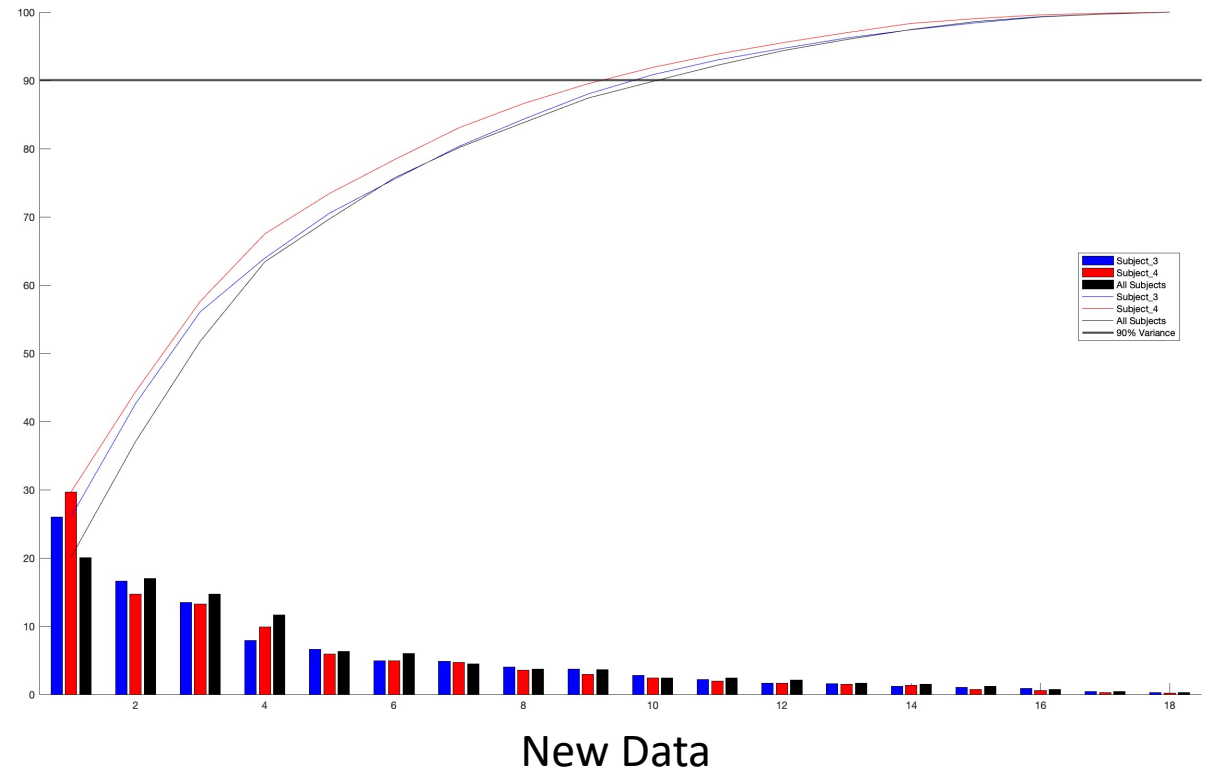
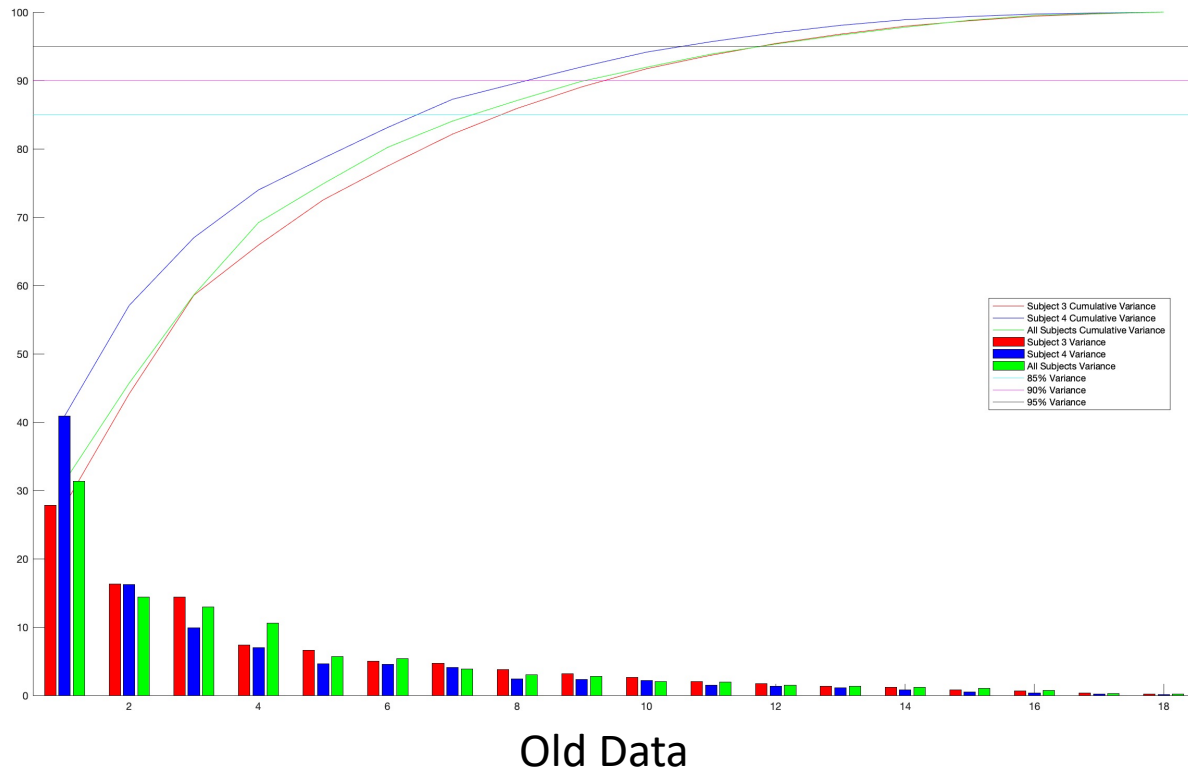


