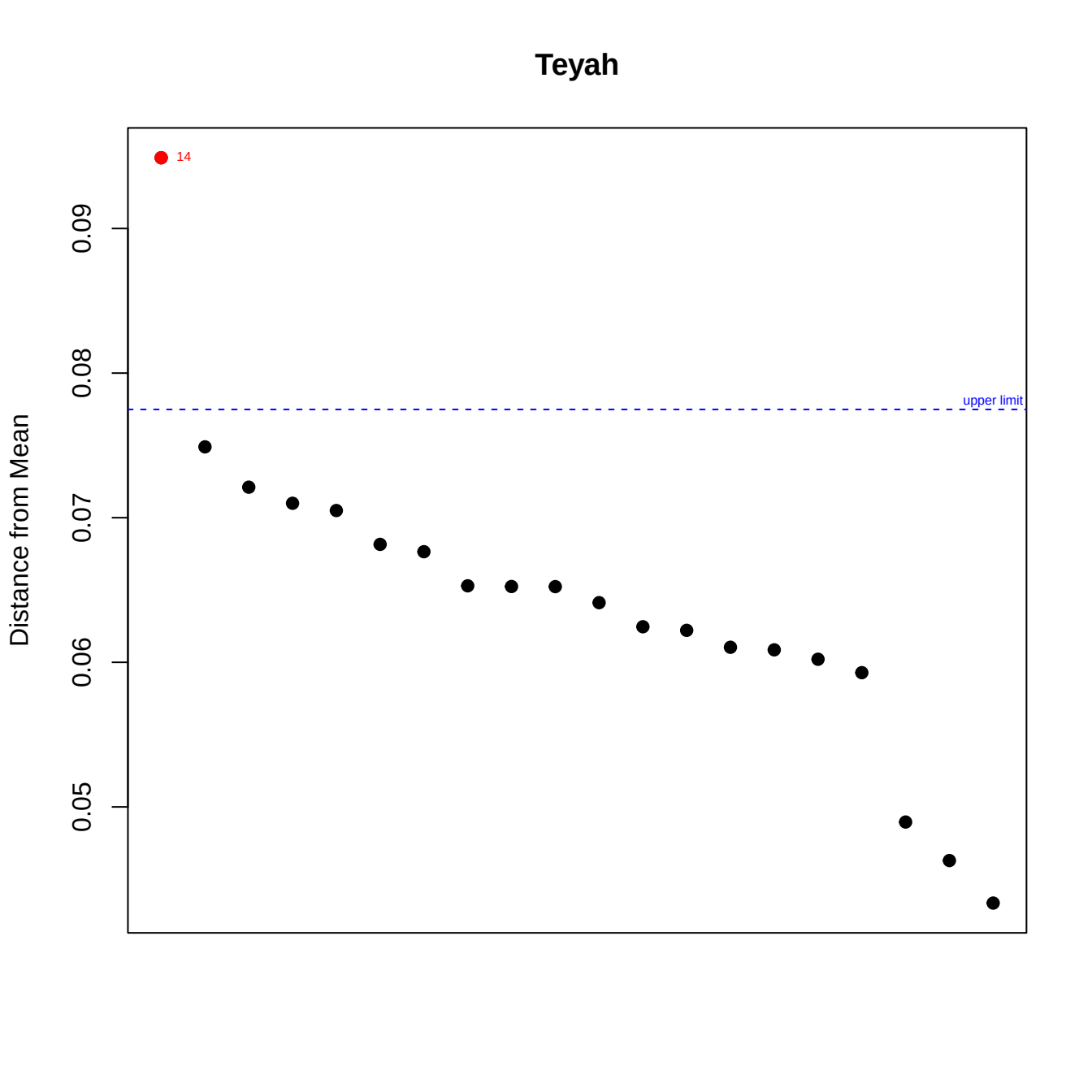

Jord
Distance from Mean
0.1
0.2
0.3
0.4
0.5
26
2
upper limit

group: Jord , specimen: 26

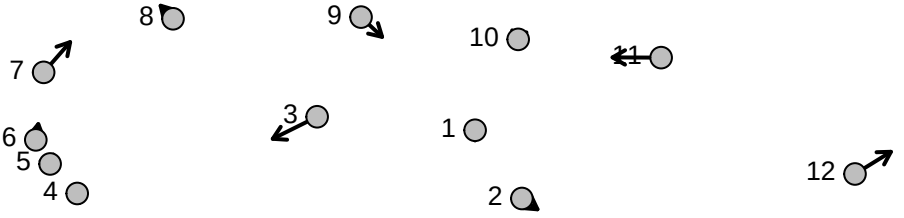


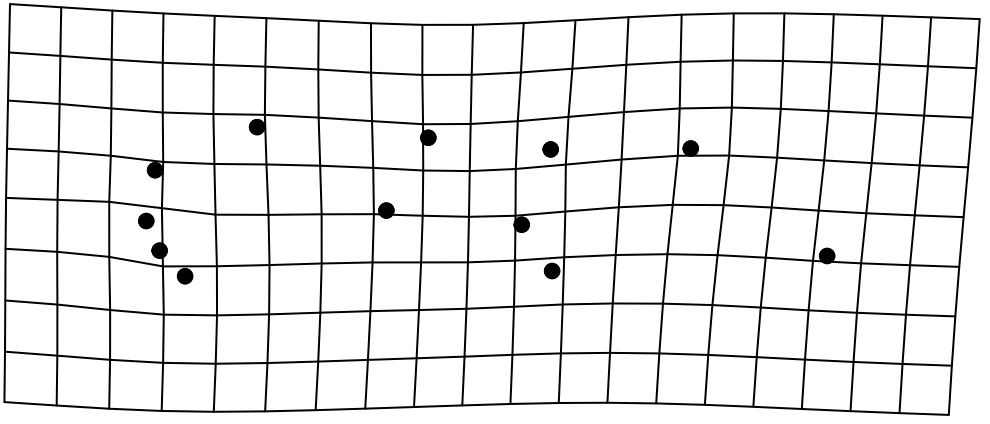
group: Jord , specimen: 2

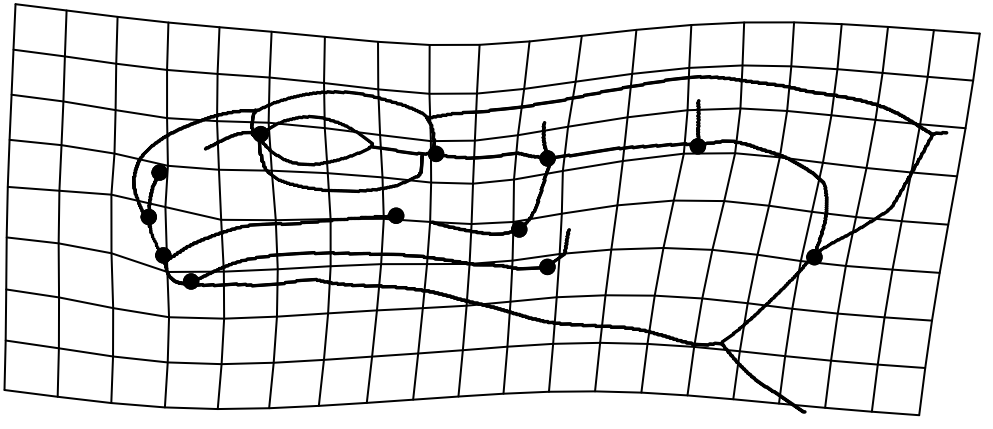


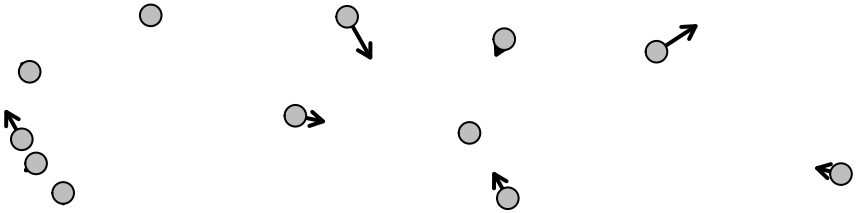

Teyah
14
upper limit
Distance from Mean
0.09
0.08
0.07
0.06
0.05

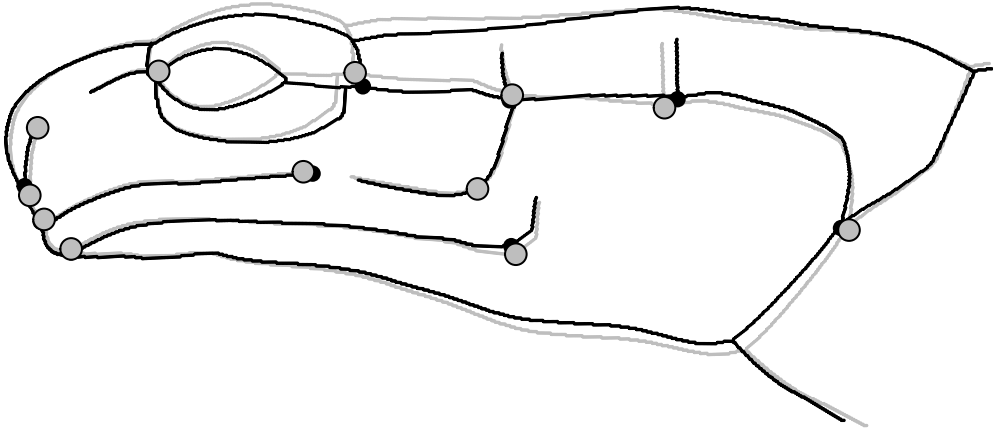
group: Teyah , specimen: 14

