

Ordination, Principal coordinate analysis

Quiz

The goal of quizzes is to help you learn.

Compare your answers to the list of correct answers at the end of the quiz.

Principal coordinate analysis (PCoA) – generalities

1. Principal coordinate analysis (PCoA) is an ordination method applicable to pre-computed dissimilarity matrices (**D**). It cannot be directly applied to raw data matrices. – True, False.
2. PCoA is applicable to **D** matrices computed from data of any mathematical types: quantitative, qualitative, or a mixture of these types. – True, False.
3. PCoA cannot be used to produce ordinations in 2 dimensions. – True, False.
4. PCoA can act as a data transformation after computing an appropriately chosen dissimilarity measure. The coordinates of the objects in full-dimensional PCoA space represent the transformed data. – True, False.

Principal coordinate analysis (PCoA) – computation

5. In PCoA, eigen decomposition is applied to the transformed $[-0.5 * D_{ij}^2]$ and centred dissimilarity matrix. – True, False.
6. The original dissimilarities D_{ij} in matrix **D** cannot be fully reconstructed (recomputed) from the principal coordinates. – True, False.
7. A PCoA ordination in 2 dimensions is always identical to a PCA ordination in 2 dimension, whatever the dissimilarity function D that was used. – True, False.

Properties of dissimilarity coefficients

8. The triangular inequality condition is met by all dissimilarity coefficients used by ecologists. – True, False.
9. The dissimilarity indices used by ecologists to analyse community composition data include semimetric coefficients, which violate the triangular inequality. – True, False.
10. A Euclidean **D** matrix is one that can be fully represented in Euclidean space without distortion. – True, False.
11. A non-Euclidean dissimilarity matrix is identified by the criterion that PCoA of that matrix produces some negative eigenvalues. – True, False.
12. A PCoA ordination of n objects occupies at most $(n - 1)$ dimensions. There is always at least one null eigenvalue. – True, False.
13. When a **D** matrix is non-Euclidean, taking the square root of the dissimilarities before PCoA solves the problem in most cases and makes it Euclidean. – True, False.

PCoA biplots

14. Species cannot be projected onto PCoA biplots. – True, False.
15. A pseudo- R^2 statistics can be computed, indicating the proportion of inertia expressed in biplots drawn in 1, 2, 3, ... dimensions, as in PCA. – True, False.

Comparison of PCoA and nMDS

16. PCoA and nMDS share the ability to produce ordinations in reduced space (usually in 2 dimensions) from any type of dissimilarity index D , except nonmetric indices. – True, False.
17. PCoA and nMDS always produce identical ordinations in 2 dimensions. – True, False.
18. Both PCoA and nMDS allow users to obtain all ordination axes corresponding to a given \mathbf{D} matrix. – True, False.
19. In nMDS, if the user asks for all ordination axes, i.e. $\min[p, n - 1]$, the solution is not exact since the dissimilarities are distorted. – True, False.
20. Both PCoA and nMDS allow users to precisely reconstruct (recompute) the original dissimilarities D_{ij} among objects from the ordination axes. – True, False.
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Correct answers to the quiz about PCoA –

1. True

2. True

3. False

4. True

5. True

6. False

7. False

8. False

9. True

10. True

11. True

12. True

13. True

14. False

15. True

16. True

17. False

18. True

19. True

20. False