Synergy Matching

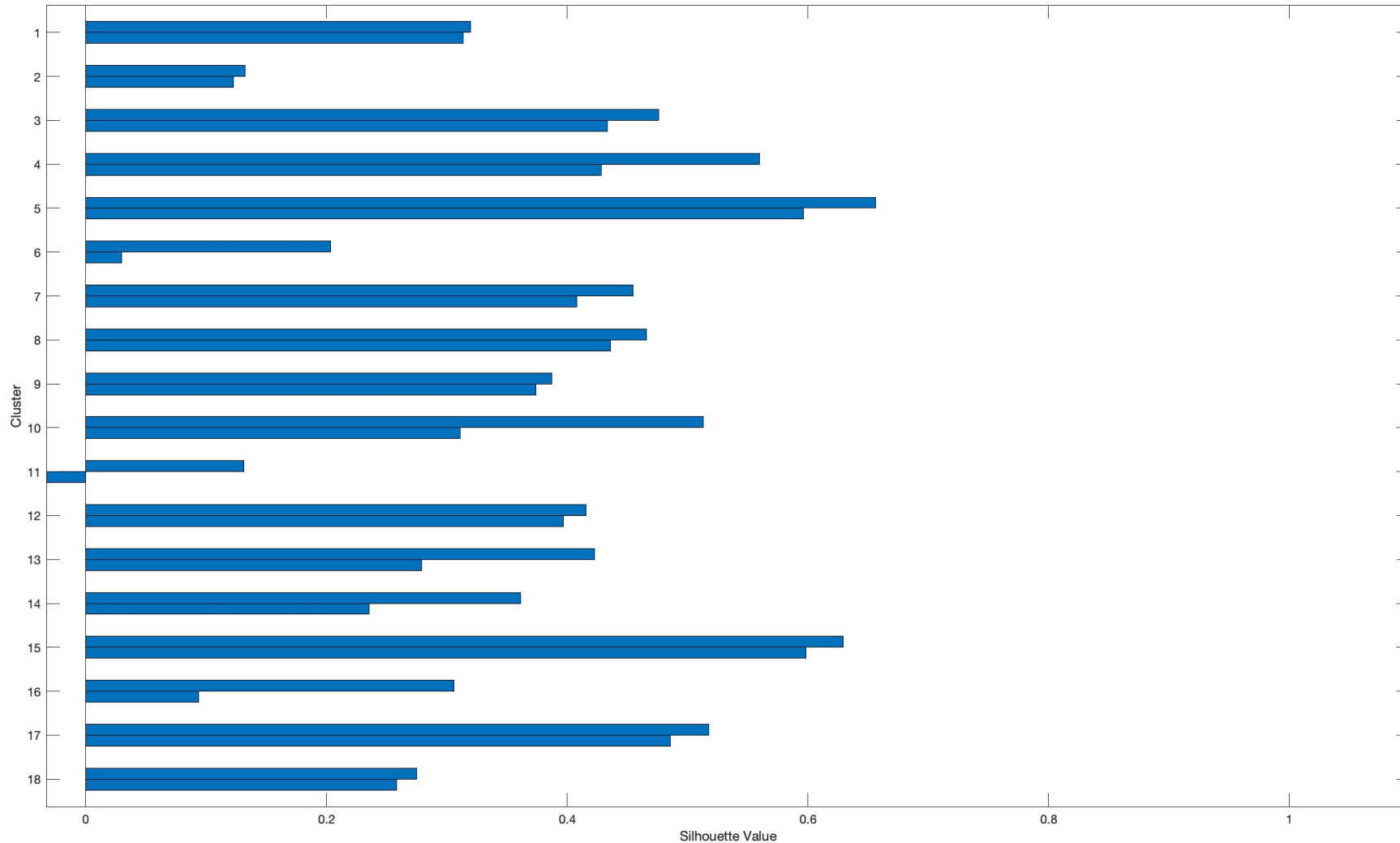
06/08/2021

Variance comparison



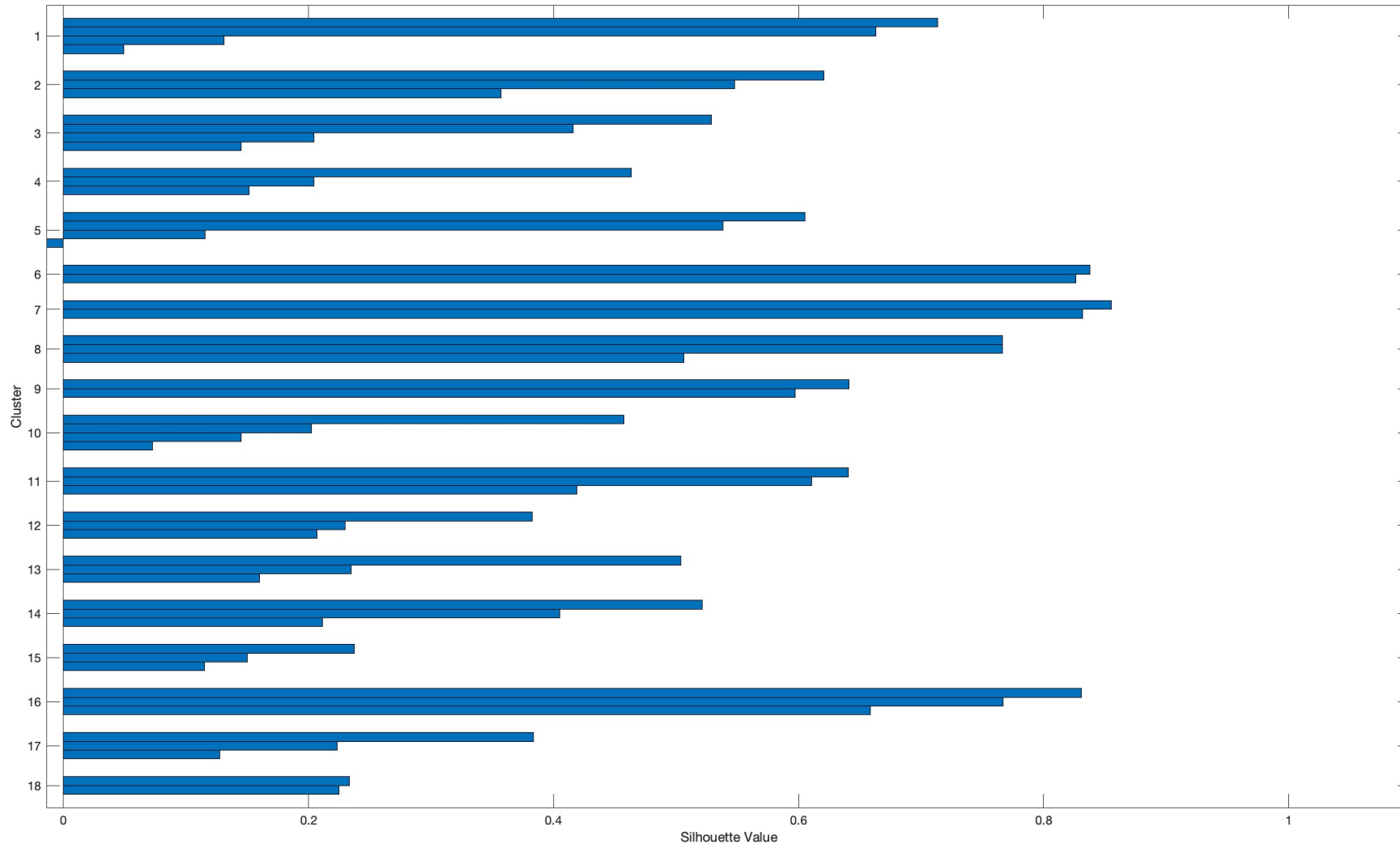
Even when the new data accomplishes for less variance in the first PC (particularly for Subject 4 and All Subjects), both datasets achieves more than 90% of the variance after 10 PCs.