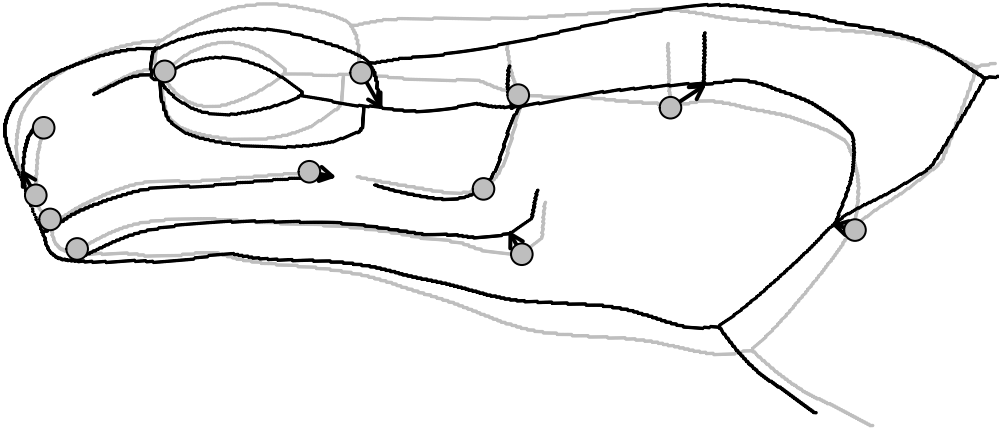


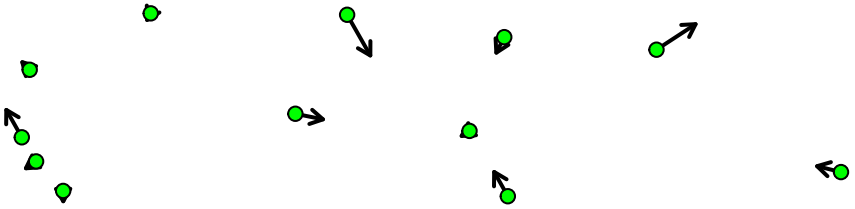


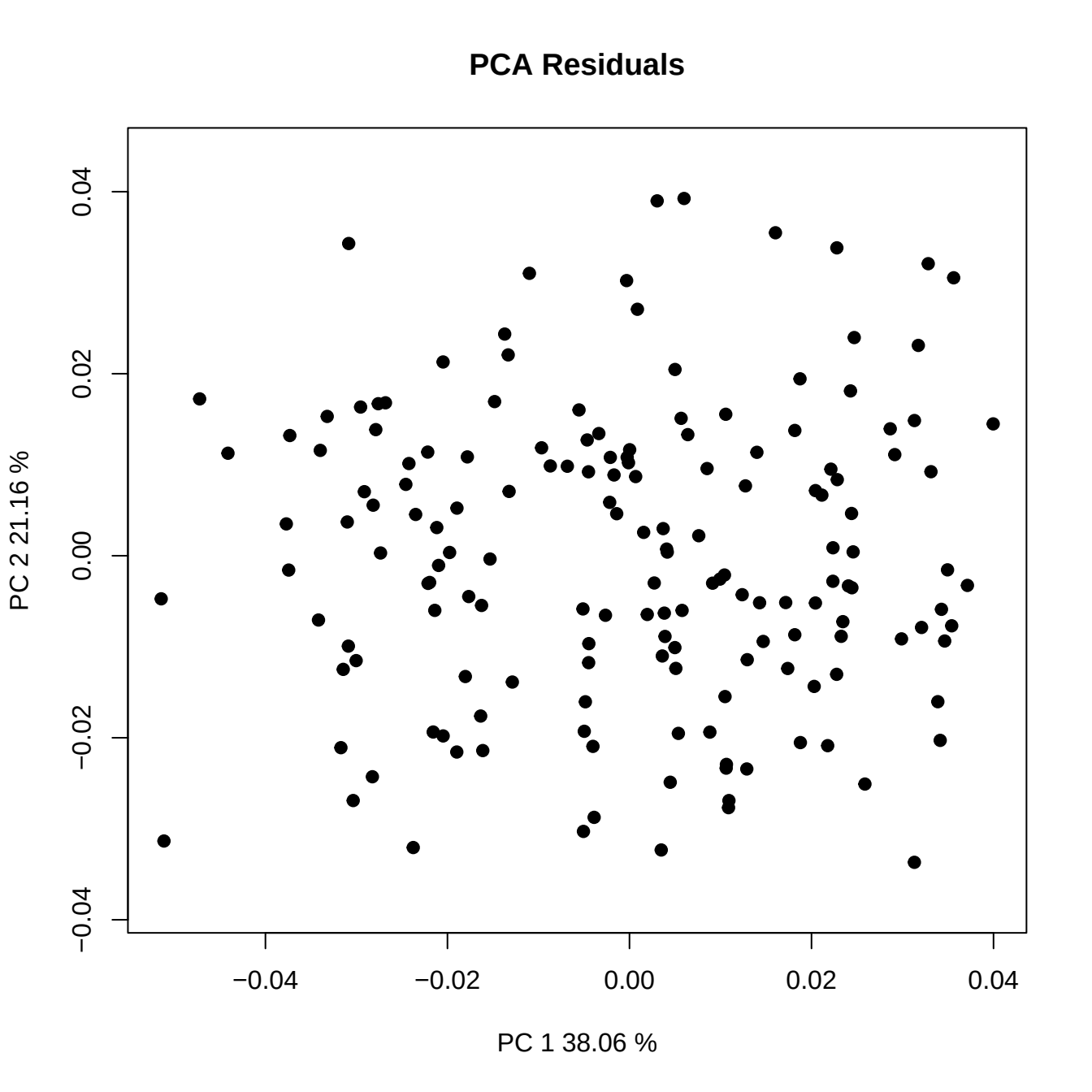


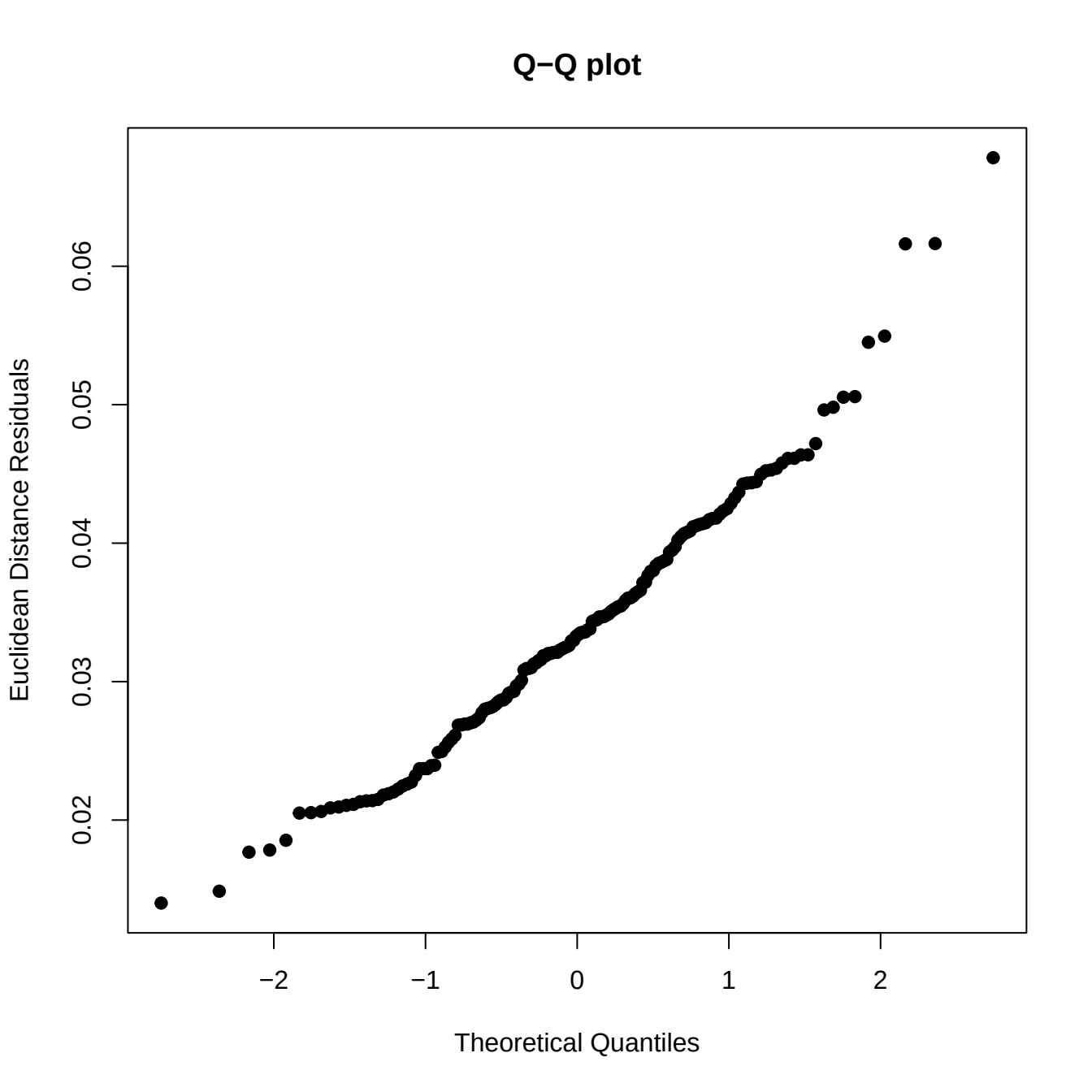


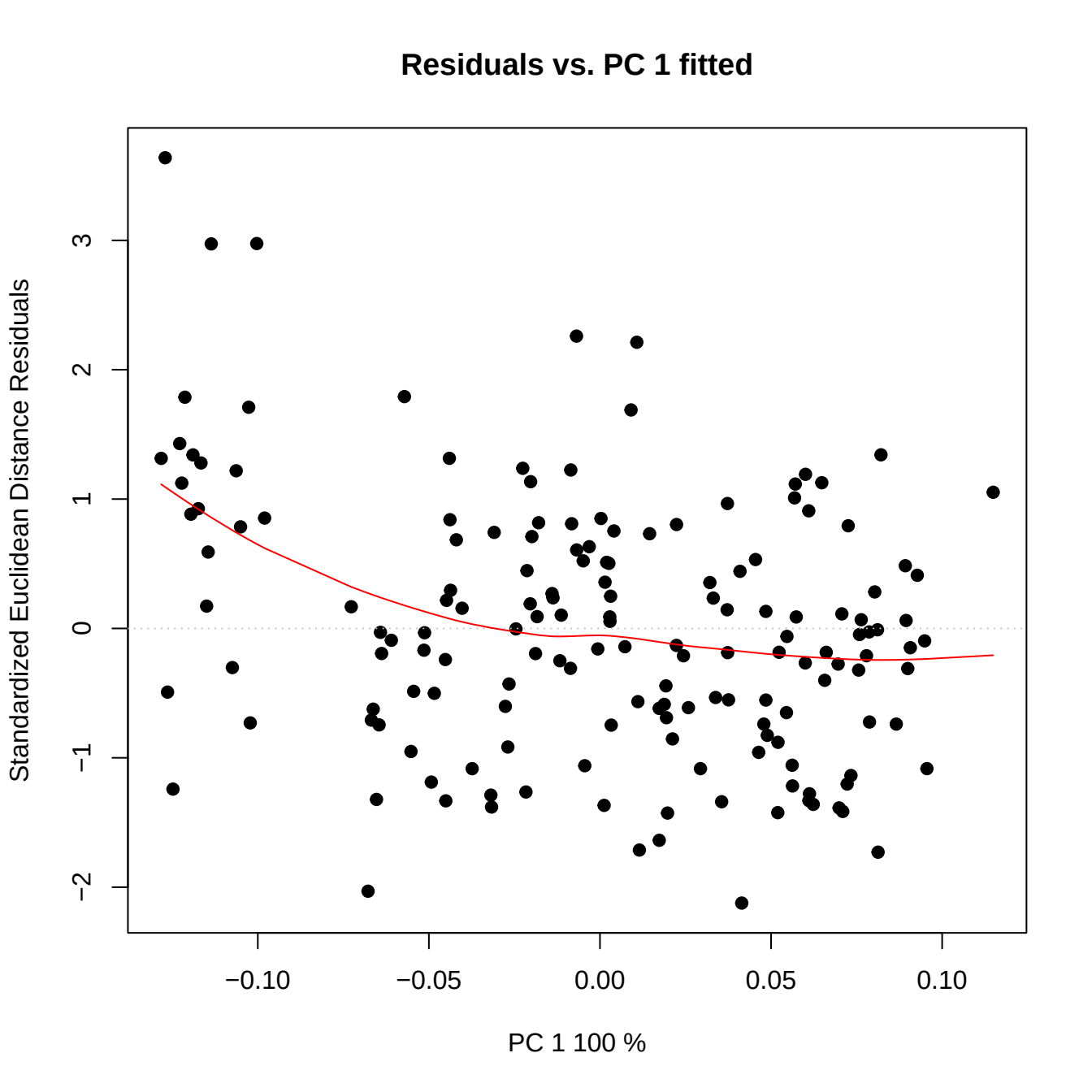


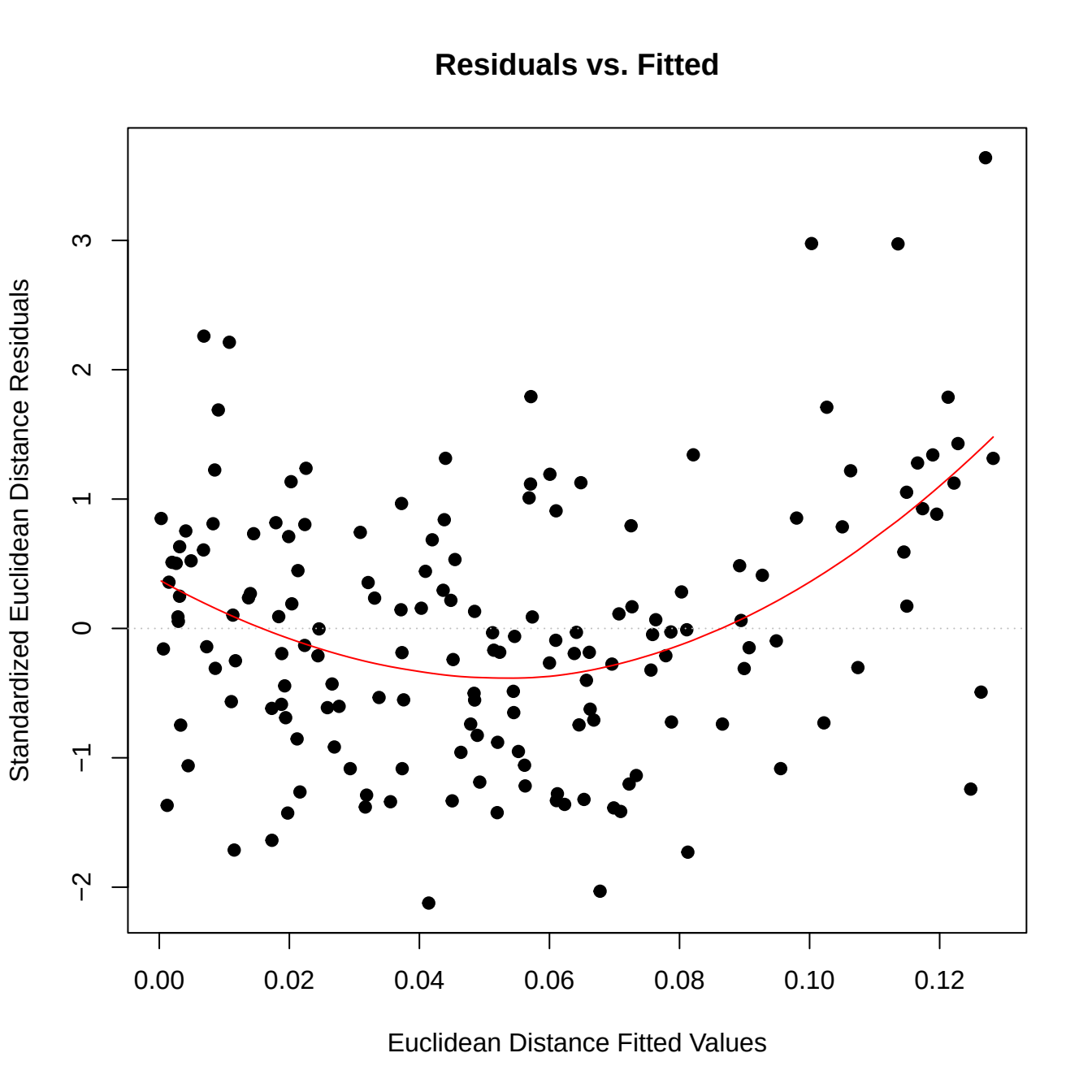


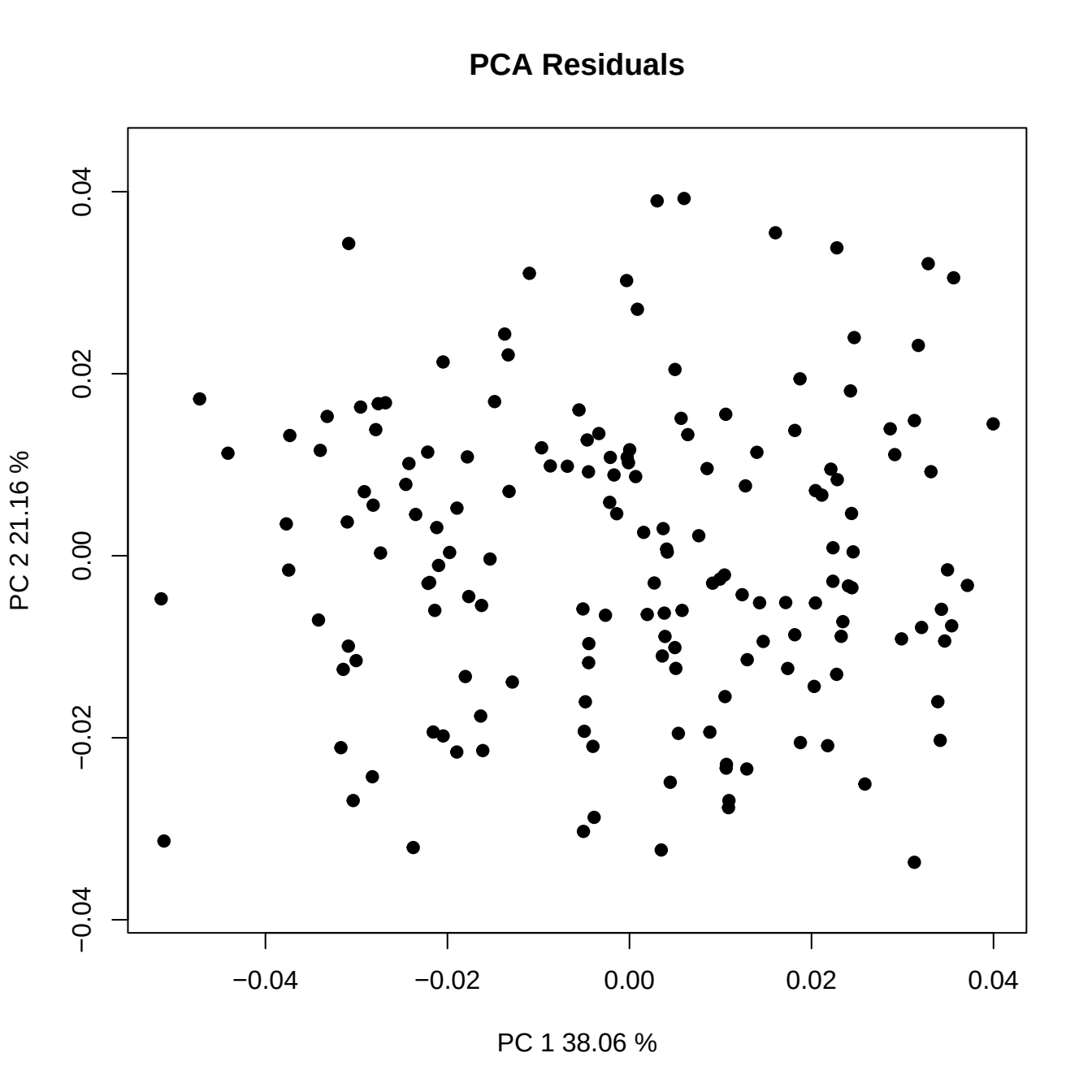


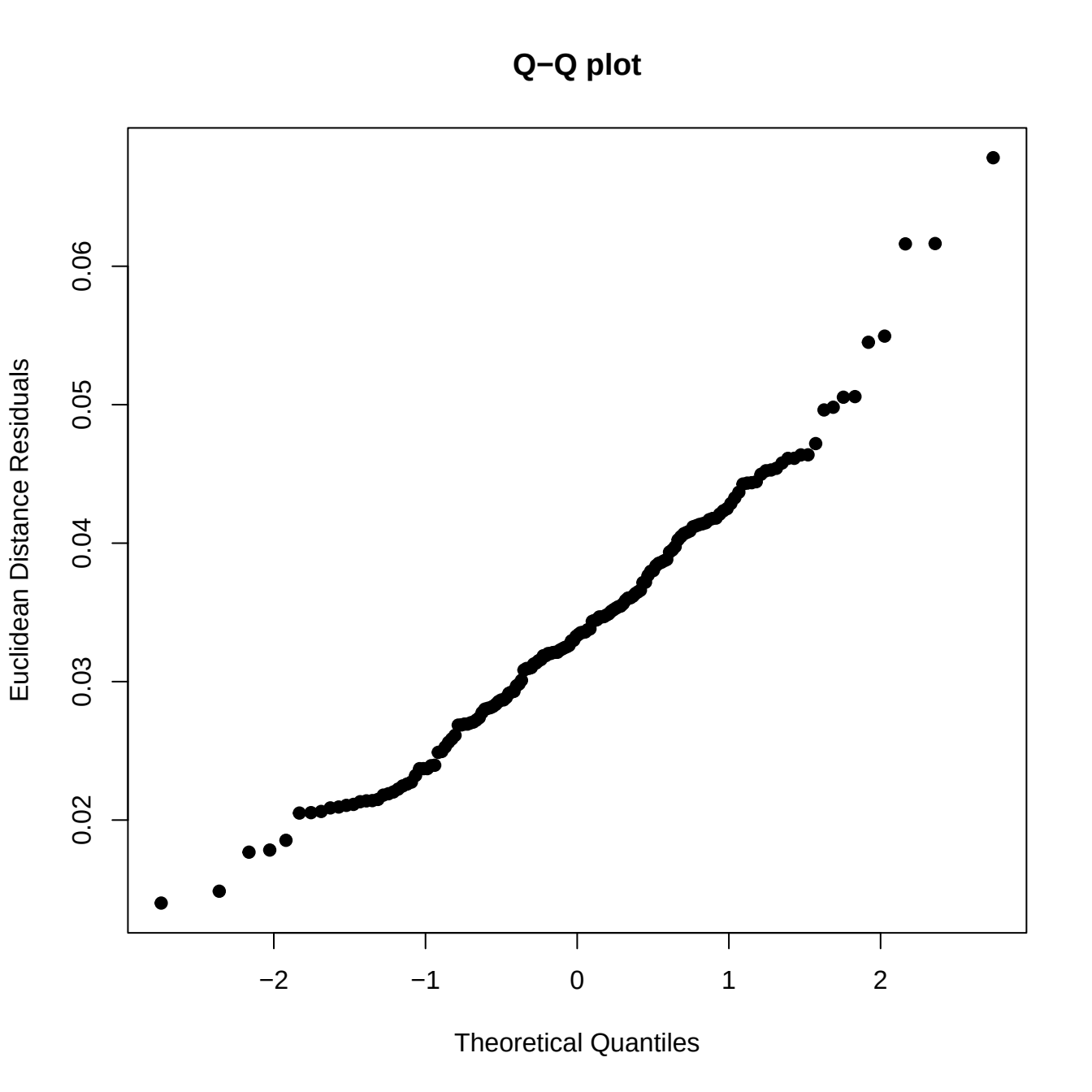

PCA Residuals
PC 2 21.16 %
PC 1 38.06 %
0.04
0.02
0.00
−0.02
−0.04
−0.04
−0.02
0.00
0.02
0.04

