

Week 14 Dimensionality Reduction

L14-04 Independent Component Analysis: Tutorial

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Master's Student

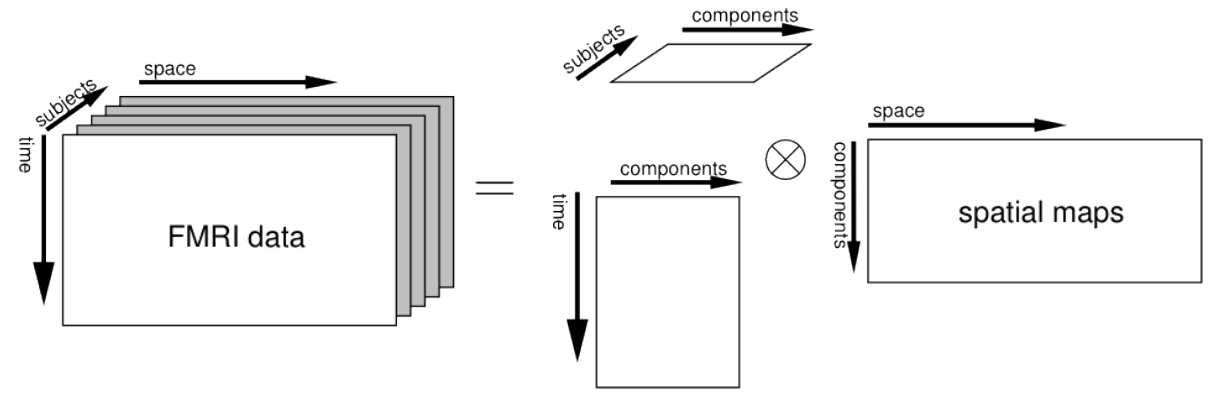


FSL MELODIC



FMRIB Software Library (FSL)

<https://fsl.fmrib.ox.ac.uk/fsl/fslwiki/>



FSL MELODIC

(**M**ultivariate **E**xploratory **L**inear **O**ptimized
Decomposition into Independent **C**omponents)

<https://fsl.fmrib.ox.ac.uk/fsl/fslwiki/MELODIC>



■ Install FSL & Download example data

<https://fsl.fmrib.ox.ac.uk/fslcourse/fslcourse.html>

- Installation
 - Windows: <https://youtu.be/QNp3lyP57rw>
 - macOS: <https://youtu.be/LgRZLev1LRw>
- Example data

Course Data

All course data is provided for educational use only, **not for research**.

We have created a simple installation script for our course data (to be used *after* you've installed FSL). To use it simply download the [fsldl script](#), move it to your Desktop and then open a terminal and paste in the following command (and don't forget to press return after pasting in order to run the command):

```
fsldlpython ~/Desktop/fsldl.py
```

fsldl.py

It will then ask you which dataset you wish to install.

For users who would prefer to install data directly themselves, there are [alternative instructions](#) here for accessing the data.

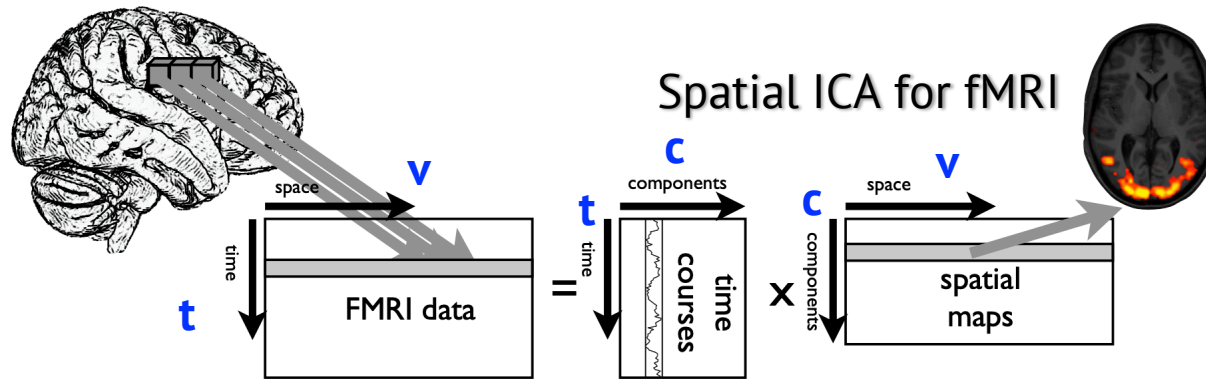


■ Resting state fMRI data: Single-subject ICA

<https://fsl.fmrib.ox.ac.uk/fslcourse/lectures/practicals/ica/index.html>

Melodic

multivariate linear decomposition:



Data is represented as a 2D matrix and decomposed into components
(image credit: FSL course)

$$AS = X$$

$$W^T X = Y$$

$$\underset{t \times v}{X} = \underset{t \times c}{(W^T)^{-1}} \underset{c \times v}{Y}$$



More Information

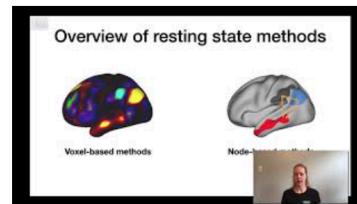
- FSL course online materials: http://fsl.fmrib.ox.ac.uk/fslcourse/online_materials.html

Section 6: Resting-State fMRI: ICA and Dual Regression

[Section 6 Pre-Practical Video](#)

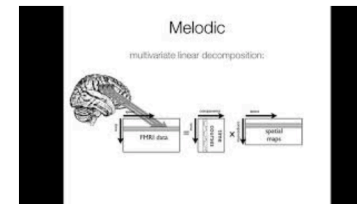
[Section 6 Practical Instructions \(written\)](#)

28. Resting State: Introduction to Resting State FMRI and ICA



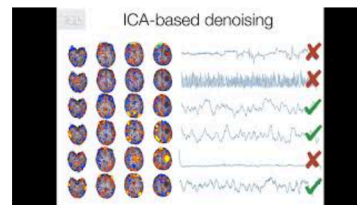
[Play video](#) [PDF slides](#)

29. Resting State: Independent Component Analysis



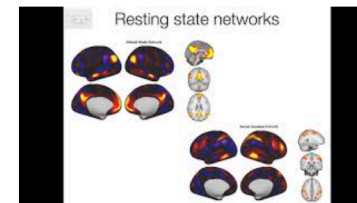
[Play video](#) [PDF slides](#)

30. Resting State: Single Subject ICA



[Play video](#) [PDF slides](#)

31. Resting State: Multi-Subject ICA and Dual Regression



[Play video](#) [PDF slides](#)