Silhouette values for clusters with two subjects



A silhouette value measures how similar a point is to points in its own cluster, when compared to points in other clusters. Values range from -1 to 1 . A high silhouette value indicates that a point is well matched to its own cluster, and poorly matched to other clusters.

Silhouette values for clusters including All subjects



If we include the data corresponding to both subjects together the results are not so good. Some clusters include only 2 PCs (like 6 and 7) while some other clusters (like 1, 3 or 10) include 4 PCs.

Two different approaches to solve this

1. Modified Traditional Clustering:

- If we find a cluster with more than one PC per subject we select the PC with the higher silhouette value and discard the other(s).
- That discarded PC will not appear in any other synergy.
- The clustering algorithm is executed only once.

2. Recursive Clustering:

- First we find the cluster with higher score using the Matlab function '*evalclusters*'. If that cluster has more than one PC per subject we select the PC with the higher silhouette value.
- We replace the selected PCs with *NaNs*.
- We call again to the clustering function with one cluster less.
- In this case, those PCs discarded from one synergy could be matched with the remaining PCs in another synergy.
- The clustering algorithm is executed until we only have 2 clusters (base case).

Synergies for two subjects

Synergy	PC Subject 3	PC Subject 4
1	PC 2	PC 1
2	PC 1	PC 4
3	PC 3	PC 2
4	PC 4	PC 3
5	PC 7	PC 5
6	PC 5	PC 8
7	PC 6	PC 6
8	PC 8	PC 7
9	PC 9	PC 12
10	PC 11	PC 10
11	PC 10	PC 13
12	PC 15	PC 9
13	PC 13	PC 11
14	PC 14	PC 14
15	PC 12	PC 15
16	PC 16	PC 16
17	PC 17	PC 18
18	PC 18	PC 17

Traditional Clustering

Synergy	PC Subject 3	PC Subject 4
1	PC 2	PC 1
2	PC 1	PC 4
3	PC 3	PC 2
4	PC 4	PC 3
5	PC 7	PC 5
6	PC 5	PC 8
7	PC 6	PC 6
8	PC 8	PC 7
9	PC 9	PC 12
10	PC 11	PC 10
11	PC 10	PC 13
12	PC 15	PC 9
13	PC 13	PC 11
14	PC 14	PC 14
15	PC 12	PC 15
16	PC 16	PC 16
17	PC 17	PC 18
18	PC 18	PC 17

Recursive Clustering

Synergies with All subjects

Synergy	PC Subject 3	PC Subject 4	PC All Subjects
1	PC 3	PC 1	PC 1
2	PC 2		PC 3
3	PC 1	PC 4	PC 5
4	PC 14	PC 3	PC 4
5		PC 5	PC 6
6	PC 4	PC 12	
7	PC 7	PC 6	PC 7
8	PC 5	PC 8	PC 8
9	PC 6	PC 7	PC 9
10	PC 8	PC 11	PC 12
11	PC 11	PC 10	PC 11
12	PC 15	PC 9	PC 10
13	PC 10	PC 13	PC 13
14	PC 13	PC 14	PC 14
15	PC 12	PC 15	PC 15
16	PC 16	PC 16	PC 16
17	PC 17		PC 17
18	PC 18	PC 18	PC 18

Traditional Clustering

Synergy	PC Subject 3	PC Subject 4	PC All Subjects
1	PC 3	PC 1	PC 2
2	PC 1	PC 4	PC 1
3	PC 2		PC 3
4	PC 14	PC 3	PC 4
5		PC 5	PC 6
6	PC 7	PC 6	PC 7
7	PC 5	PC 8	PC 8
8	PC 6	PC 7	PC 9
9	PC 9	PC 12	PC 5
10	PC 8	PC 11	PC 12
11	PC 11	PC 10	PC 11
12	PC 15	PC 9	PC 10
13	PC 10	PC 13	PC 13
14	PC 13	PC 14	PC 14
15	PC 12	PC 15	PC 15
16	PC 16	PC 16	PC 16
17	PC 17		PC 17
18	PC 18	PC 18	PC 18

Recursive Clustering

Synergies with All subjects

Synergy	PC Subject 3	PC Subject 4	PC All Subjects
1	PC 3	PC 1	PC 1
2	PC 2		PC 3
3	PC 1	PC 4	PC 5
4	PC 14	PC 3	PC 4
5		PC 5	PC 6
6	PC 4	PC 12	
7	PC 7	PC 6	PC 7
8	PC 5	PC 8	PC 8
9	PC 6	PC 7	PC 9
10	PC 8	PC 11	PC 12
11	PC 11	PC 10	PC 11
12	PC 15	PC 9	PC 10
13	PC 10	PC 13	PC 13
14	PC 13	PC 14	PC 14
15	PC 12	PC 15	PC 15
16	PC 16	PC 16	PC 16
17	PC 17		PC 17
18	PC 18	PC 18	PC 18

Modified Traditional Clustering

Synergy	PC Subject 3	PC Subject 4	PC All Subjects
1	PC 3	PC 1	PC 2
2	PC 1	PC 4	PC 1
3	PC 2		PC 3
4	PC 14	PC 3	PC 4
5		PC 5	PC 6
6	PC 7	PC 6	PC 7
7	PC 5	PC 8	PC 8
8	PC 6	PC 7	PC 9
9	PC 9	PC 12	PC 5
10	PC 8	PC 11	PC 12
11	PC 11	PC 10	PC 11
12	PC 15	PC 9	PC 10
13	PC 10	PC 13	PC 13
14	PC 13	PC 14	PC 14
15	PC 12	PC 15	PC 15
16	PC 16	PC 16	PC 16
17	PC 17		PC 17
18	PC 18	PC 18	PC 18