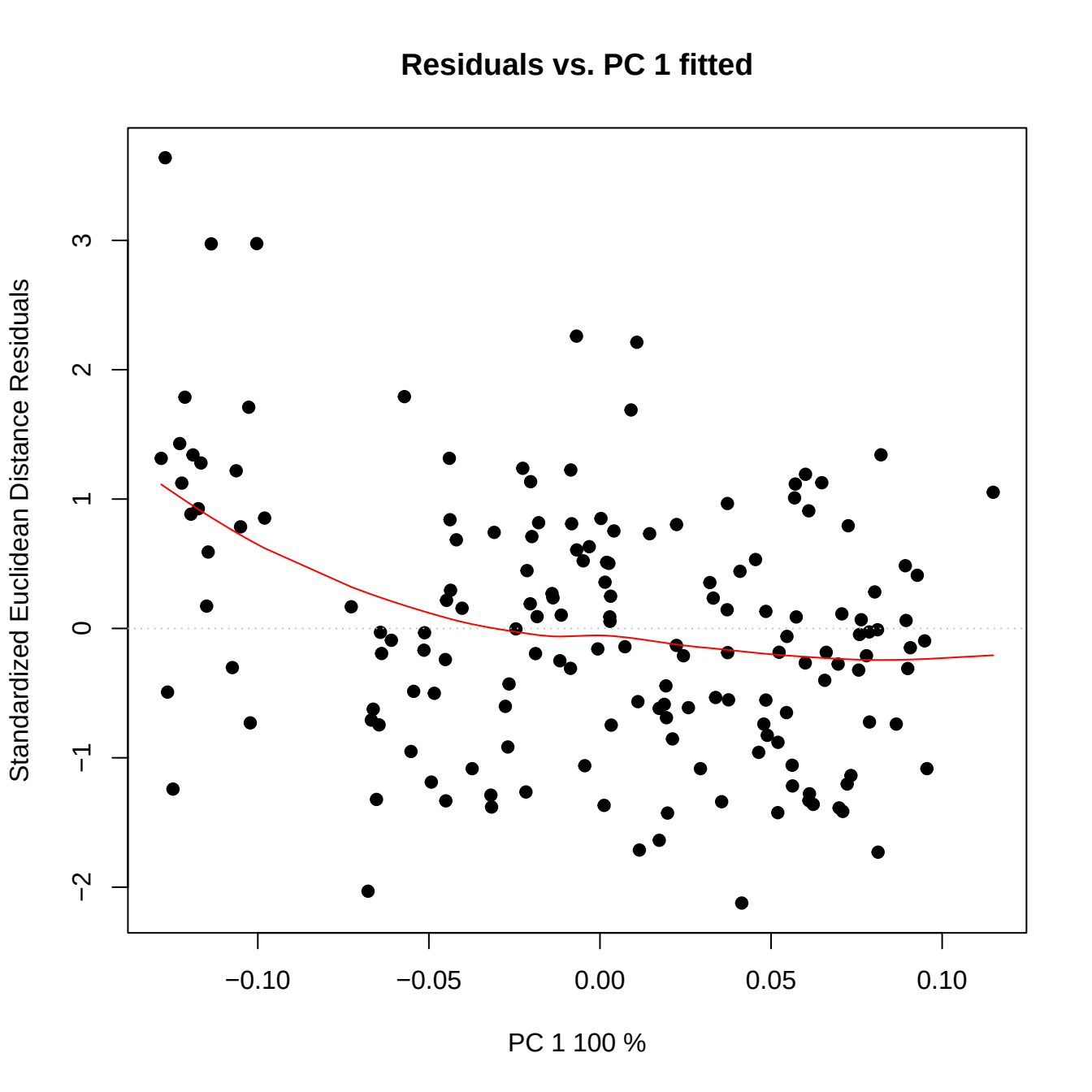

Q−Q plot
Euclidean Distance Residuals
0.02
0.03
0.04
0.05
0.06
−2
−1
0
1
2
Theoretical Quantiles

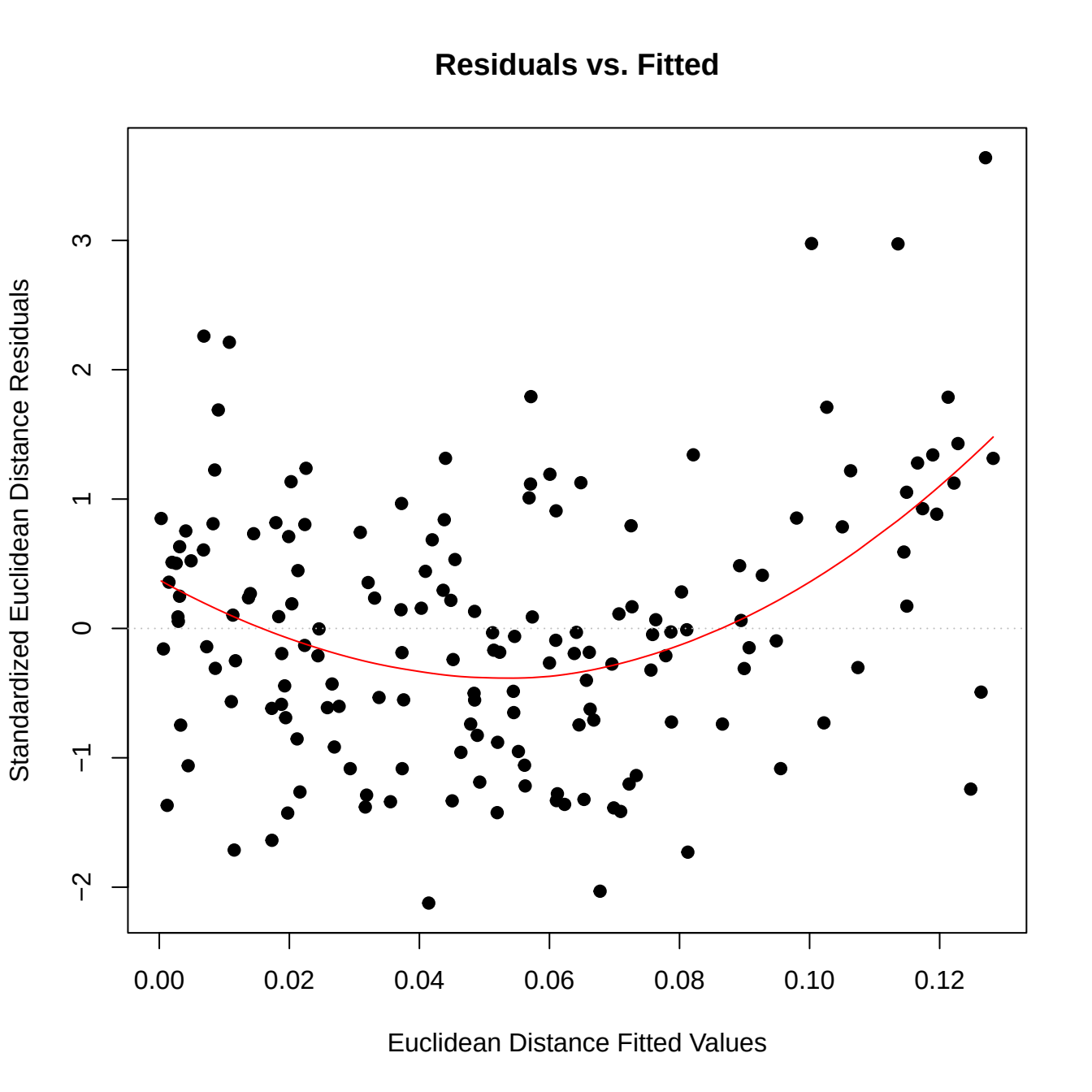

Residuals vs. PC 1 fitted
Standardized Euclidean Distance Residuals
3
2
1
0
−1
−2
−0.10
−0.05
0.00
0.05
0.10
PC 1 100 %

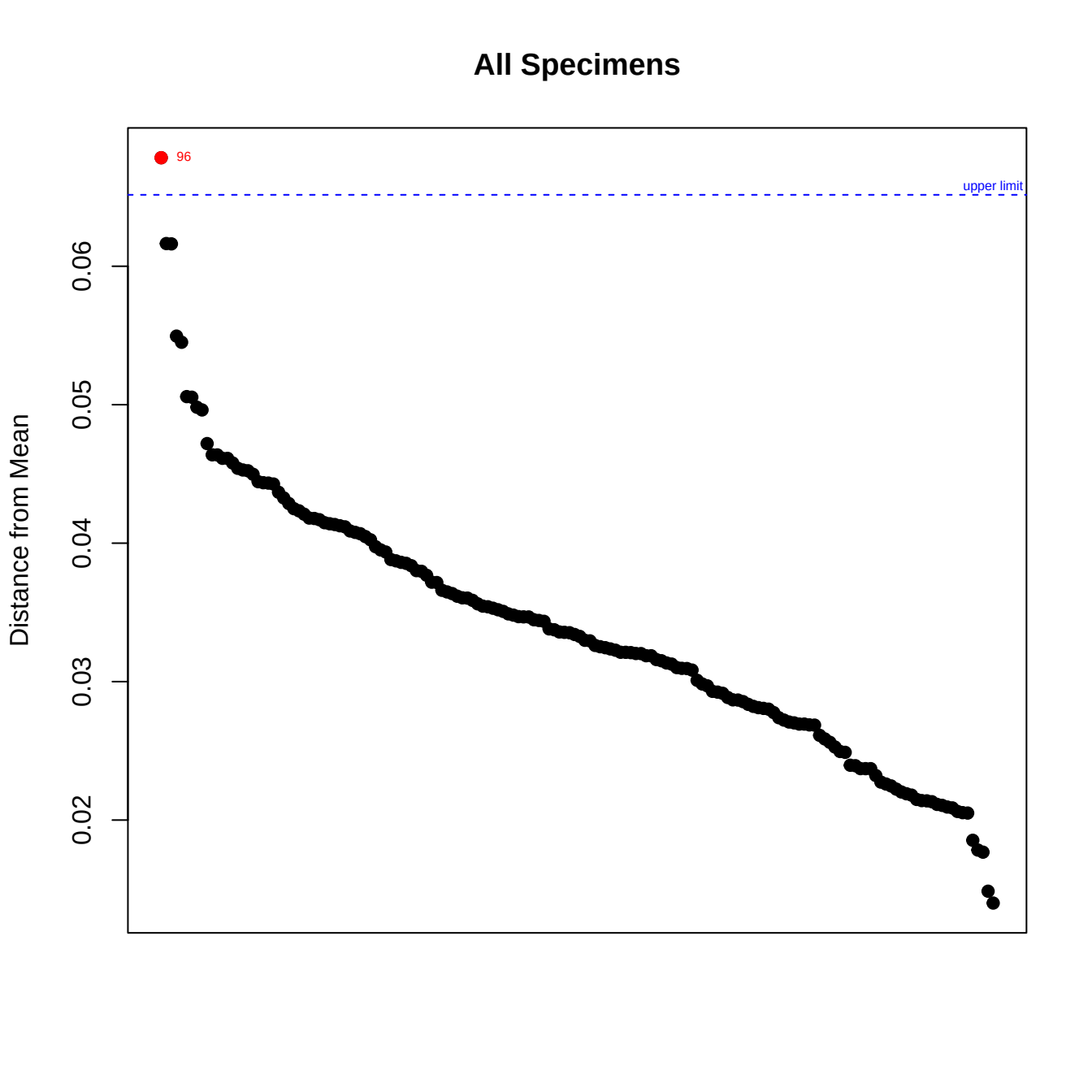

Residuals vs. Fitted
Standardized Euclidean Distance Residuals
3
2
1
0
−1
−2
0.00
0.02
0.04
0.06
0.08
0.10
0.12
Euclidean Distance Fitted Values

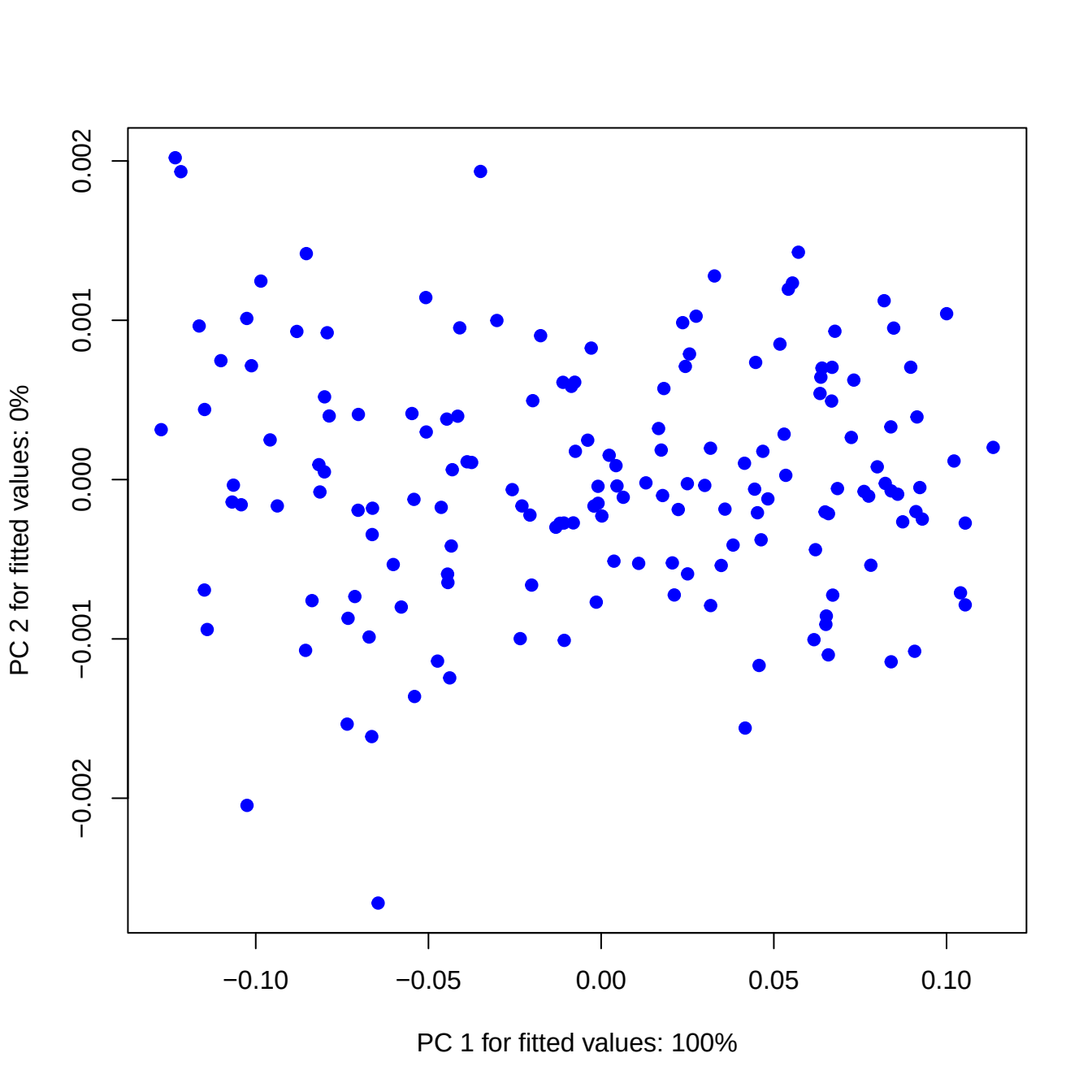

PCA Residuals
PC 2 21.16 %
PC 1 38.06 %
0.04
0.02
0.00
−0.02
−0.04
−0.04
−0.02
0.00
0.02
0.04

