Hierarchical Clustering: (Dis)similarity between clusters

- We know how to compute the dissimilarity $d(\mathbf{x}_i, \mathbf{x}_j)$ between two examples
- How to compute the dissimilarity between two clusters R and S?
- **Min-link or single-link:** results in chaining (clusters can get very large)

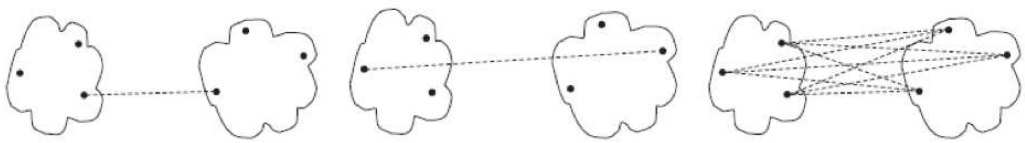
$$d(R, S) = \min_{\mathbf{x}_R \in R, \mathbf{x}_S \in S} d(\mathbf{x}_R, \mathbf{x}_S)$$

- **Max-link or complete-link:** results in small, round shaped clusters

$$d(R, S) = \max_{\mathbf{x}_R \in R, \mathbf{x}_S \in S} d(\mathbf{x}_R, \mathbf{x}_S)$$

- **Average-link:** compromise between single and complexte linkage

$$d(R, S) = \frac{1}{|R||S|} \sum_{\mathbf{x}_R \in R, \mathbf{x}_S \in S} d(\mathbf{x}_R, \mathbf{x}_S)$$



(a) MIN (single link.) (b) MAX (complete link.) (c) Group average.