Recursive Clustering

Synergies with All subjects

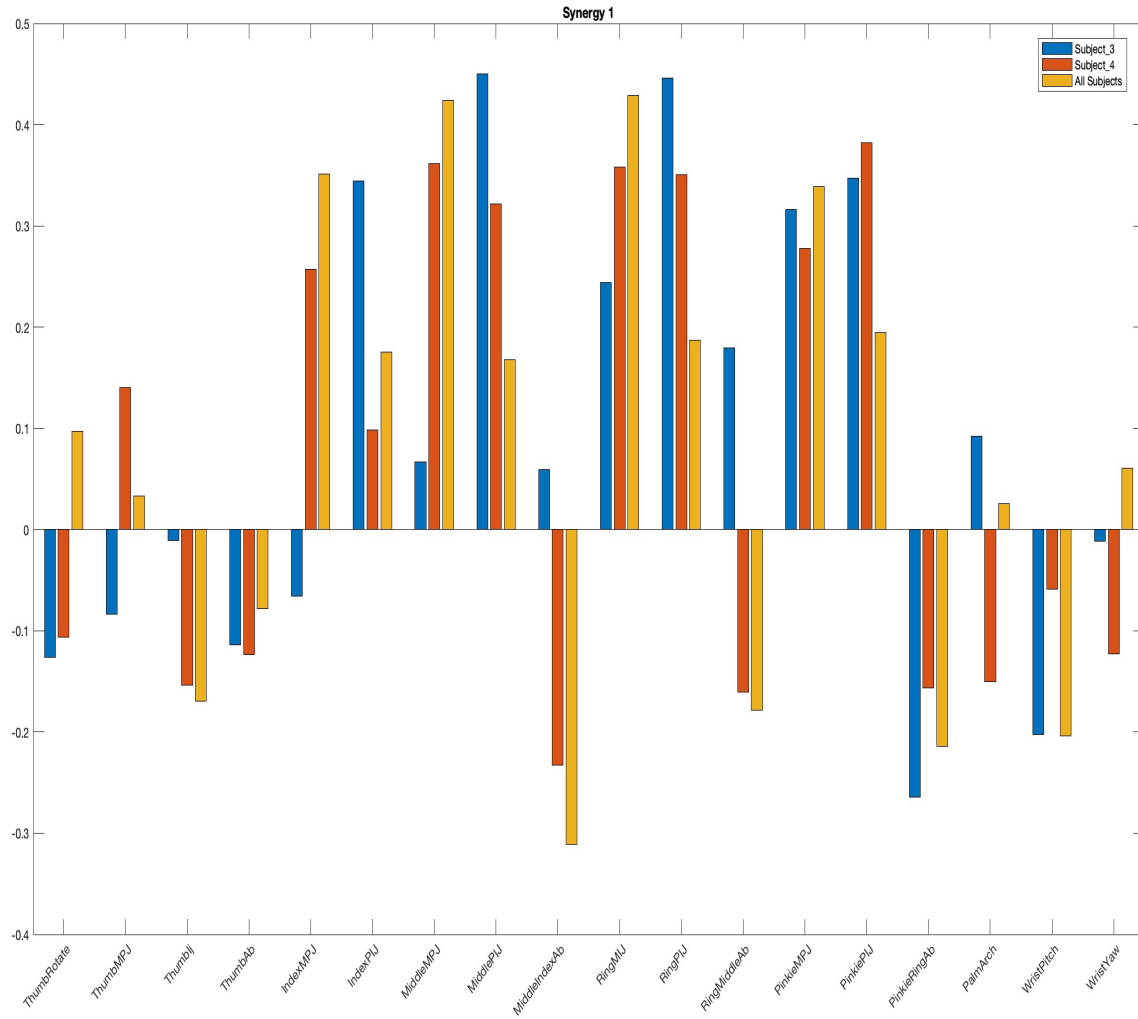
Synergy	PC Subject 3	PC Subject 4	PC All Subjects
1	PC 3	PC 1	PC 1
2	PC 2		PC 3
3	PC 1	PC 4	PC 5
4	PC 14	PC 3	PC 4
5		PC 5	PC 6
6	PC 4	PC 12	
7	PC 7	PC 6	PC 7
8	PC 5	PC 8	PC 8
9	PC 6	PC 7	PC 9
10	PC 8	PC 11	PC 12
11	PC 11	PC 10	PC 11
12	PC 15	PC 9	PC 10
13	PC 10	PC 13	PC 13
14	PC 13	PC 14	PC 14
15	PC 12	PC 15	PC 15
16	PC 16	PC 16	PC 16
17	PC 17		PC 17
18	PC 18	PC 18	PC 18

Traditional Clustering

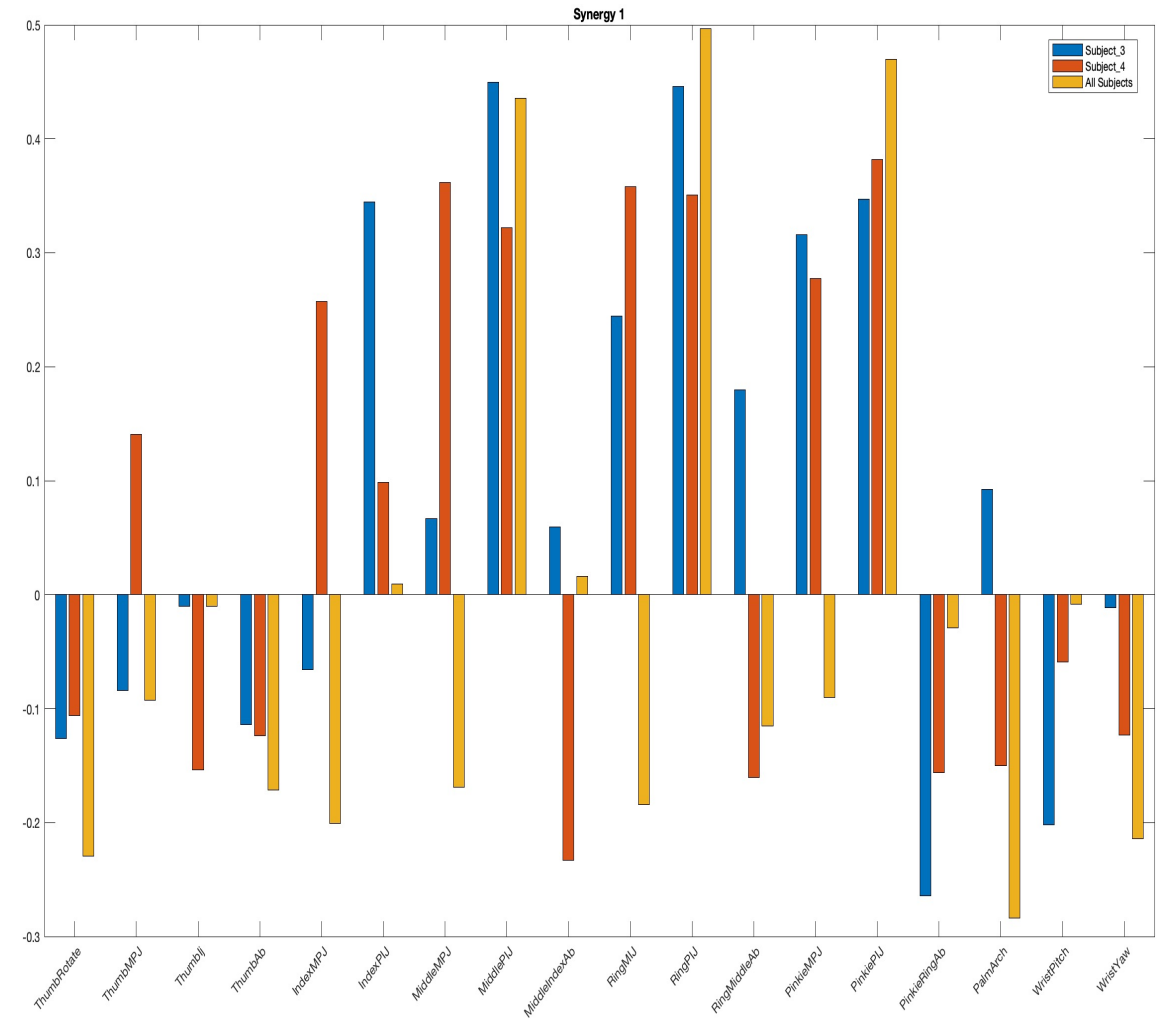
Synergy	PC Subject 3	PC Subject 4	PC All Subjects
1	PC 3	PC 1	PC 2
2	PC 1	PC 4	PC 1
3	PC 2		PC 3
4	PC 14	PC 3	PC 4
5		PC 5	PC 6
6	PC 7	PC 6	PC 7
7	PC 5	PC 8	PC 8
8	PC 6	PC 7	PC 9
9	PC 9	PC 12	PC 5
10	PC 8	PC 11	PC 12
11	PC 11	PC 10	PC 11
12	PC 15	PC 9	PC 10
13	PC 10	PC 13	PC 13
14	PC 13	PC 14	PC 14
15	PC 12	PC 15	PC 15
16	PC 16	PC 16	PC 16
17	PC 17		PC 17
18	PC 18	PC 18	PC 18