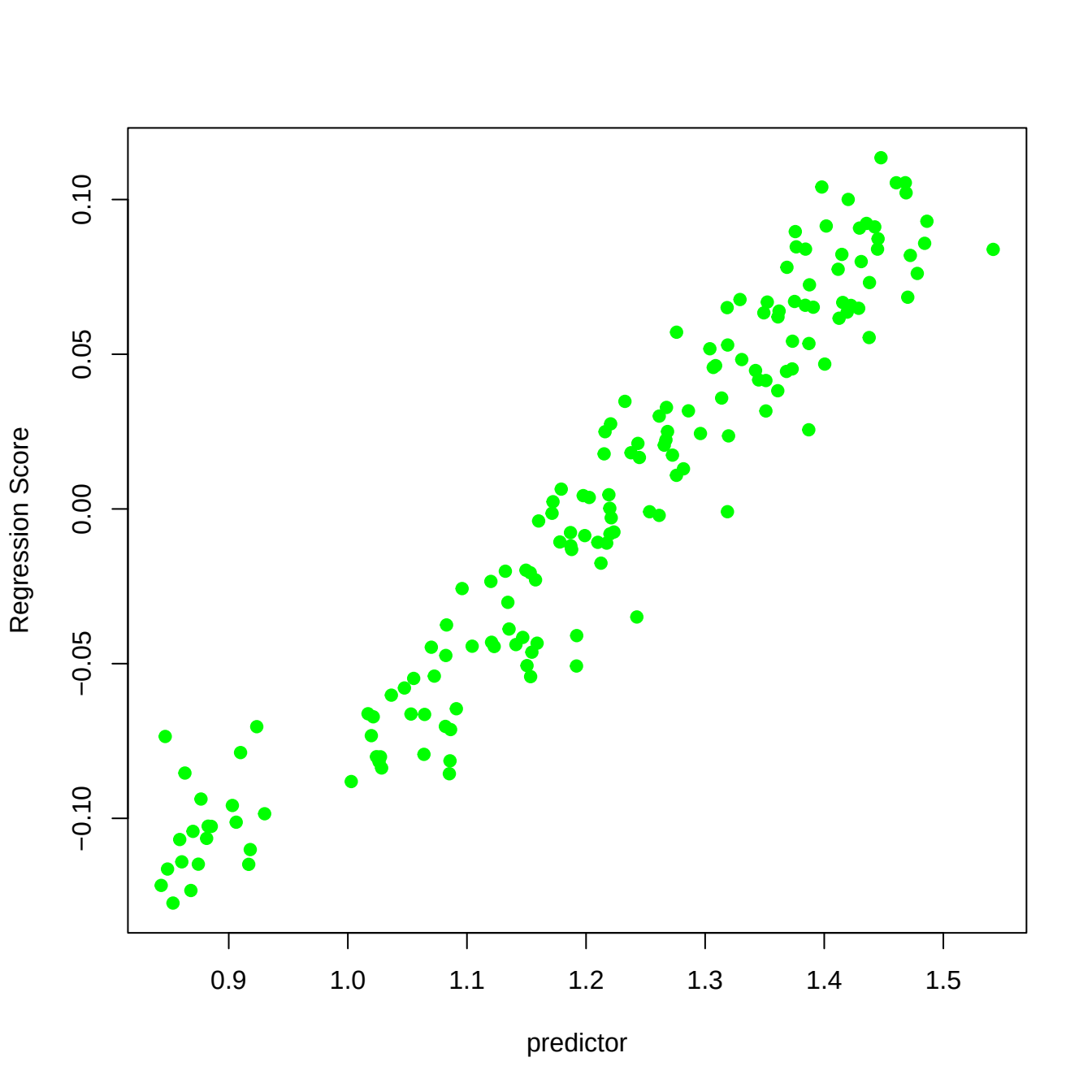

Q−Q plot
Euclidean Distance Residuals
0.02
0.03
0.04
0.05
0.06
−2
−1
0
1
2
Theoretical Quantiles

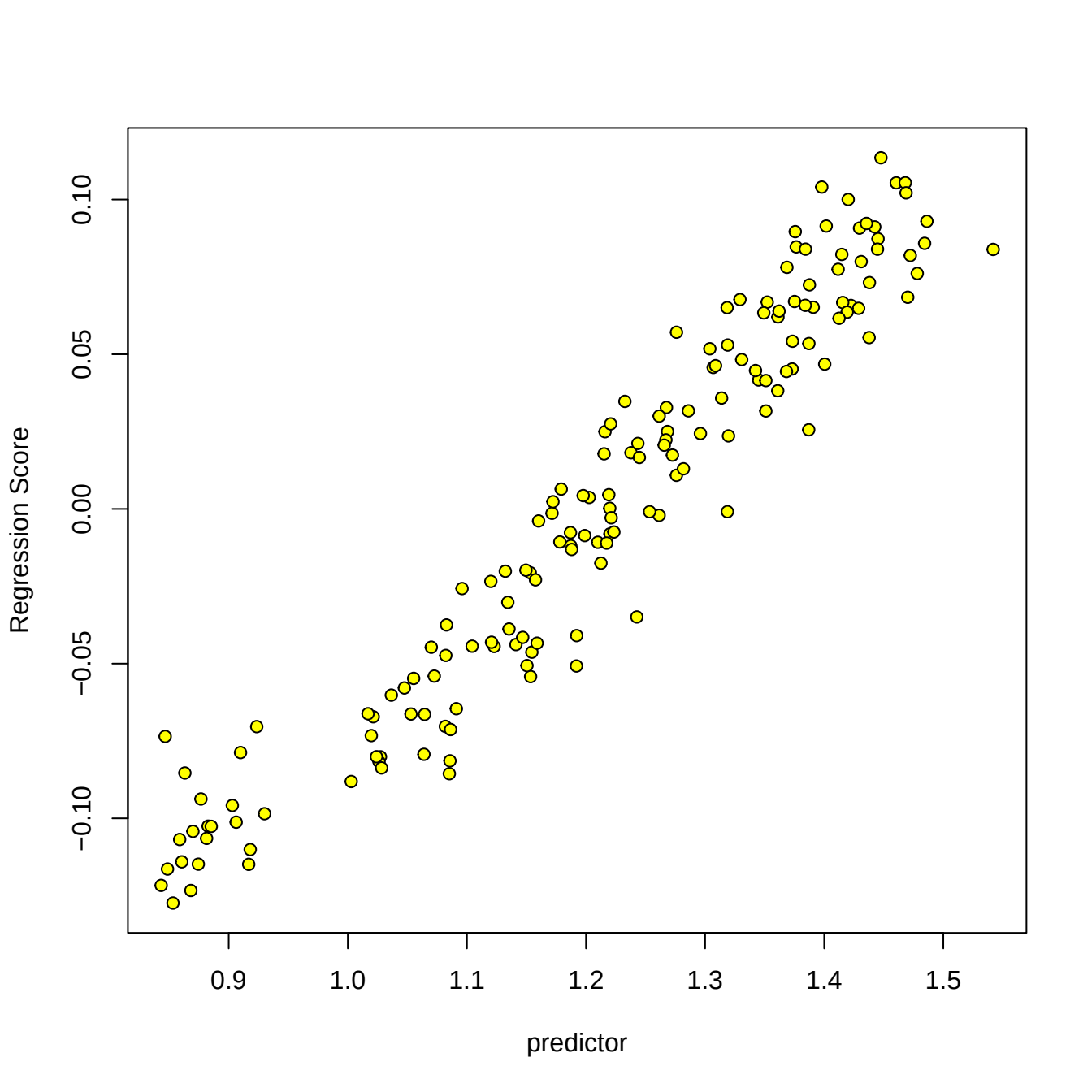

Residuals vs. PC 1 fitted
Standardized Euclidean Distance Residuals
3
2
1
0
−1
−2
−0.10
−0.05
0.00
0.05
0.10
PC 1 100 %

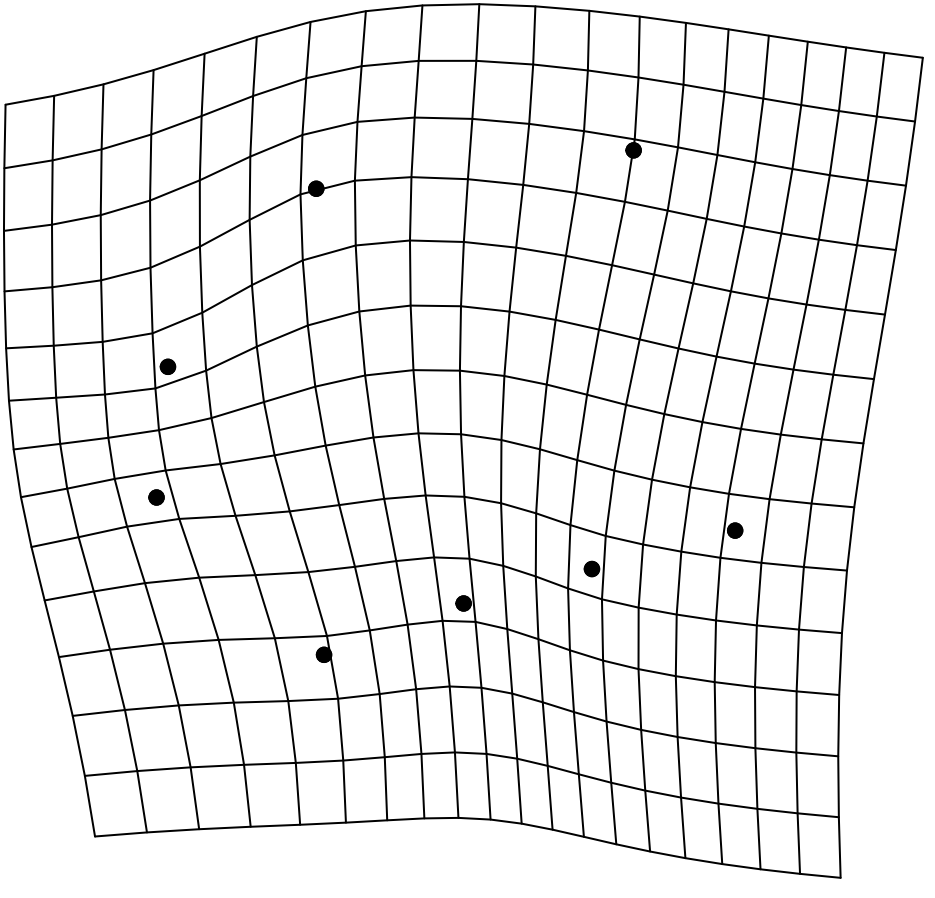

Residuals vs. Fitted
Standardized Euclidean Distance Residuals
3
2
1
0
−1
−2
0.00
0.02
0.04
0.06
0.08
0.10
0.12
Euclidean Distance Fitted Values

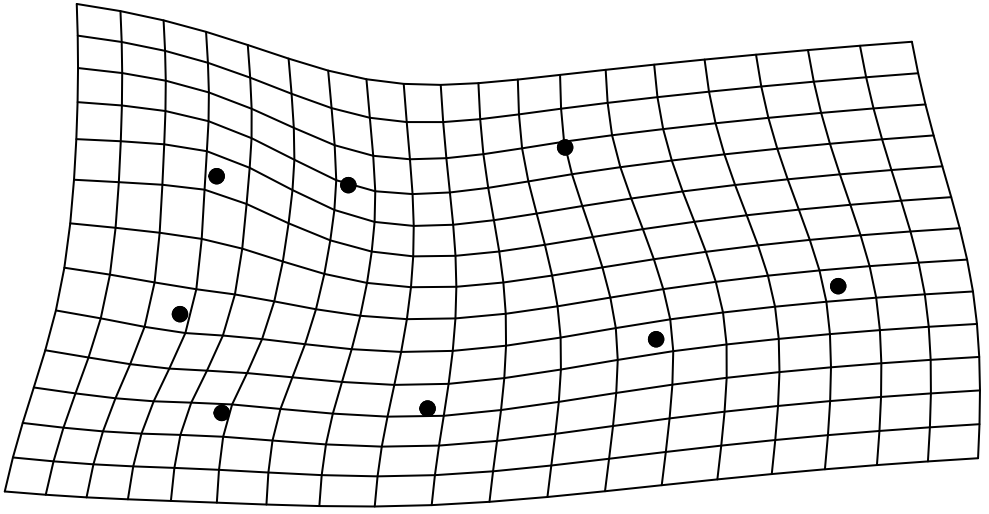

All Specimens
96
upper limit
Distance from Mean
0.02
0.03
0.04
0.05
0.06

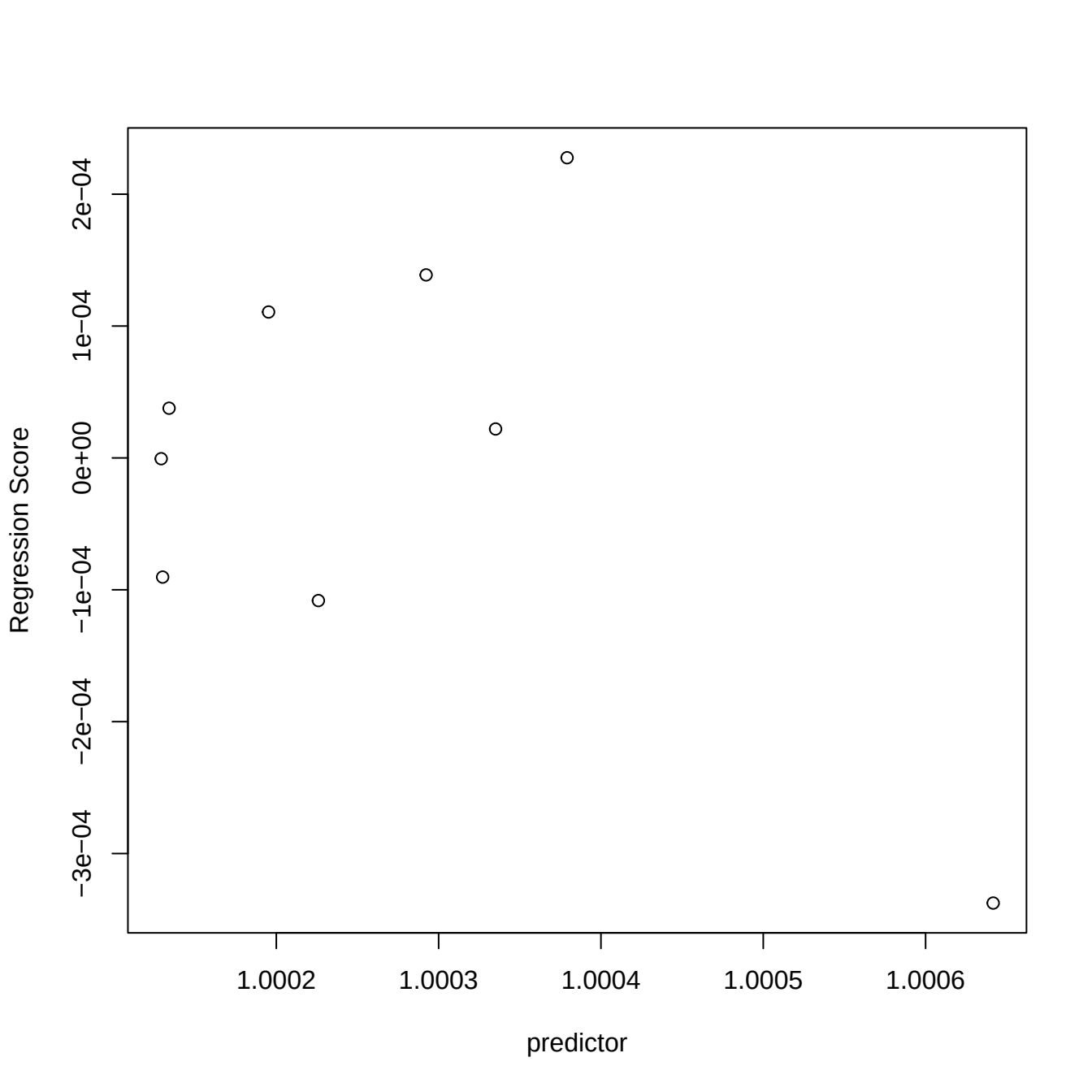

PC 2 for fitted values: 0%
0.002
0.001
0.000
−0.001
−0.002
−0.10
−0.05
0.00
0.05
0.10
PC 1 for fitted values: 100%

