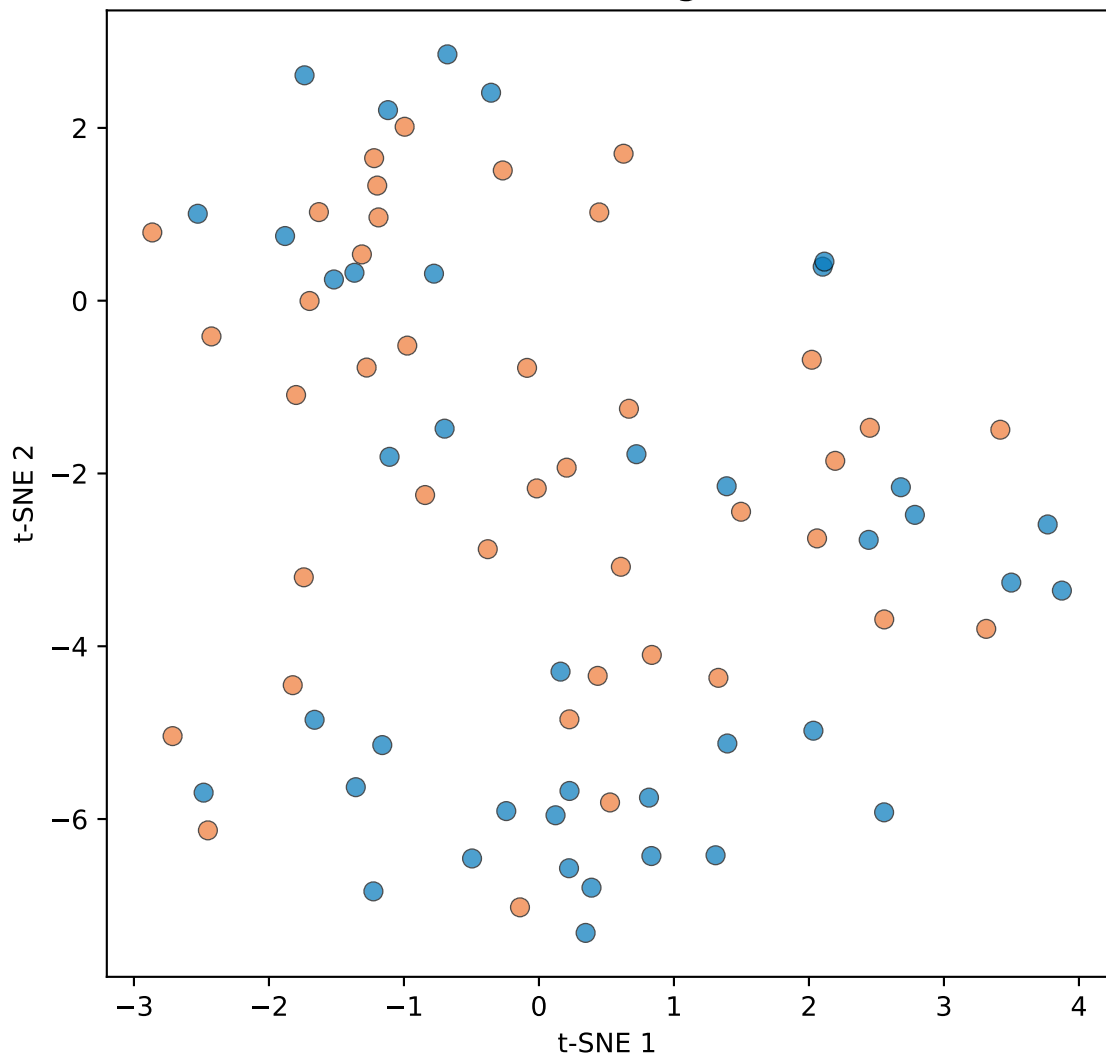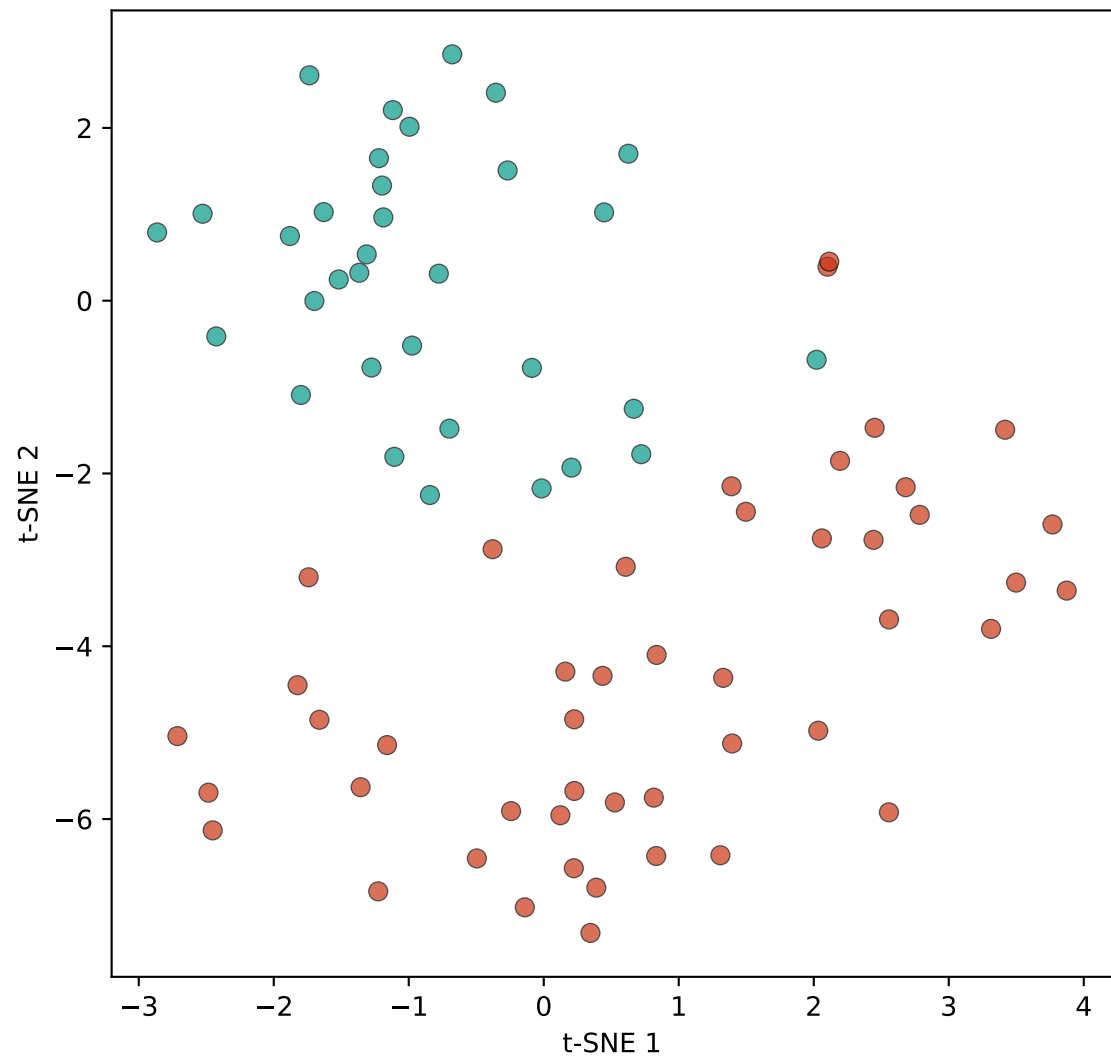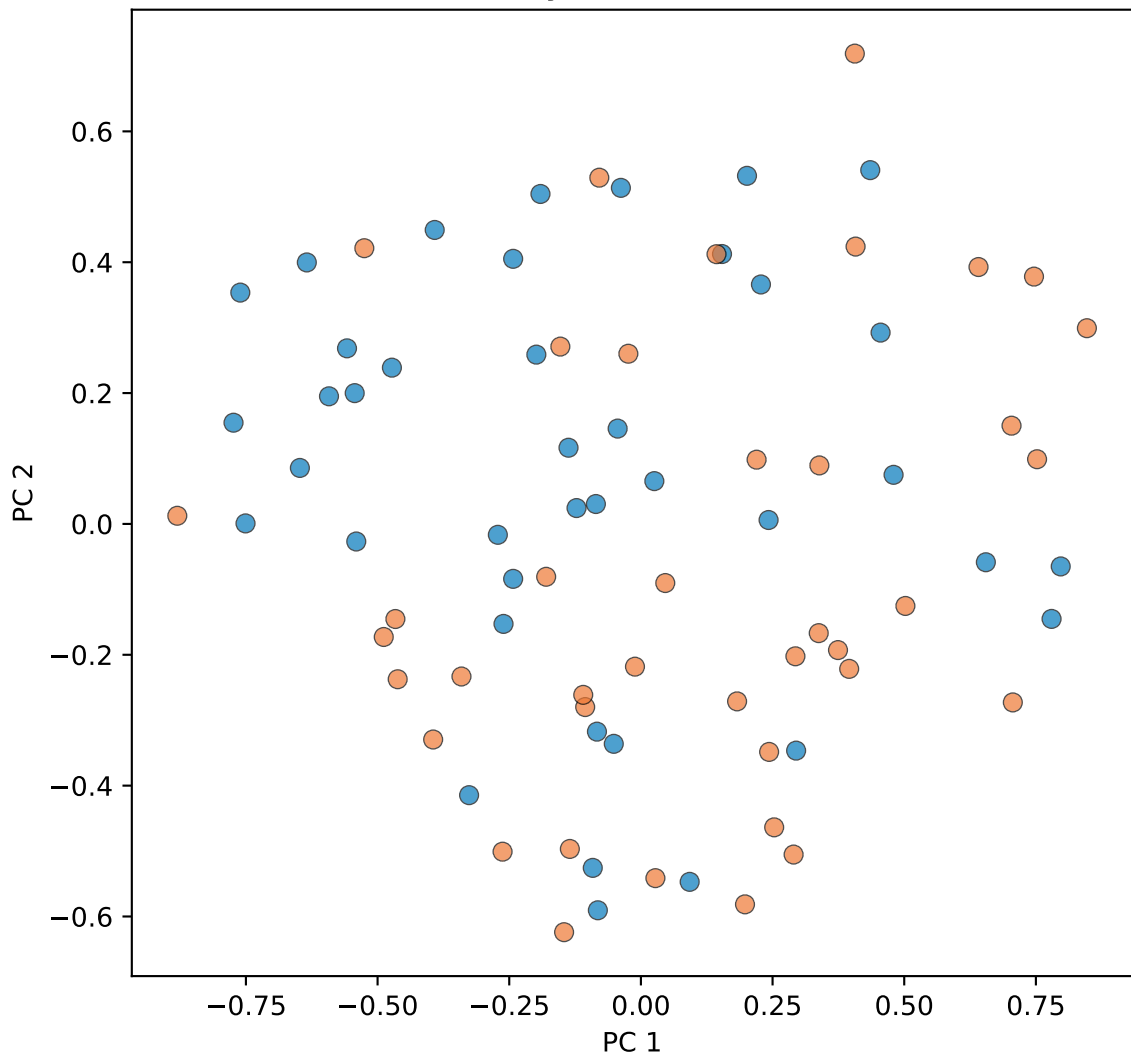**(a) Gradient Space (True Labels)**
Blue=QF, Orange=BN

(b) Discovered Clusters (K-Means)
Cluster 0=QF, Cluster 1=BN

(c) PCA Projection (True Labels)

```
GRADIENT-BASED DOMAIN DISCOVERY
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Method:
   • Collect actor gradients from batches
   • Normalize to unit vectors (direction only)
   • PCA → K-Means clustering

Data:
   • 40 QF batches
   • 40 BN batches
   • 28,897 gradient dimensions

Clustering Quality:
   • Silhouette Score: 0.118
   • Adjusted Rand Index: 0.039
   • Average Purity: 61.6%

Confusion Matrix:
                   True QF    True BN
   Cluster 0       28         19
   Cluster 1       12         21

CONCLUSION:
○ Partial separation
```