Recursive Clustering

Synergies comparison

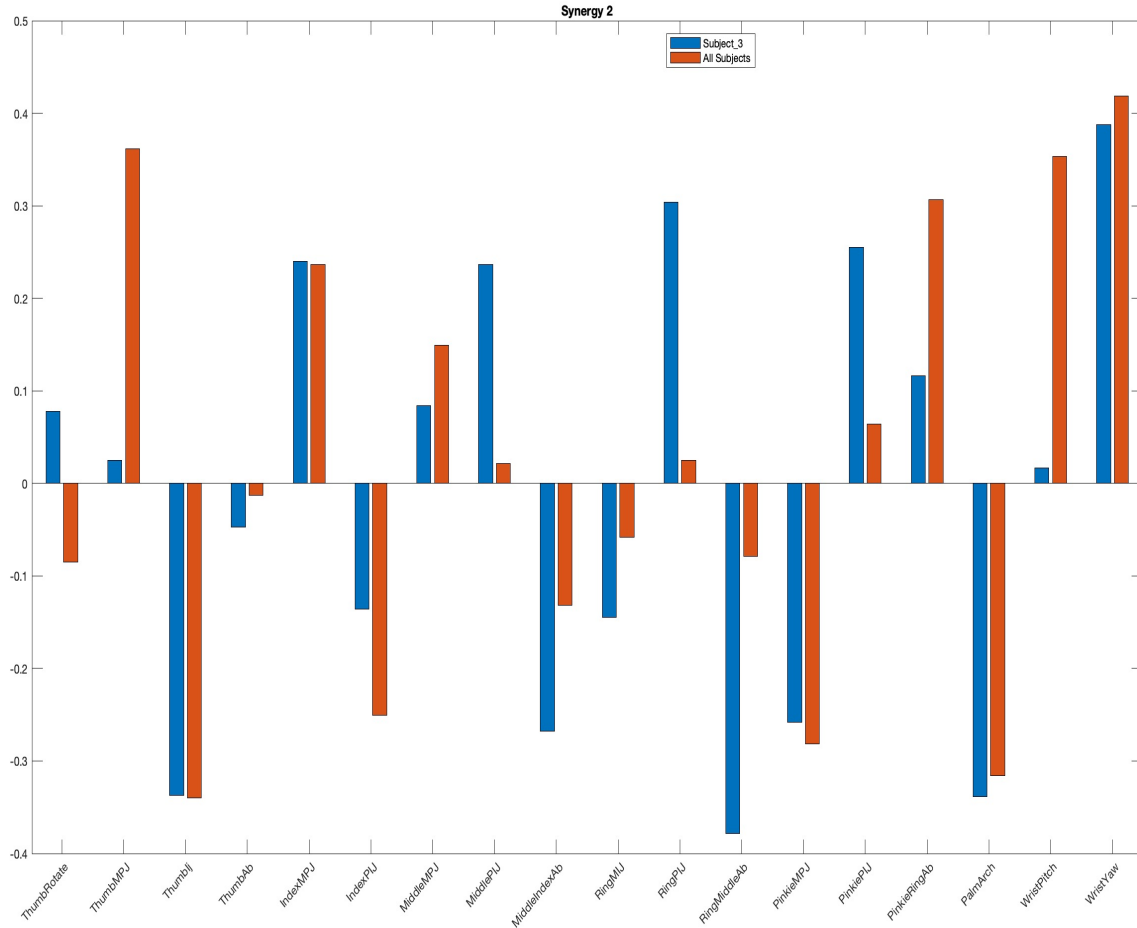


Modified Traditional Clustering

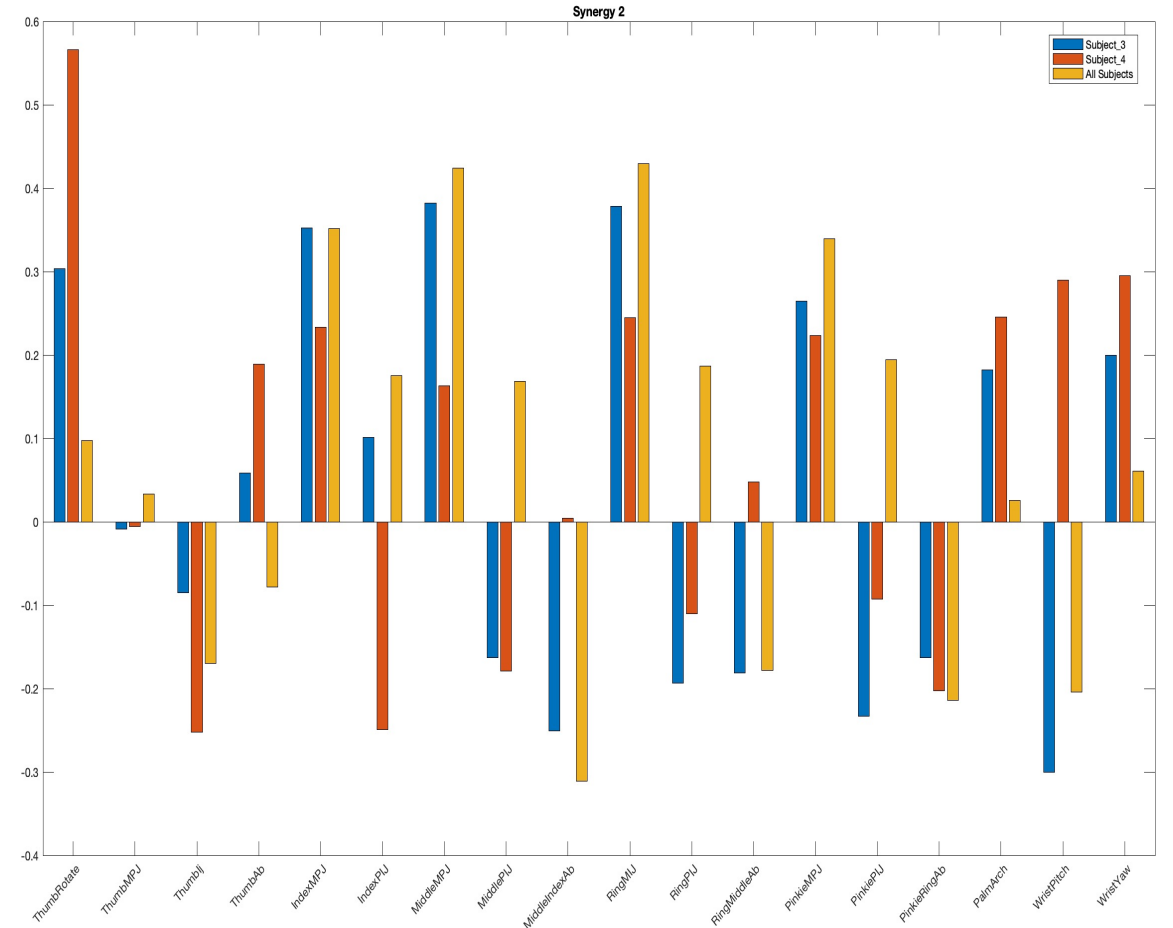


Recursive Clustering

Synergies comparison