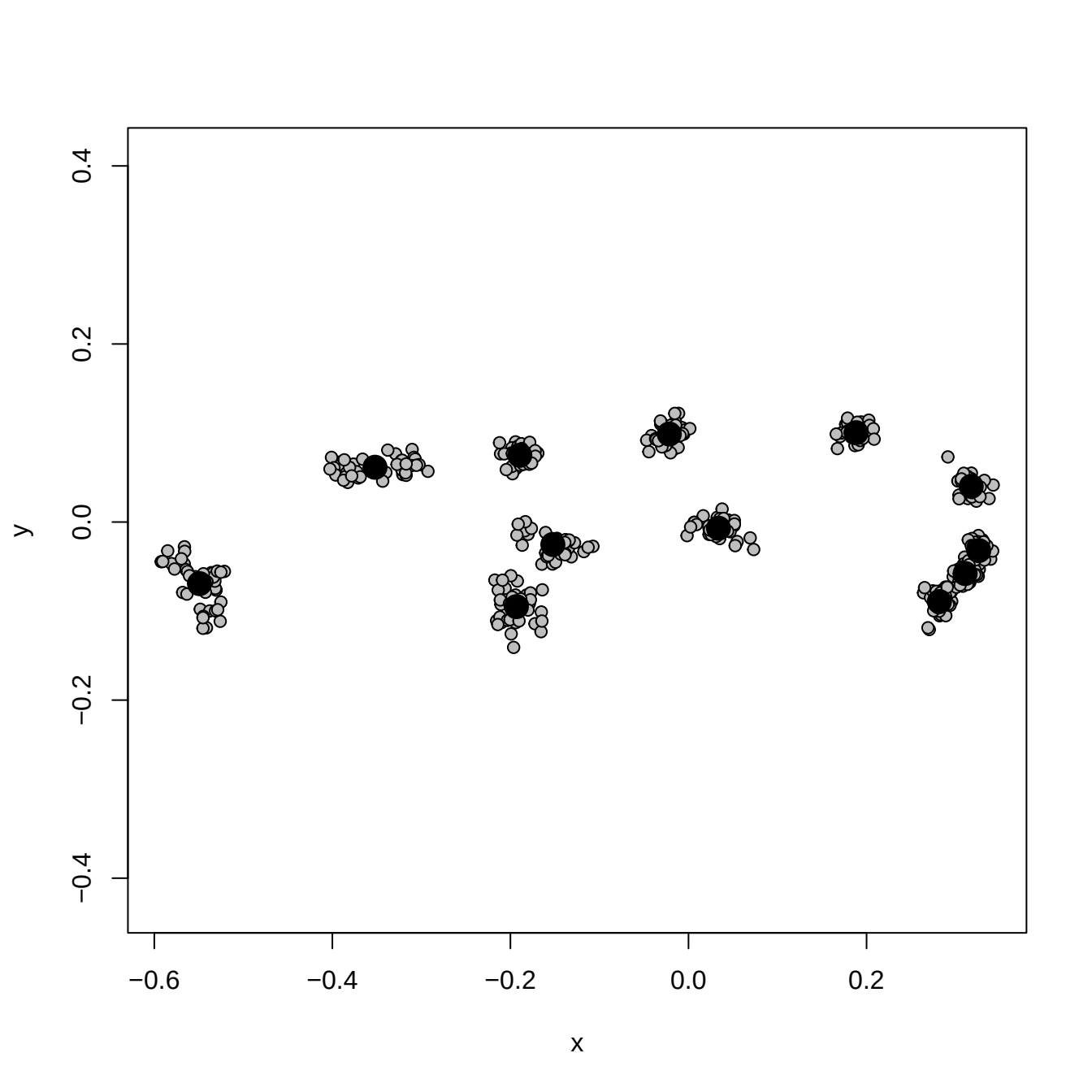

Regression Score
0.10
0.05
0.00
−0.05
−0.10
0.9
1.0
1.1
1.2
1.3
1.4
1.5
predictor

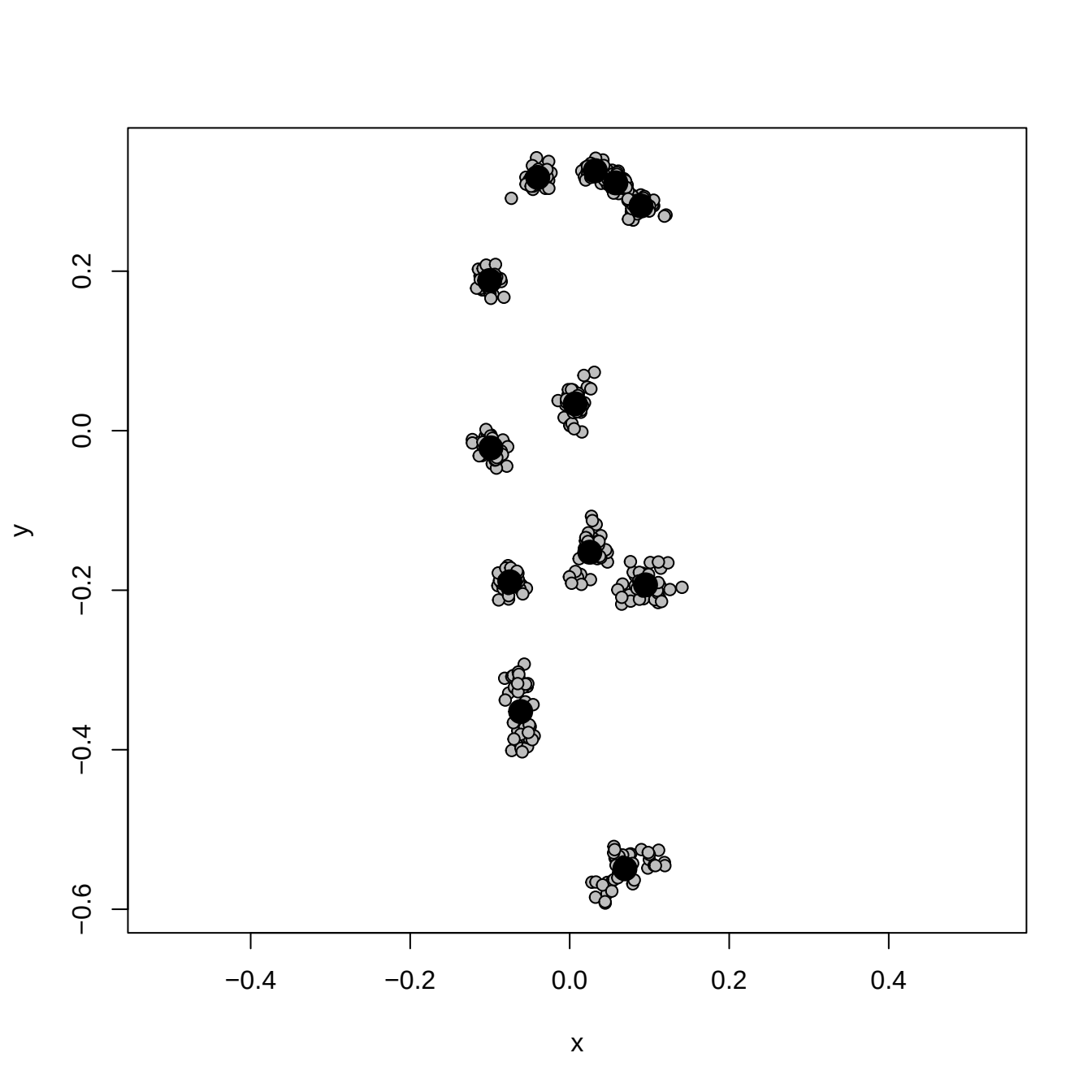

Regression Score
0.10
0.05
0.00
−0.05
−0.10
0.9
1.0
1.1
1.2
1.3
1.4
1.5
predictor

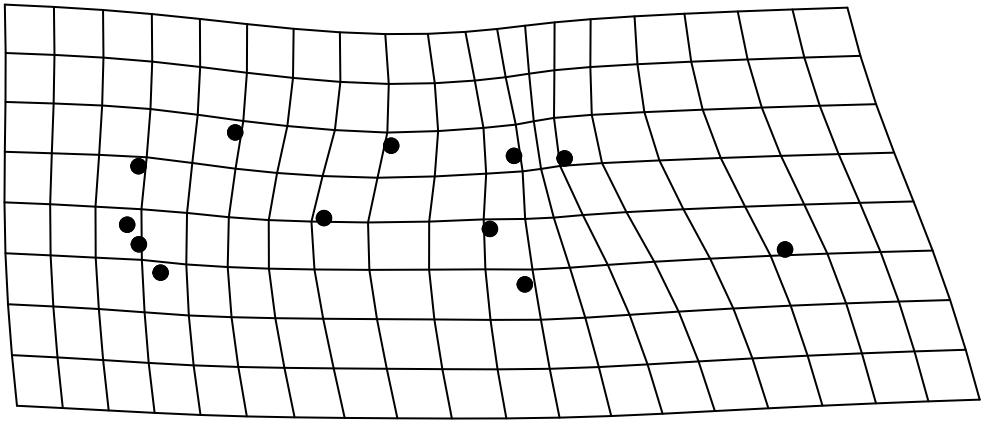


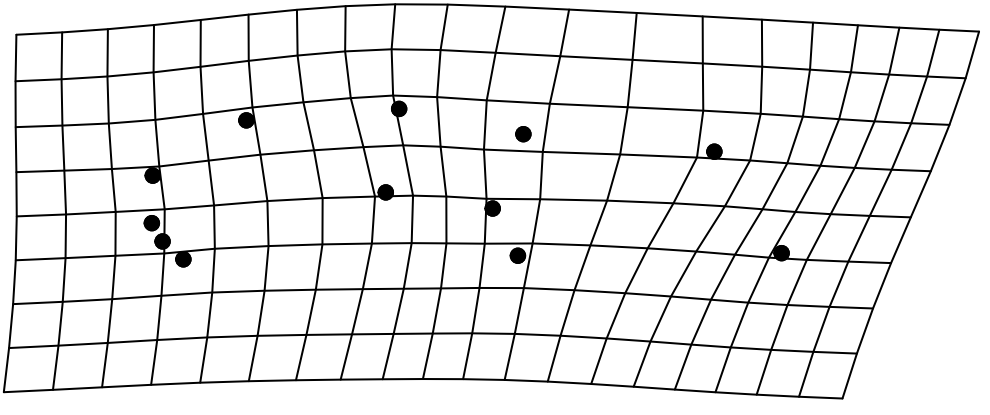


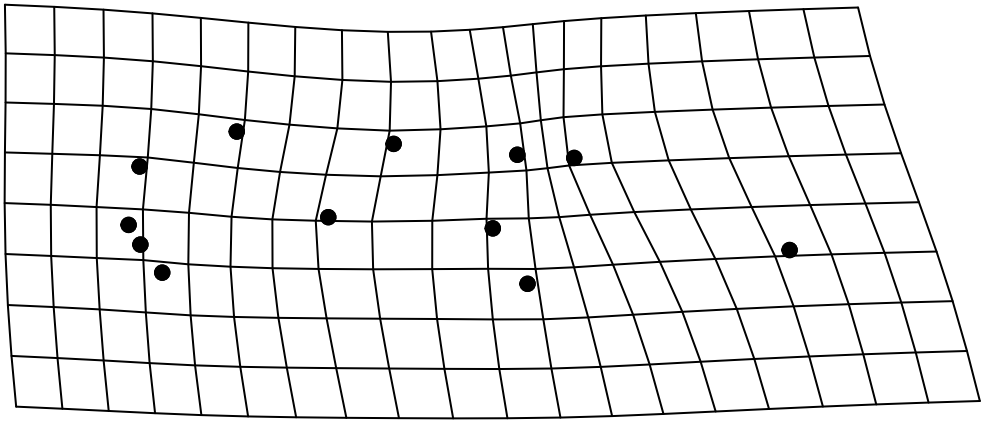

Regression Score
2e−04
1e−04
0e+00
−1e−04
−2e−04
−3e−04
1.0002
1.0003
1.0004
1.0005
1.0006
predictor

