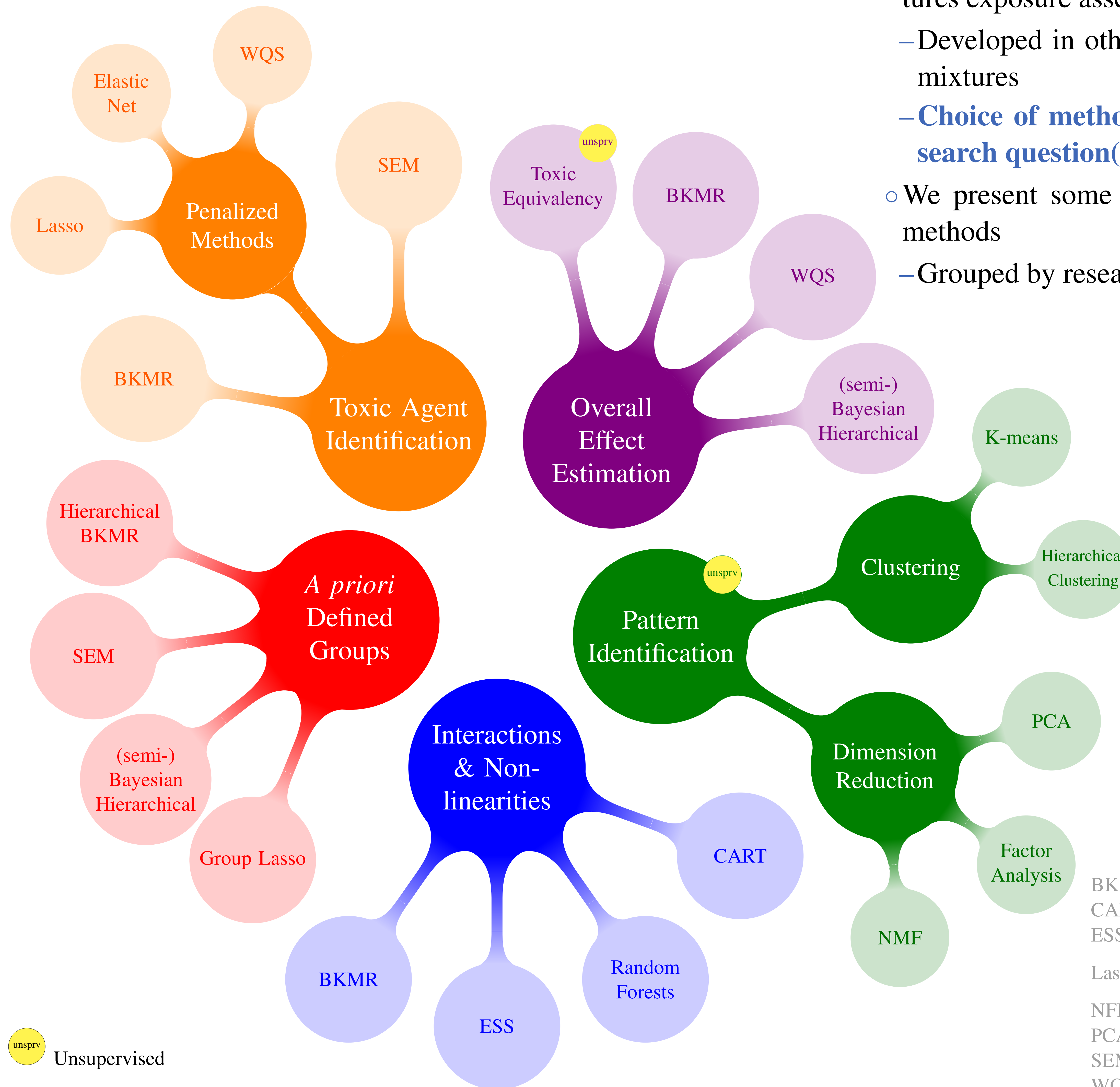


# Overview of Commonly-Used Methods to Analyze Exposure to Mixtures in Environmental Epidemiology

Elizabeth A. Gibson<sup>†</sup>, Yanelli Nunez, Marianthi-Anna Kioumourtzoglou

COLUMBIA UNIVERSITY | MAILMAN SCHOOL of PUBLIC HEALTH | ENVIRONMENTAL HEALTH SCIENCES

<sup>†</sup>e.a.gibson@columbia.edu



- Numerous methods exist for environmental mixtures exposure assessment in health studies
  - Developed in other fields or for environmental mixtures
  - **Choice of method primarily depends on research question(s)**
- We present some **examples** of commonly-used methods
  - Grouped by research question

## Other Considerations for Method Selection

1. No single method outperforms all others for all potential questions
2. Interpretability
3. Robustness
4. Computational scalability
  - As dimensionality increases ( $N$  or  $p$ ) some methods may fail
5. Exploration vs. hypothesis testing
6. Not a good idea to “blindly” use methods from other fields
  - They were developed for different purposes!
  - May need to adjust them first

## To supervise or not?

1. Do we want to inform policy?
  - Identify common exposure **patterns**, independent of outcomes, on which we can act
    - Through regulatory action, interventions etc
2. Or better understand certain biological pathways?
  - Must include the outcome of interest

BKMR Bayesian Kernel Machine Regression  
 CART Classification and Regression Trees  
 ESS Exposure Space Smoothing  
 Lasso Least Absolute Shrinkage and Selection Operator  
 NMF Non-negative Matrix Factorization  
 PCA Principal Component Analysis  
 SEM Structural Equation Modelling  
 WQS Weighted Quantile Sum Regression

Unsupervised

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