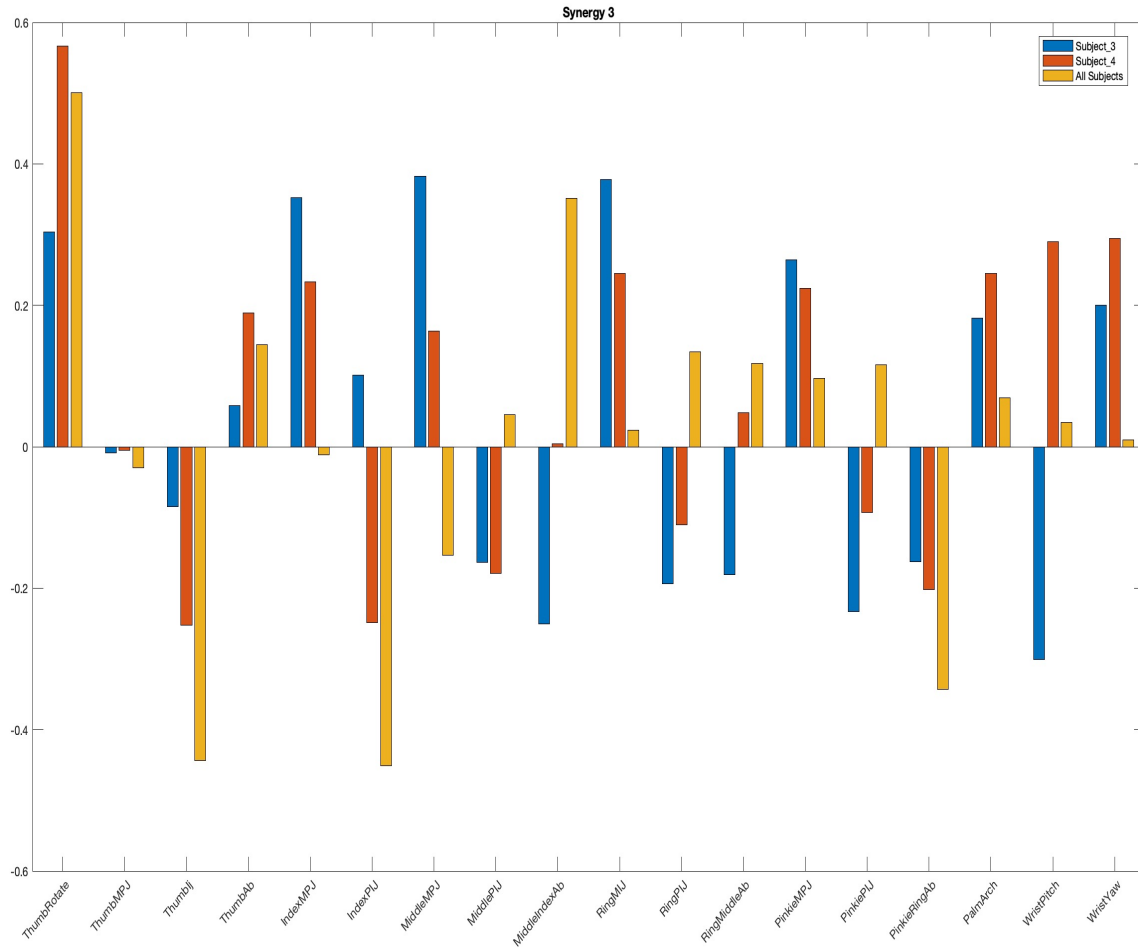


Modified Traditional Clustering

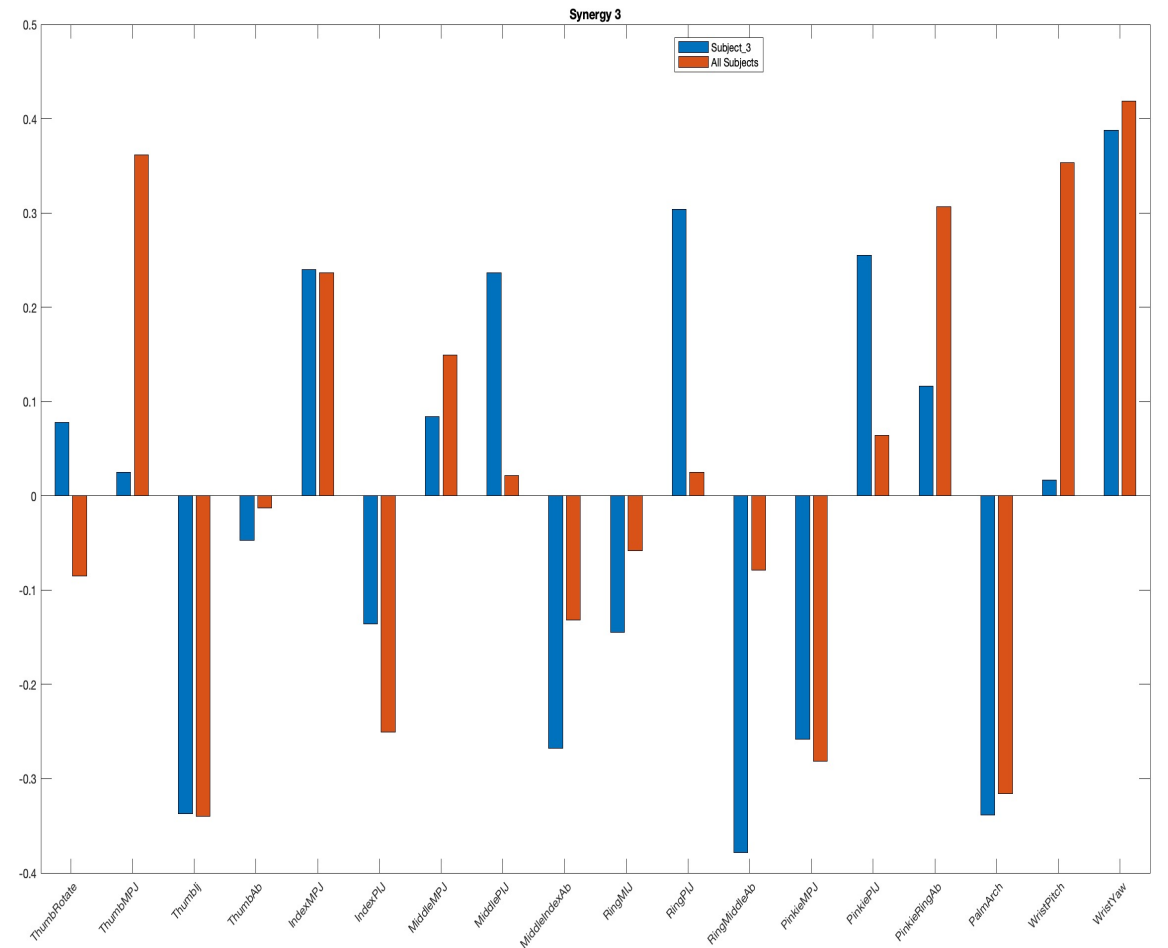


Recursive Clustering

Synergies comparison

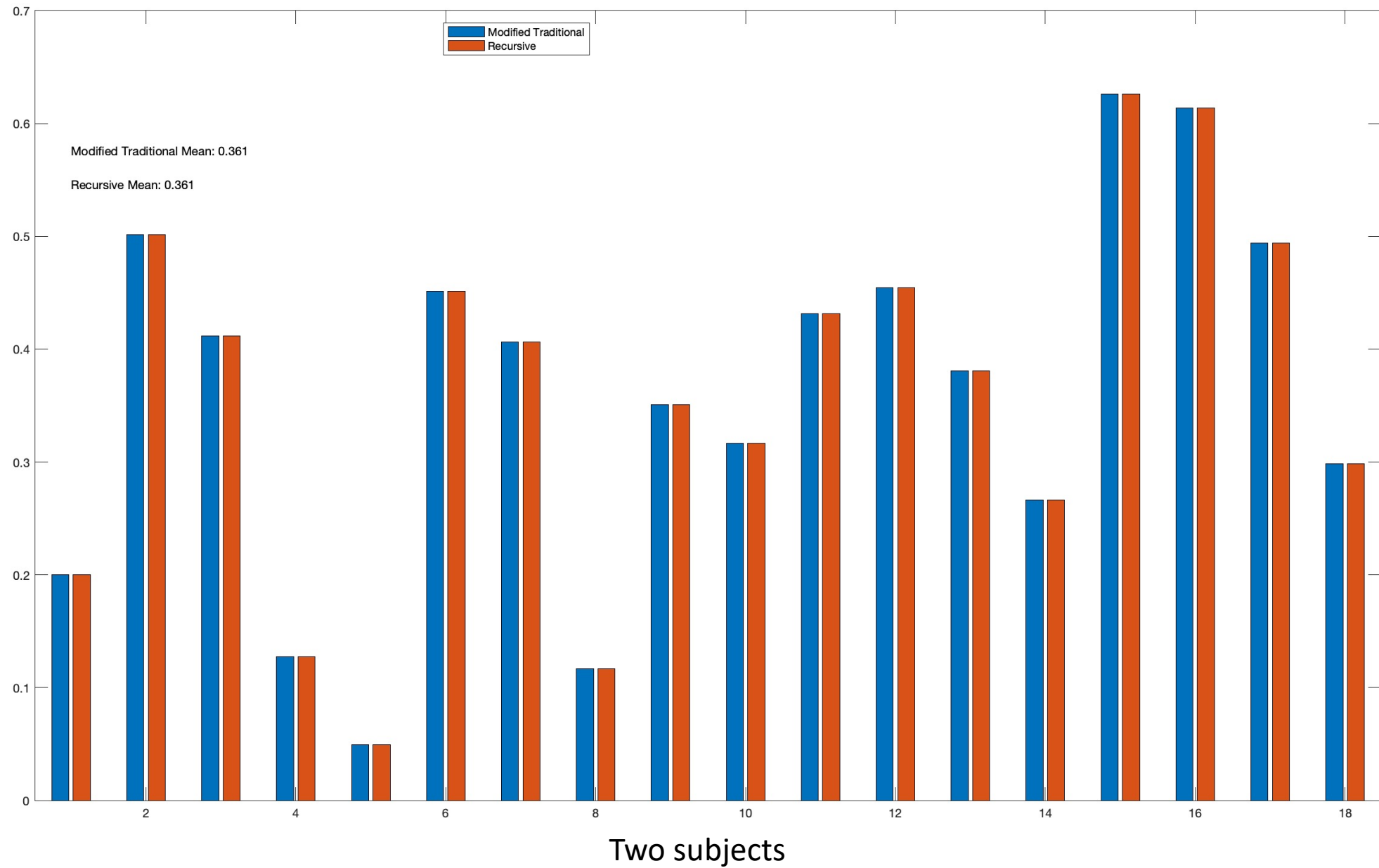