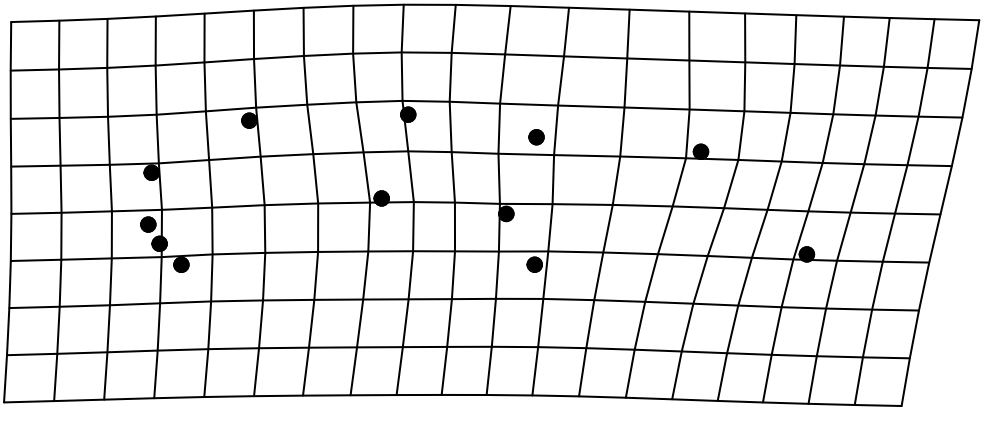

0.4
0.2
0.0
−0.2
−0.4
y
−0.6
−0.4
−0.2
0.0
0.2
x

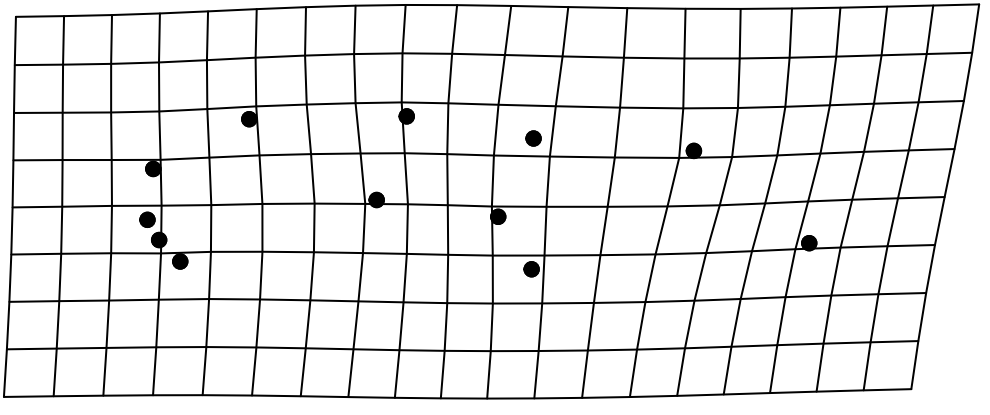

0.2
0.0
−0.2
−0.4
−0.6
y
−0.4
−0.2
0.0
0.2
0.4
x

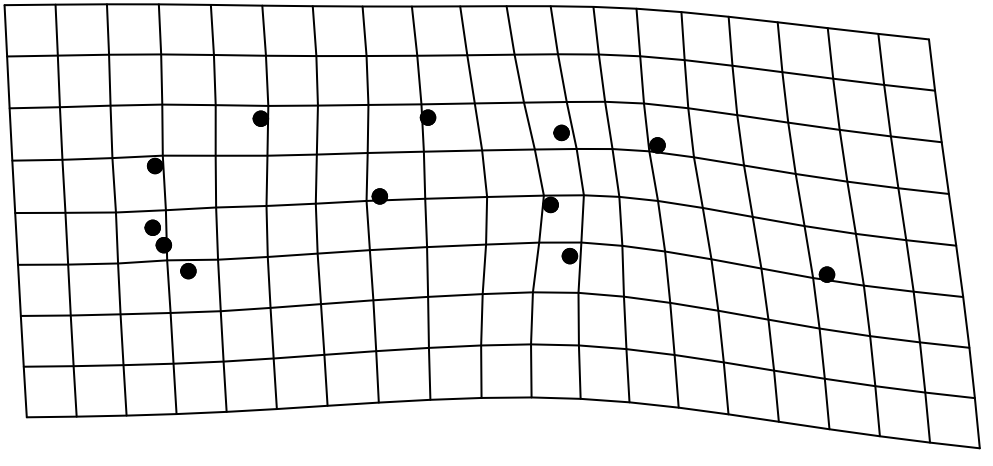


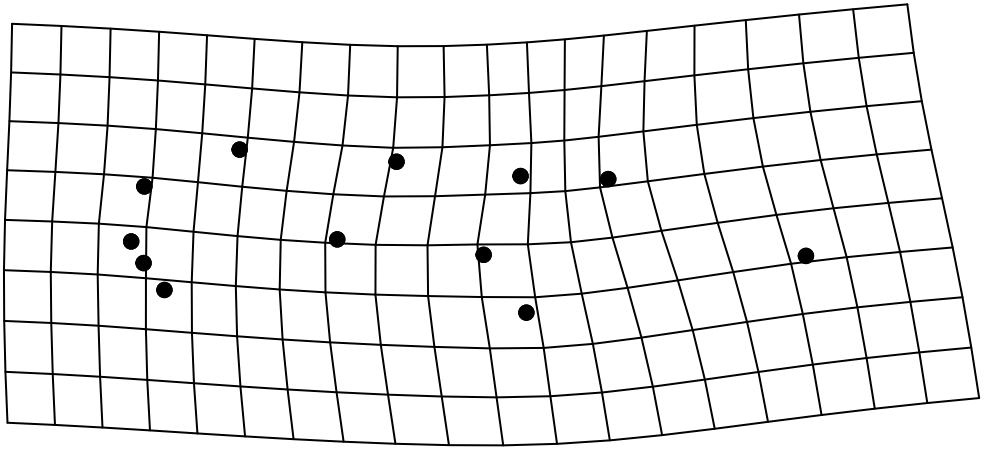


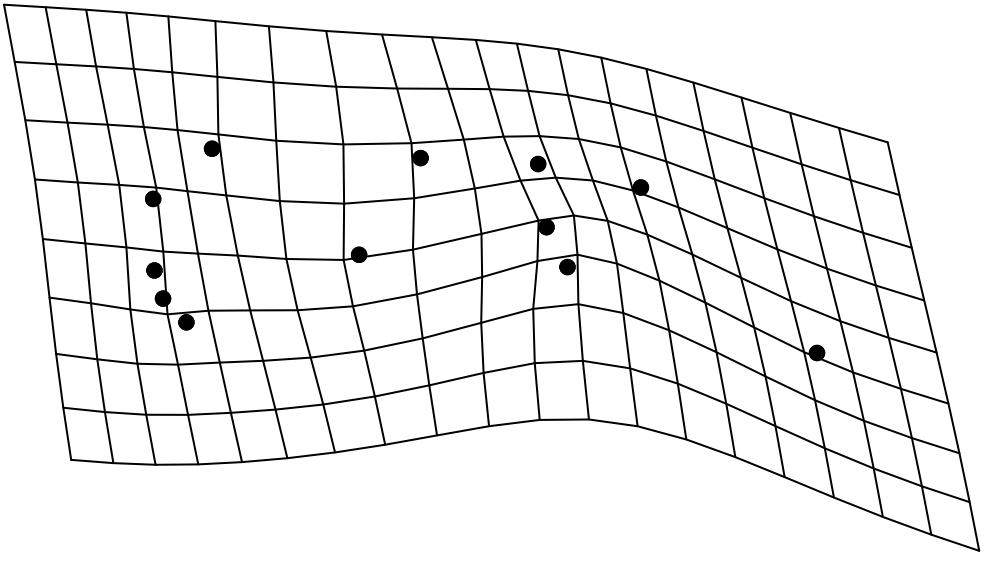


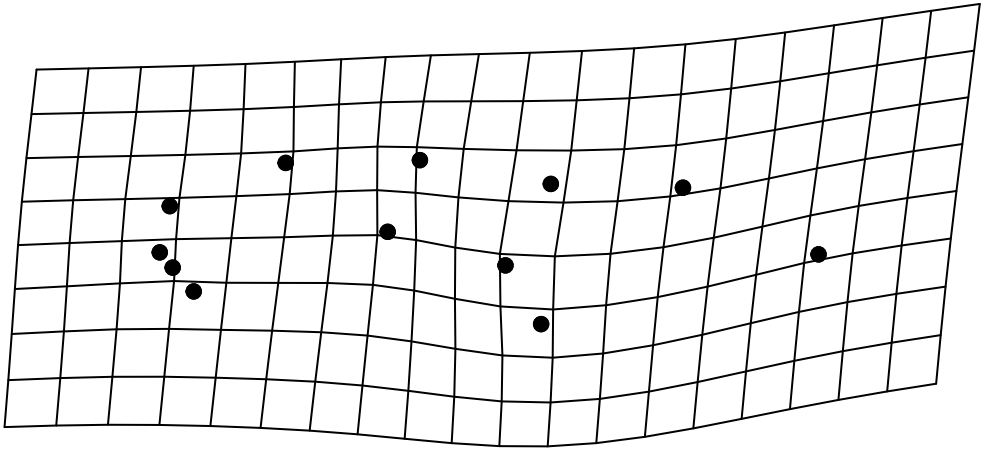


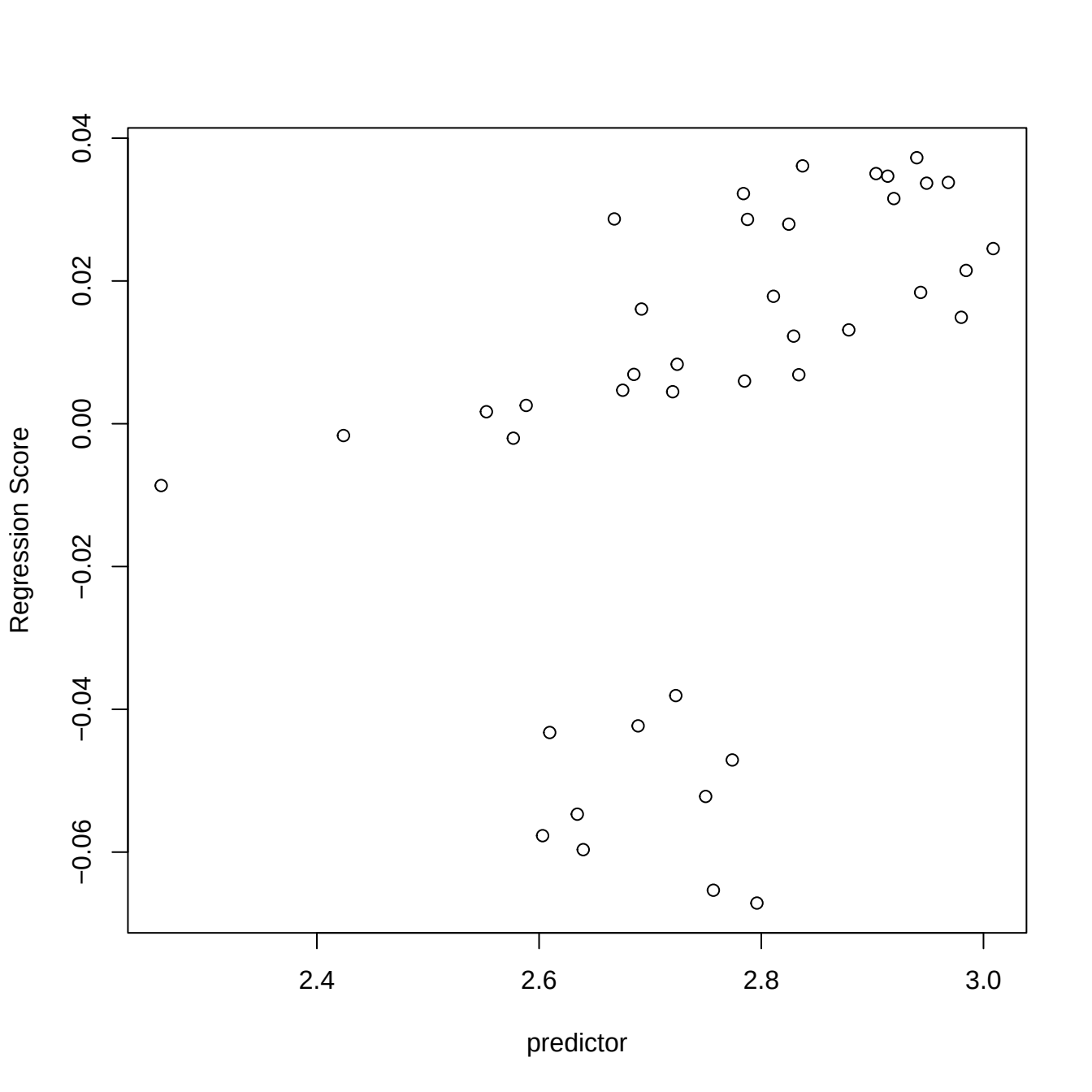


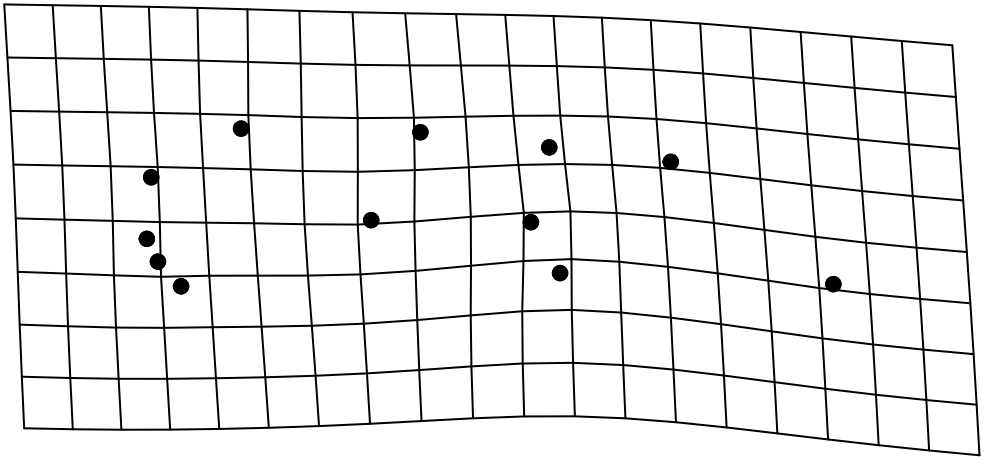


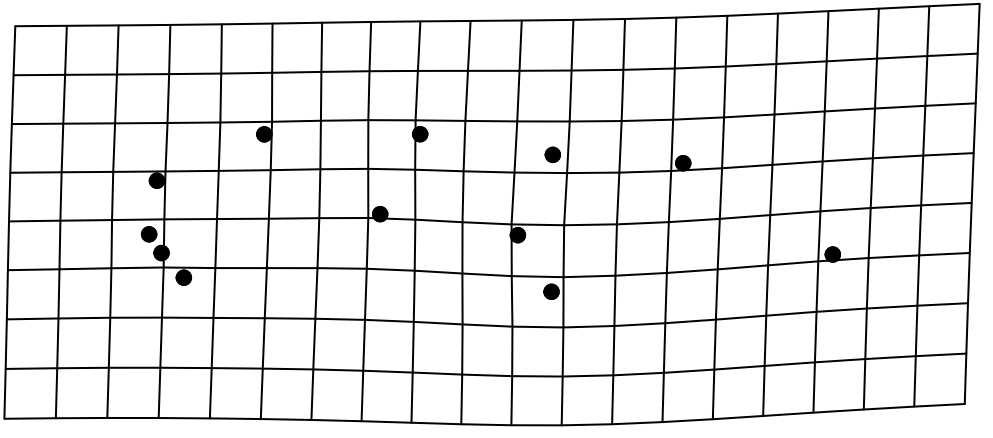


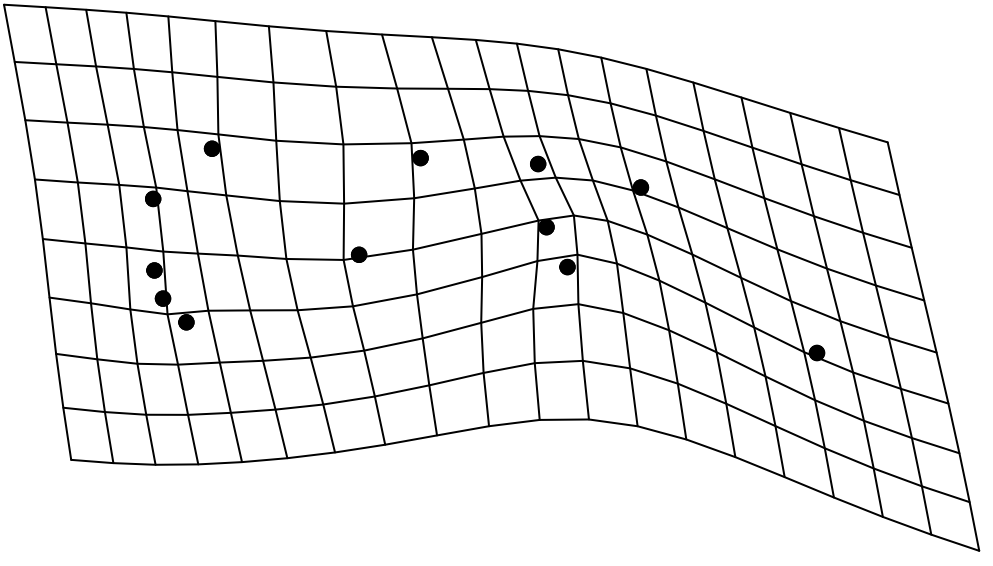


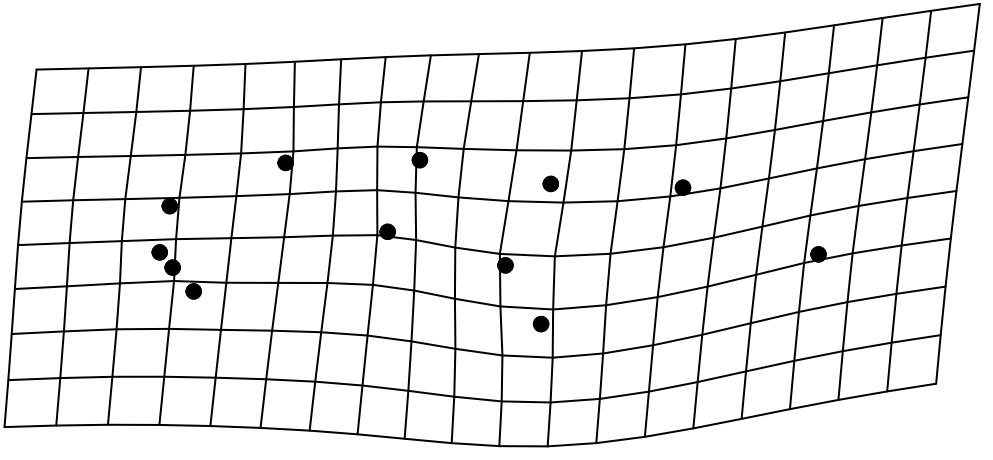


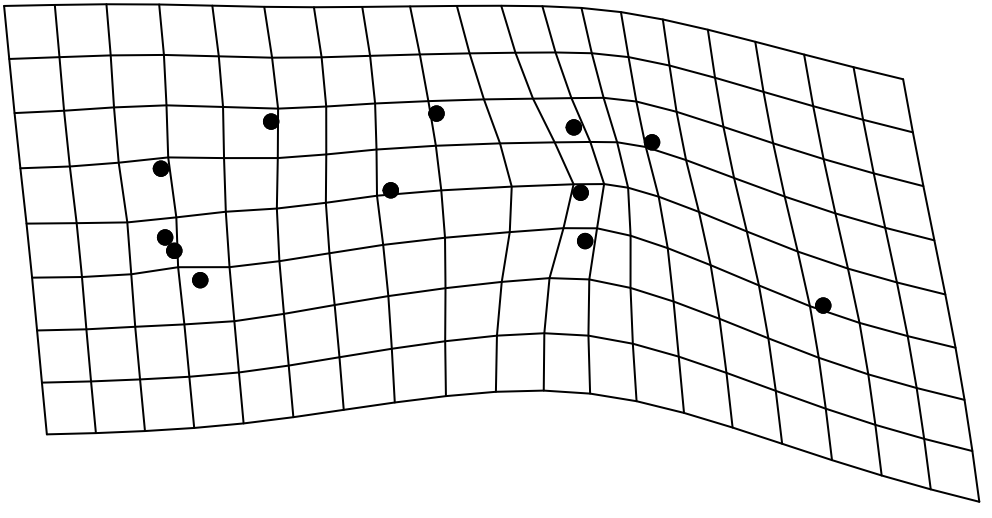

Regression Score
0.04
0.02
0.00
