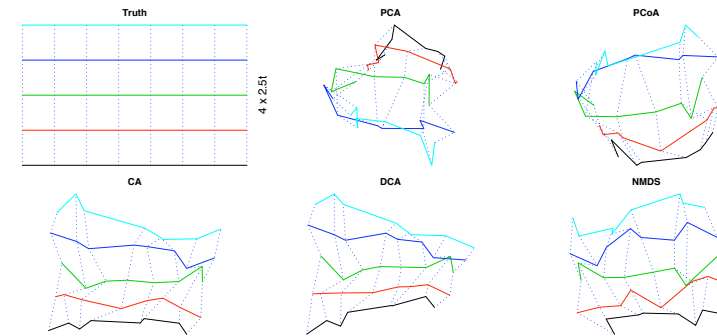


## Comparing methods

- Ordination methods cannot be compared with real data sets: The truth is unknown.
  - The correct structure is inferred from the data, and the comparison biased towards the pet result.
- Comparison needs external criteria (environmental variables?).
- Simulated community pattern:
  - Assume an interpretable gradient pattern, and see if the method can find this pattern: Reliable only if it finds the known pattern.
  - Robustness is the ability to work even when the assumptions are violated.

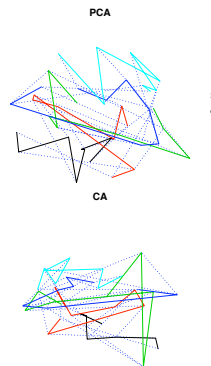
## Community pattern simulation



*Gaussian response model, presence/absence, binomial(1) error.*

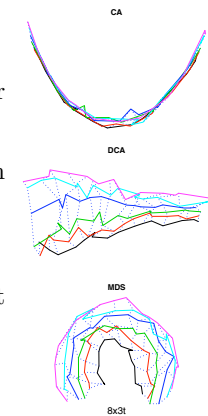
## Short gradients: Is there a niche for PCA?

- Folklore: PCA with short gradients ( $\leq 2t$ ).
- Not based on research, but simulation finds PCA uniformly worse than CA: At the best case about as good as CA.
- There should be no species optimum within gradient: Shortness alone not sufficient.
- PCA best used for really linear cases (environment) or for reduction of variables into principal components (but see FA).
- Noise dominates over signal in homogeneous data.



## Long gradients: DCA or NMDS

- Curvature with long gradients: Need either DCA or NMDS.
- NMDS is a test winner: More robust than DCA.
- DCA more popular.
- DCA may produce new artefacts, since it twists the space.

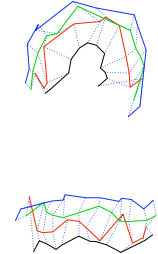
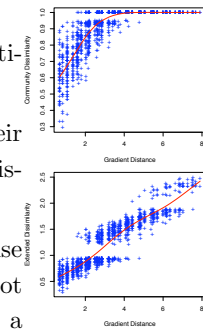


### Handling curves

1. **Accept and acknowledge:** Clear only with a single dominant gradient.
2. **Degree of absence:** If curve caused by 'noughty noughts', estimate how much the species is absent.
3. **Extended dissimilarity:** If all distant points have nothing in common, estimate dissimilarity through stepstone points.
4. **Detrend:** Distort the space so that configuration disappears.
5. **Monotone regression:** Do not require linear relation with ordination and dissimilarity.
6. **Constrain:** Use linear constraints to force straightening.

### Extended dissimilarities and step-across

- How different are sites that have nothing in common?
- Use step-across points to estimate their distance
- Flexible shortest path or their approximations, extended dissimilarities
- Extended dissimilarity: use only one-site steps, do not update dissimilarities below a threshold



### Analysed using modern methods...