Modified Traditional Clustering

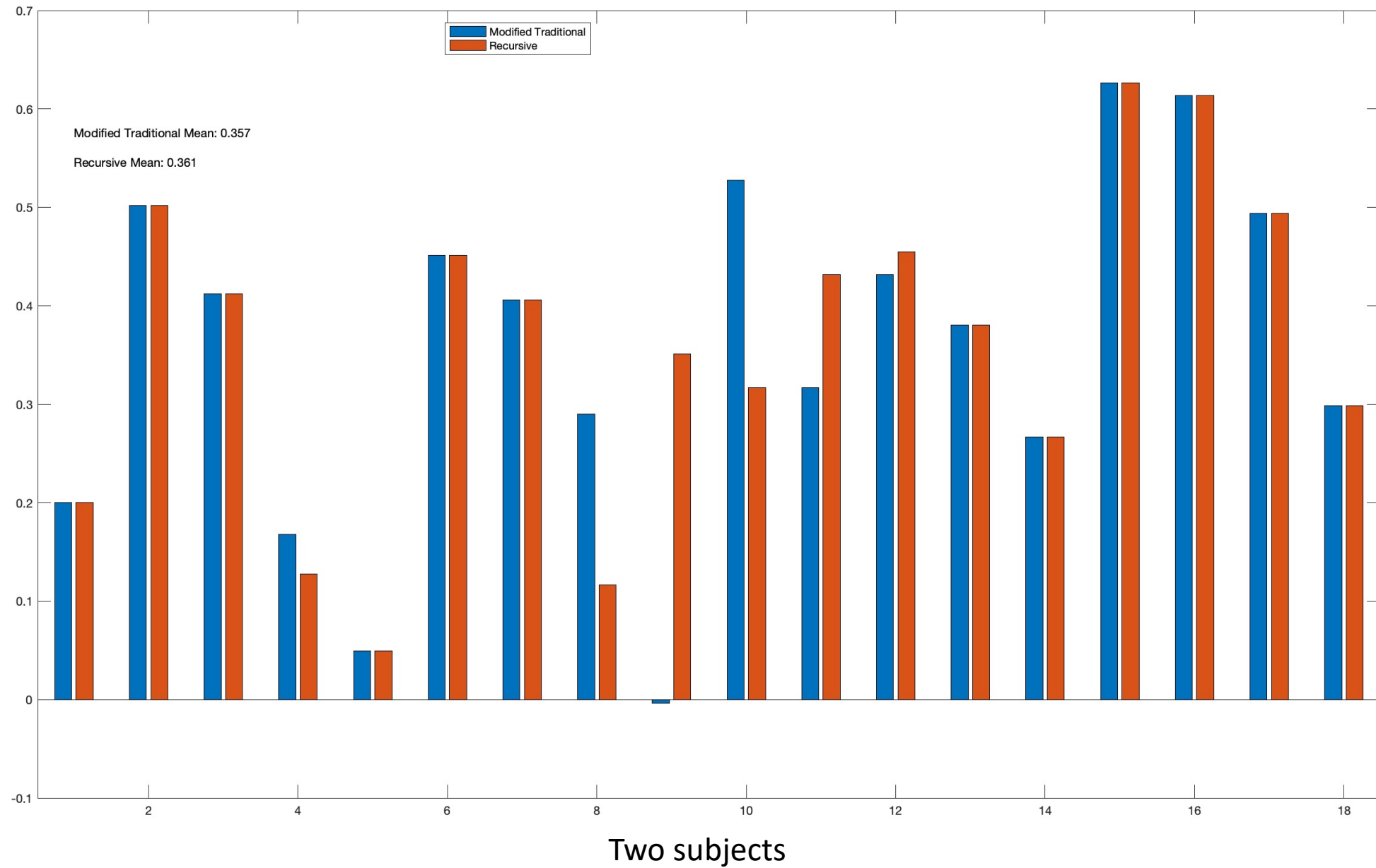


Recursive Clustering

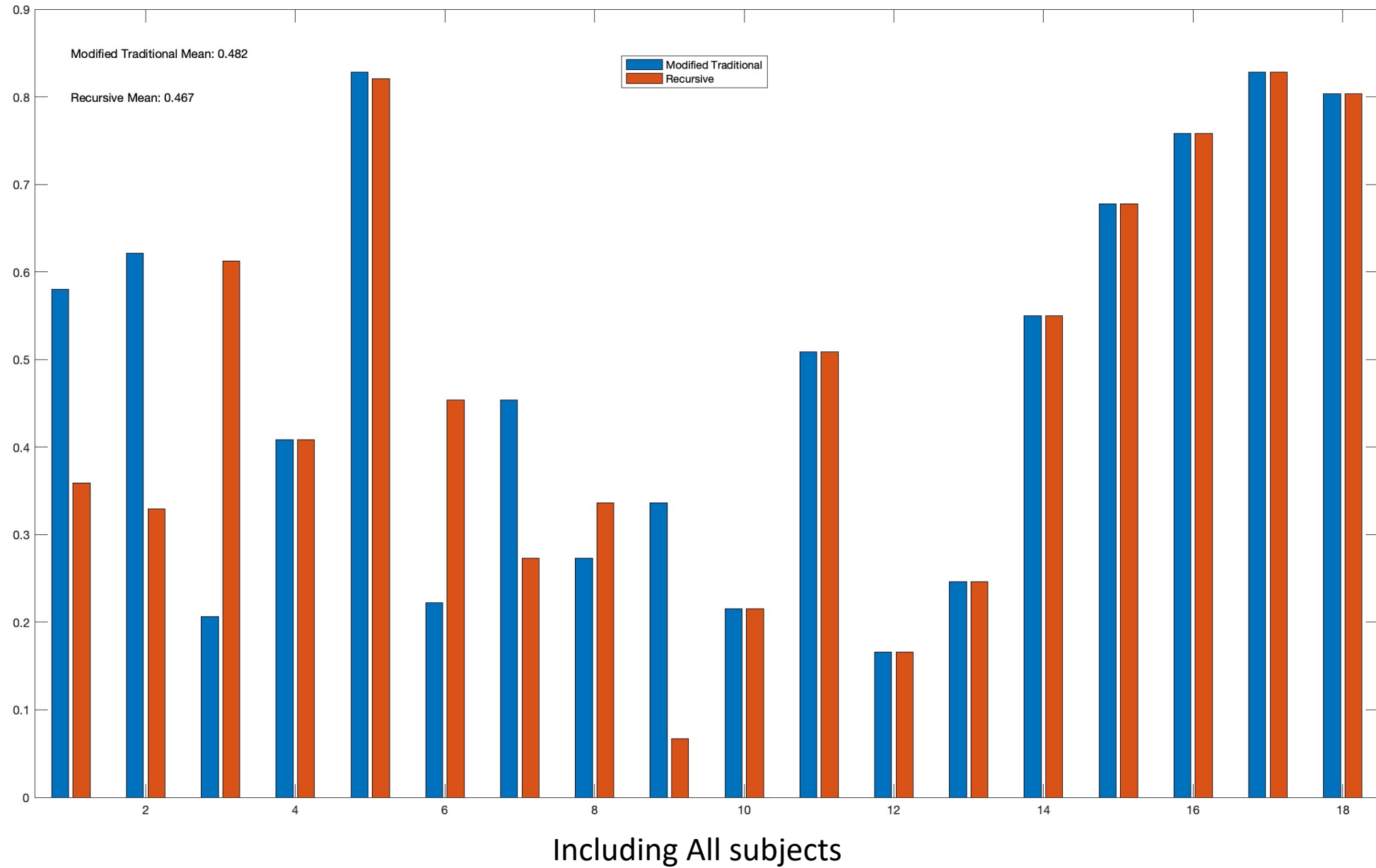
Cluster evaluation



Cluster evaluation

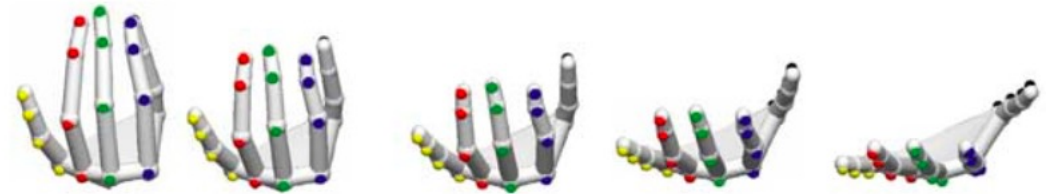


Cluster evaluation



Next steps

- Check synergy differences using the same algorithm.
- Calculate dynamic synergies (how synergies evolve during time).
- Synergies representations.



Items to comment

- Mendeley.