−0.02
−0.04
−0.06
2.4
2.6
2.8
3.0
predictor

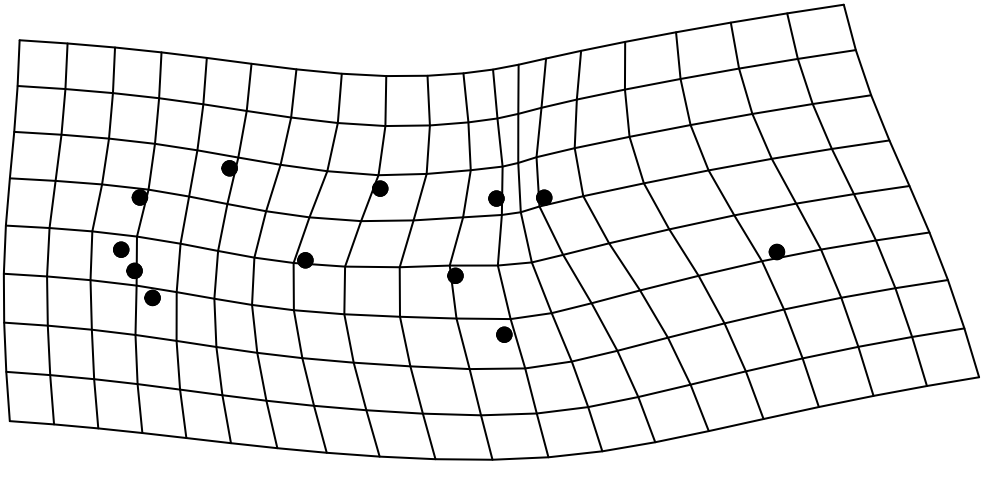


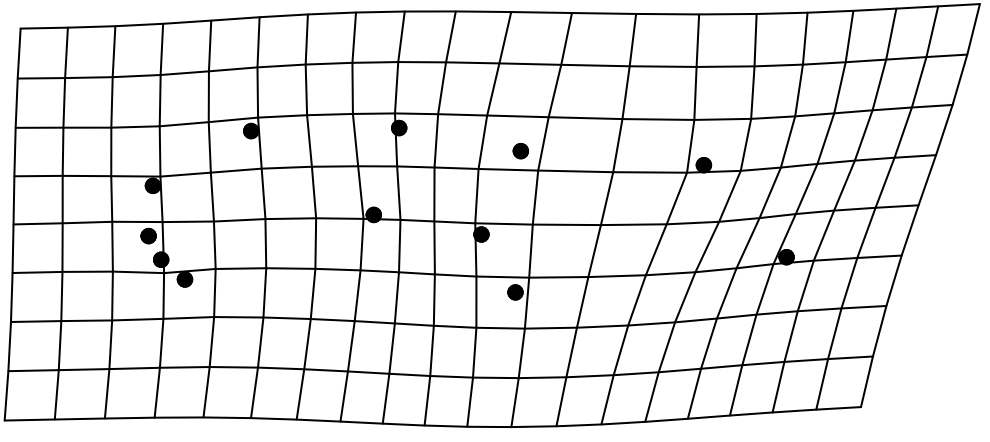


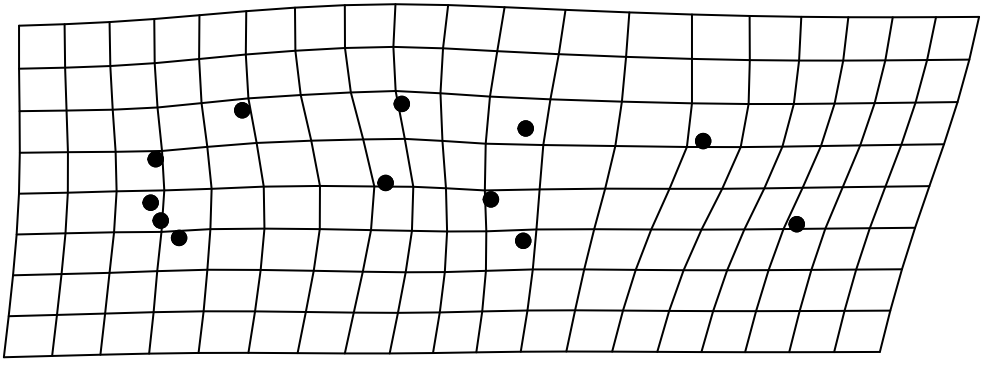


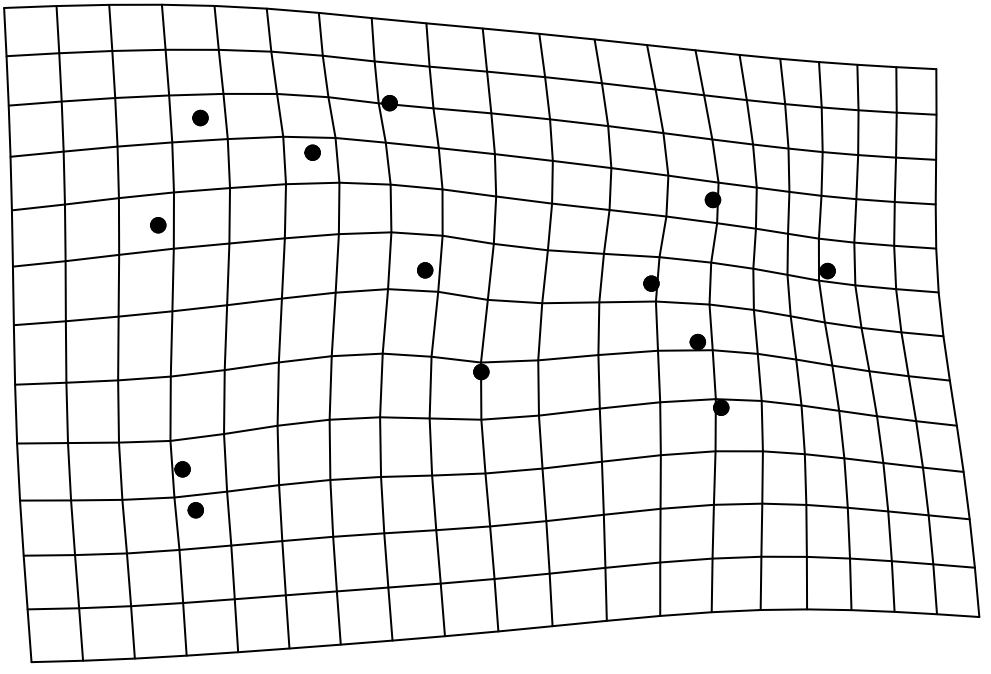


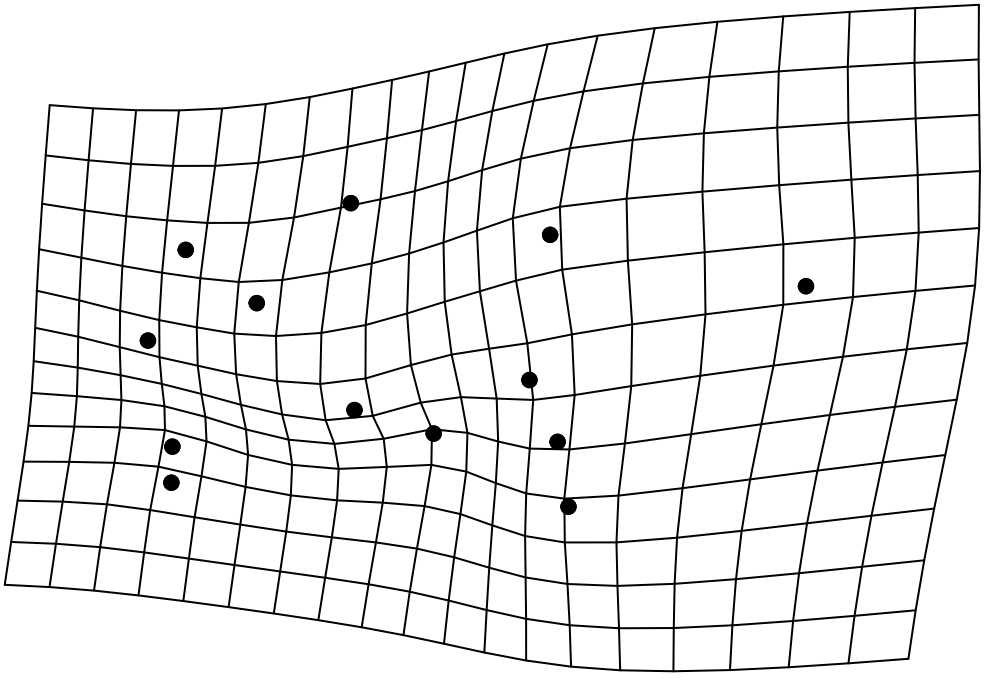


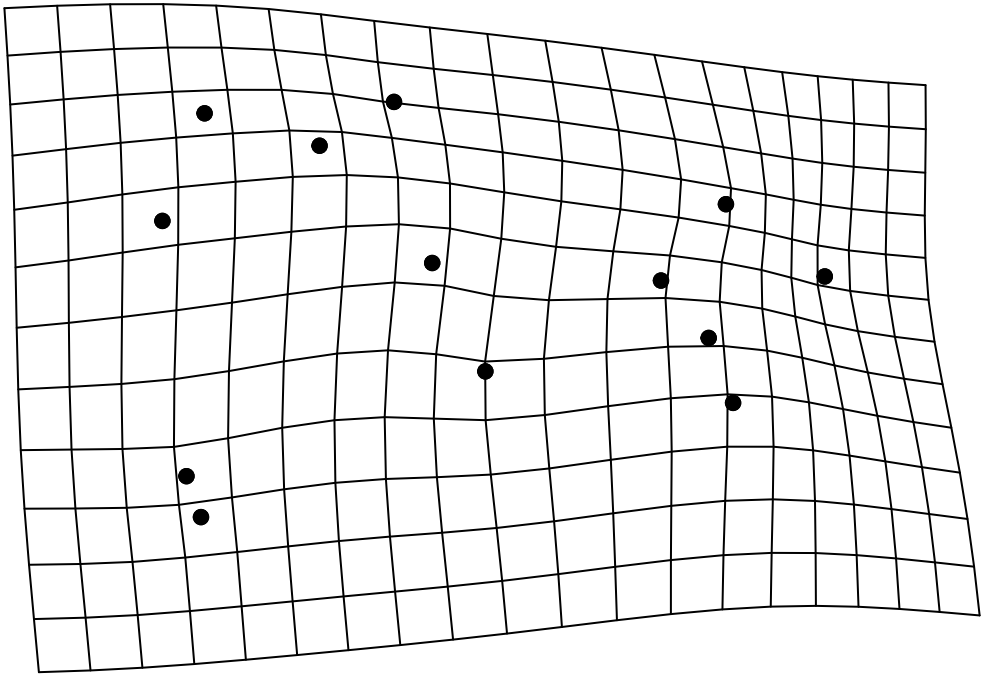


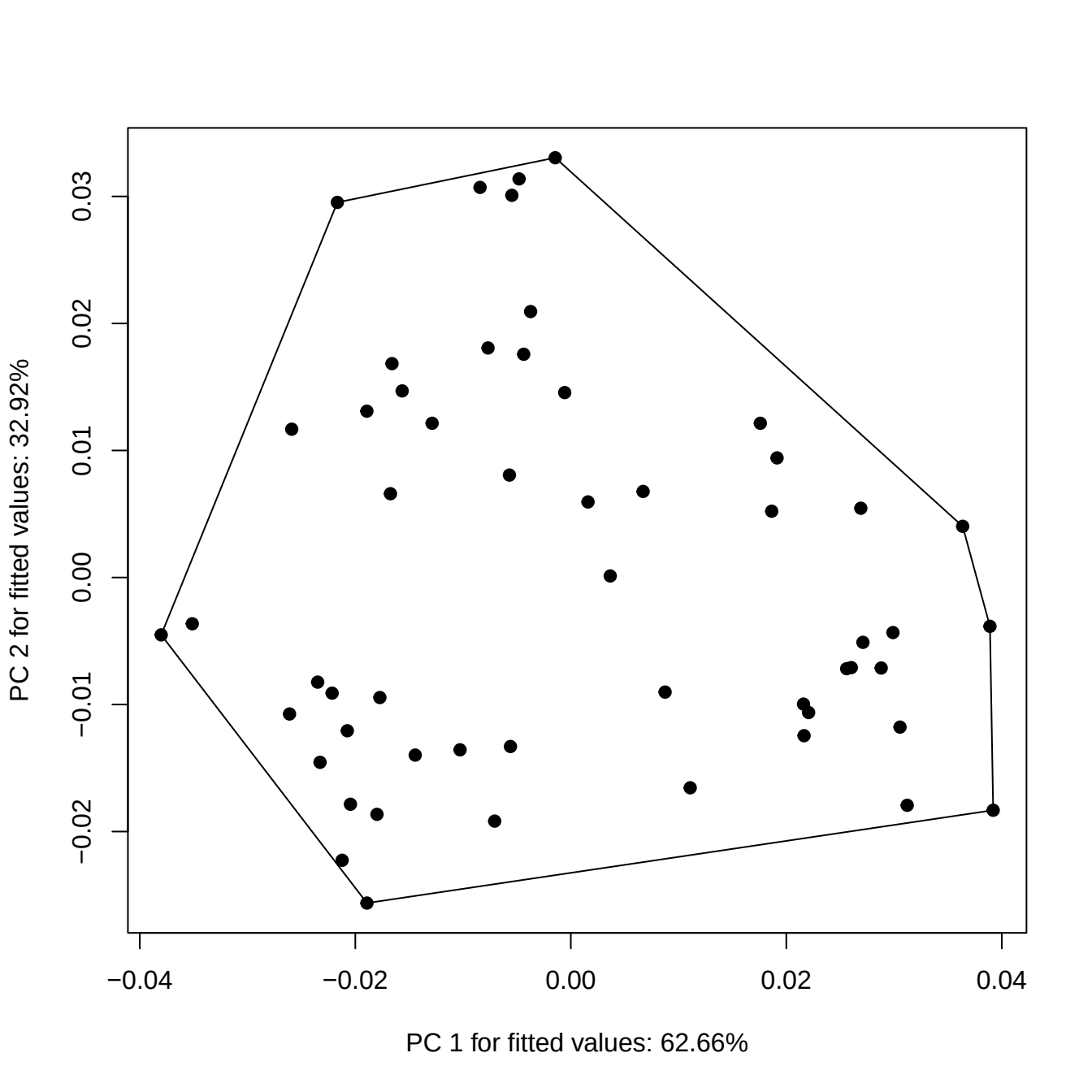


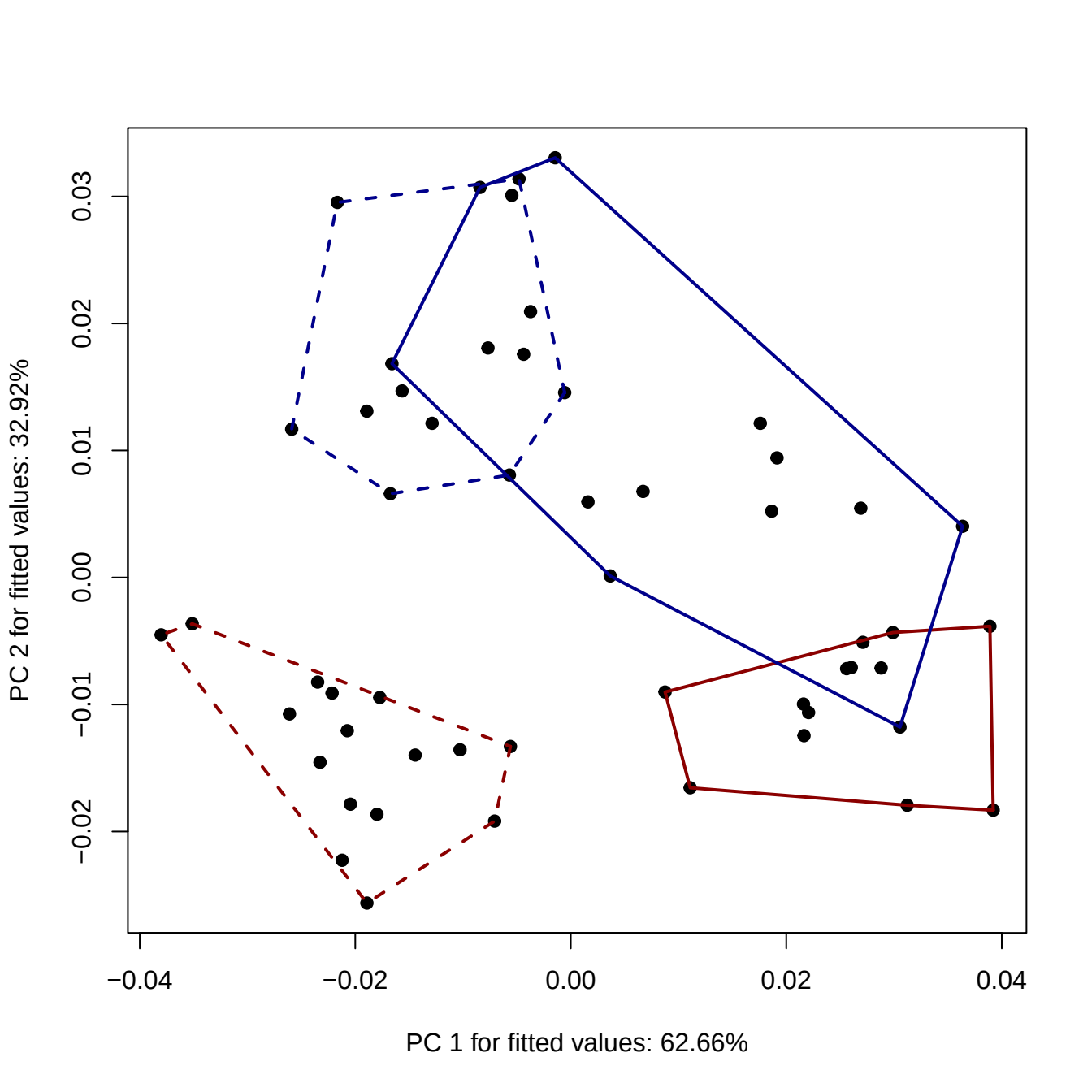


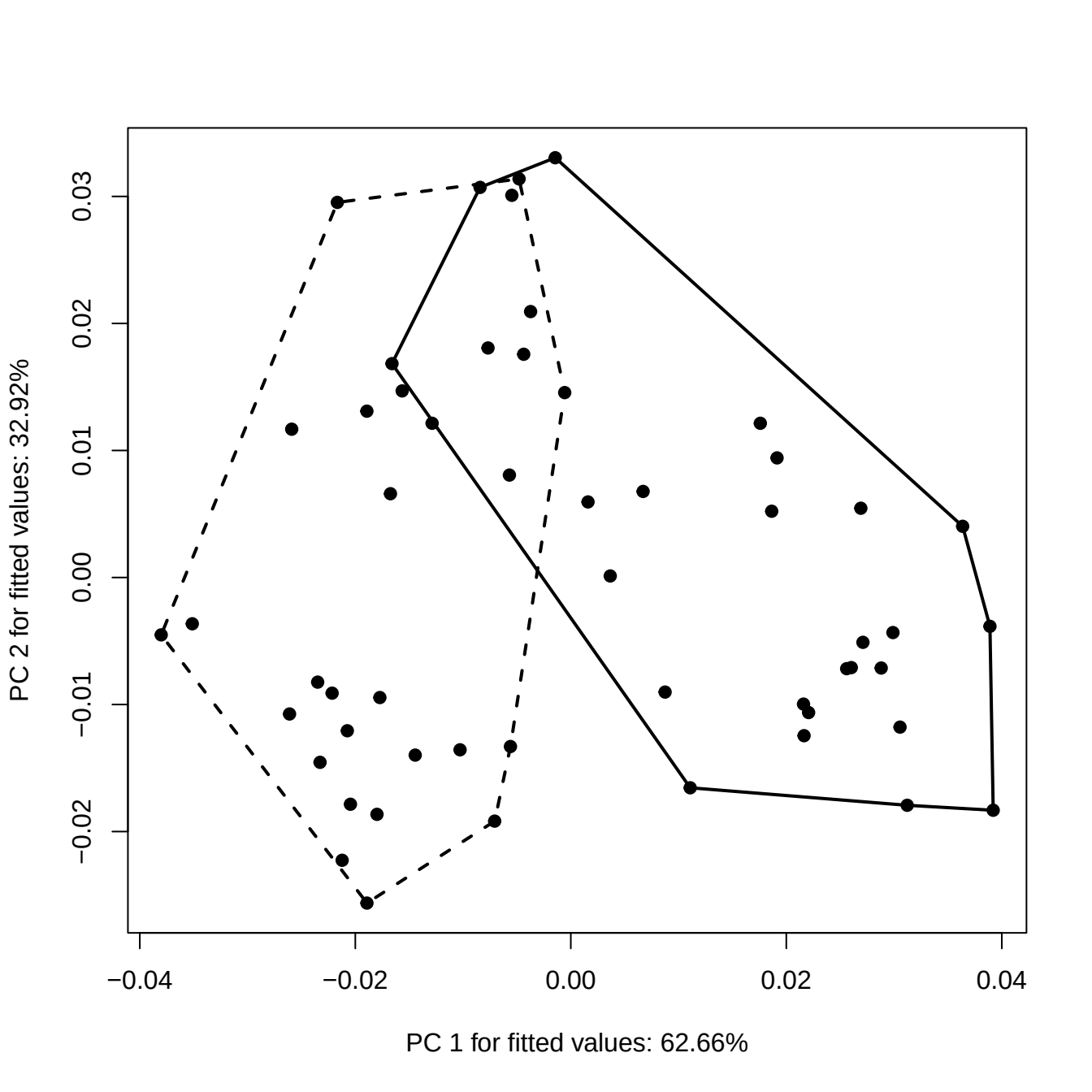


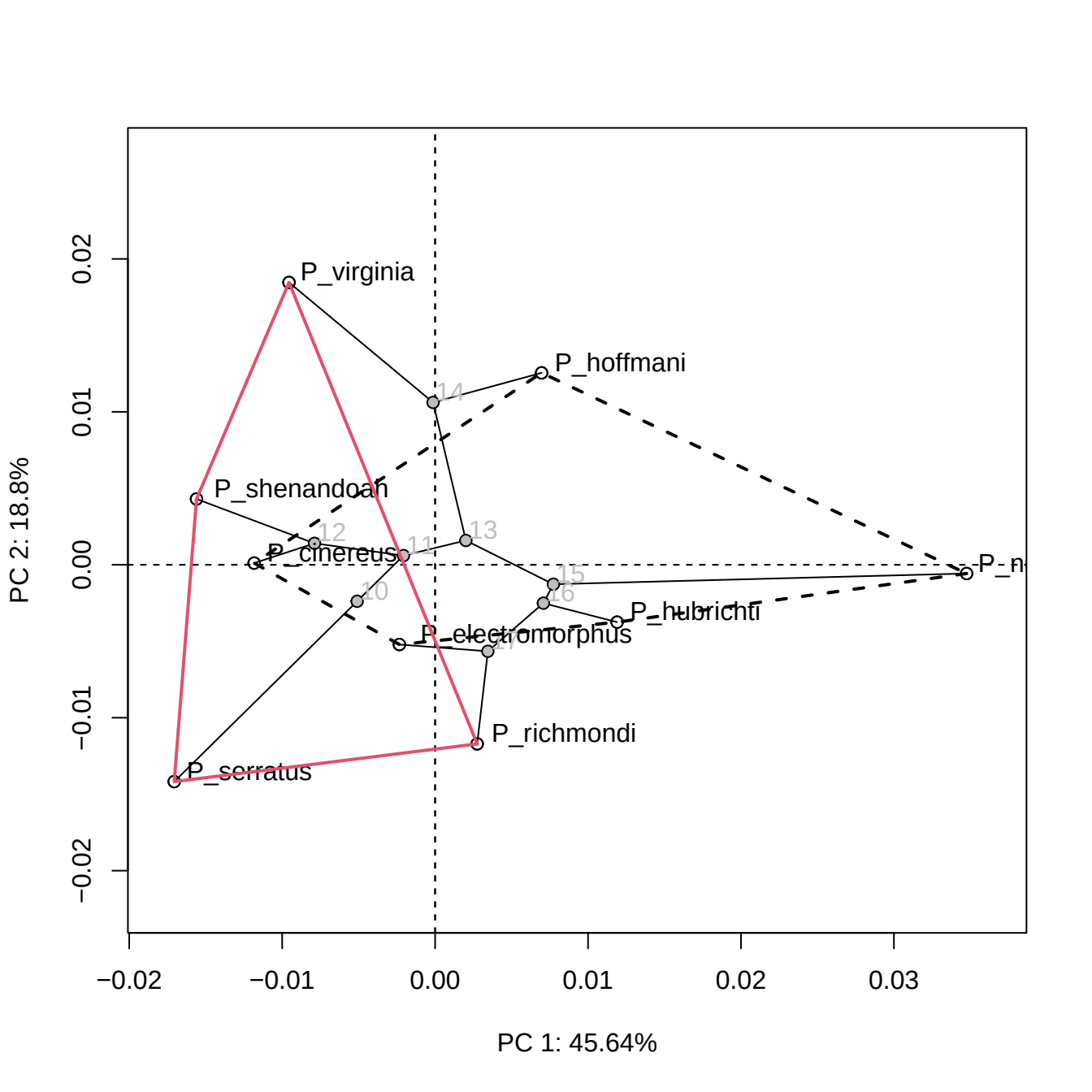


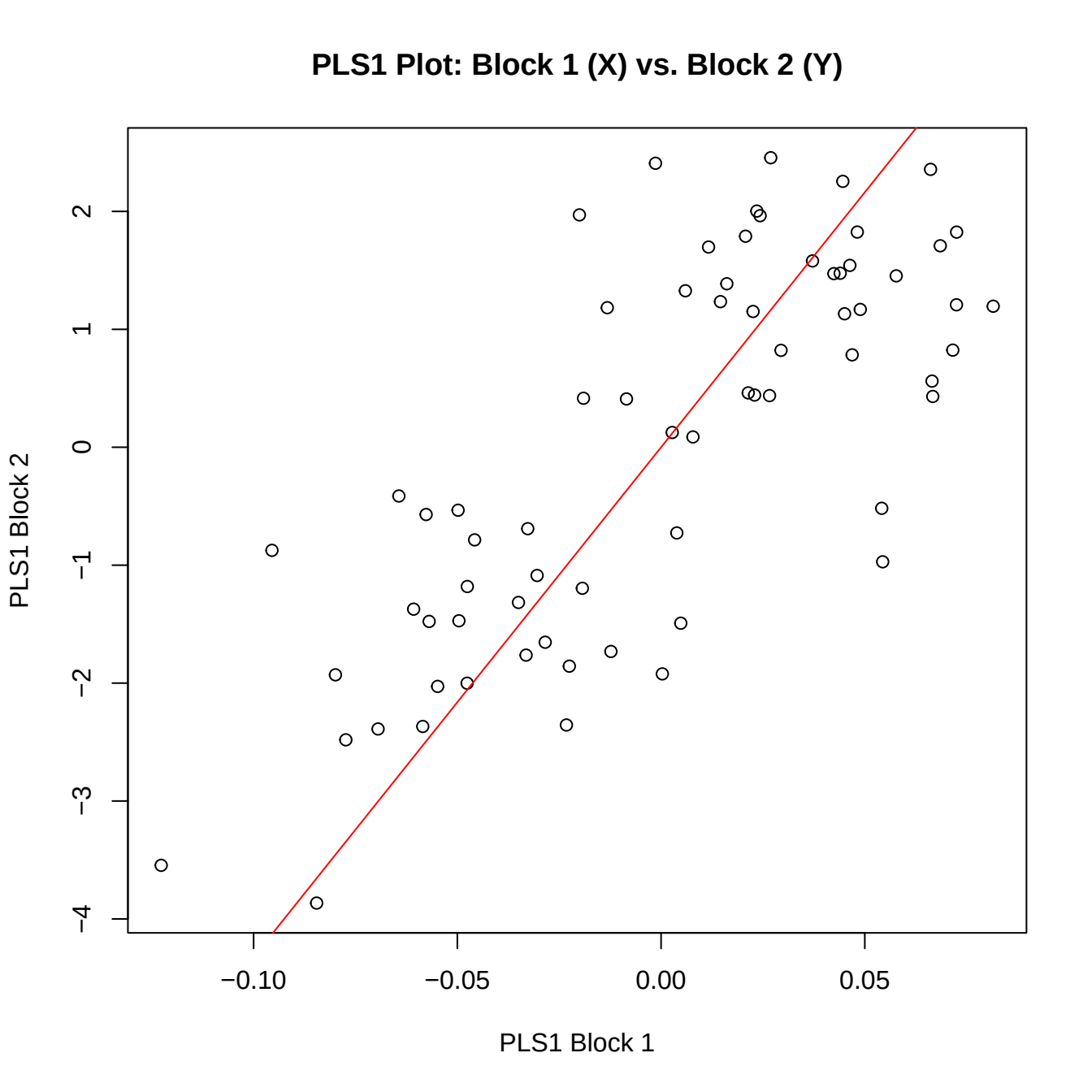


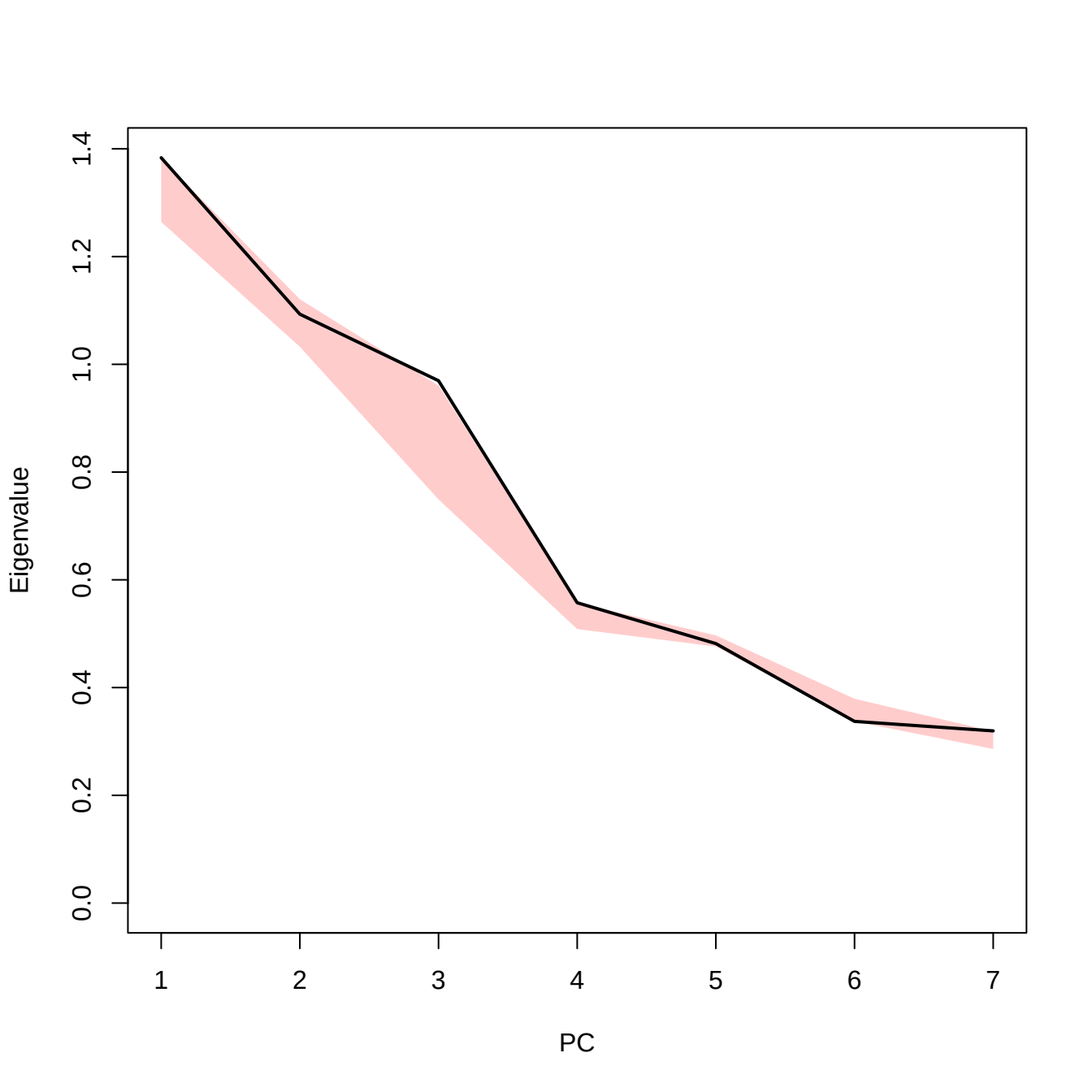

PC 2 for fitted values: 32.92%
0.03
0.02
0.01
0.00
−0.01
−0.02
−0.04
−0.02
0.00
0.02
0.04
PC 1 for fitted values: 62.66%


PC 2 for fitted values: 32.92%
0.03
0.02
0.01
0.00
−0.01
−0.02
−0.04
−0.02
0.00
0.02
0.04
PC 1 for fitted values: 62.66%


PC 2 for fitted values: 32.92%
0.03
0.02
0.01
0.00
−0.01
−0.02
−0.04
−0.02
0.00
0.02
0.04
PC 1 for fitted values: 62.66%


P_virginia
P_hoffmani
P_shenandoah
P_cinereus
P_hubrichti
P_electromorphus
P_richmondi
P_serratus
14
12
11
13
15
16
10
PC 2: 18.8%
PC 1: 45.64%
0.02
0.01
0.00
−0.01
−0.02
0.03


PLS1 Plot: Block 1 (X) vs. Block 2 (Y)
PLS1 Block 2
PLS1 Block 1
2
1
0
−1
−2
−3
−4
−0.10
−0.05
0.00
0.05


Eigenvalue
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1
2
3
4
5
6
7
PC