



Central European Institute of Technology
BRNO | CZECH REPUBLIC



Caveats in fMRI result interpretation

Bartoň, M.

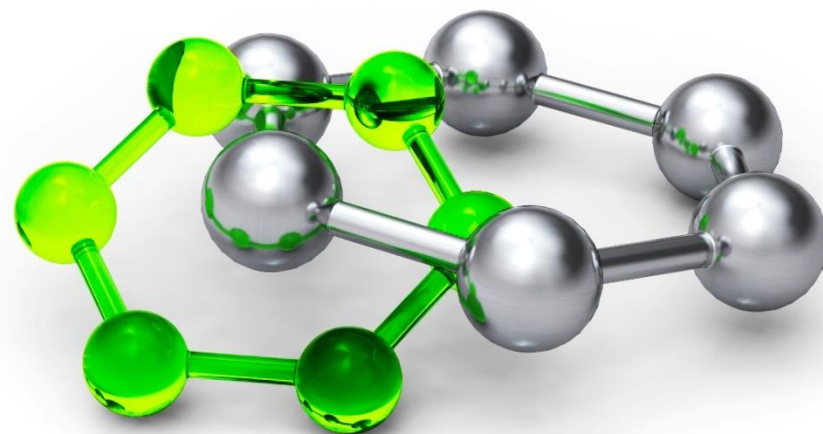
CEITEC MU, Masarykova univerzita



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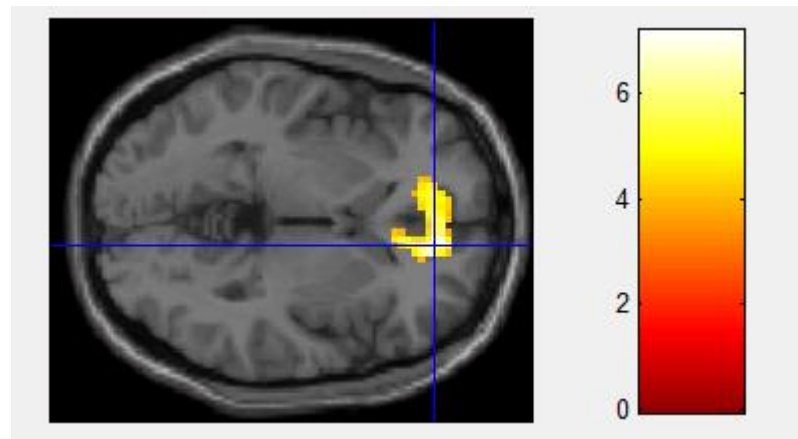
OP Research and
Development for Innovation



Difference between groups – group has significantly stronger effect than group 2... cool!
But...



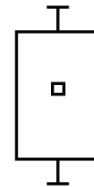
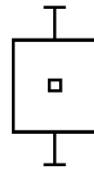
- group 1 > group 2



Difference between groups – group has significantly stronger effect than group 2... cool!
But...



- Strengths of effect for group 1 and group 2, significant difference between groups, $g1 > g2$:



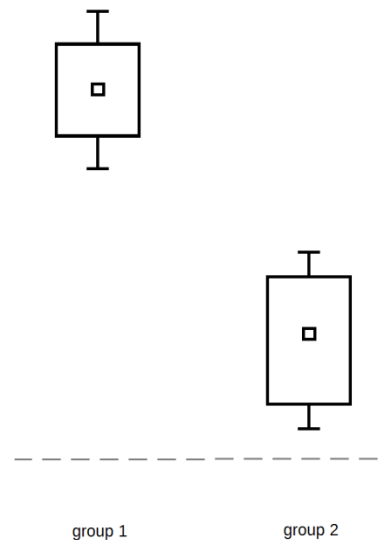
group 1

group 2

Difference between groups – cool! But...



- Strengths of effect for group 1 and group 2, significant difference between groups, $g1 > g2$:

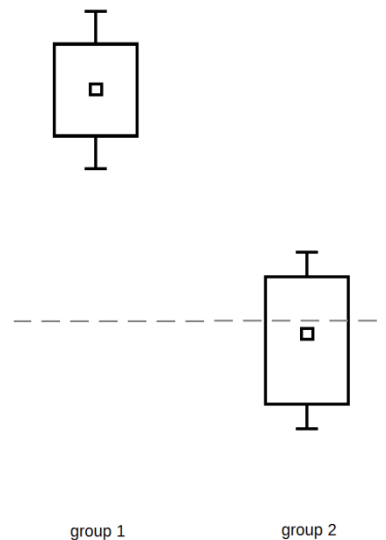


both groups > 0

Difference between groups – cool! But...



- Strengths of effect for group 1 and group 2, significant difference between groups, $g1 > g2$:

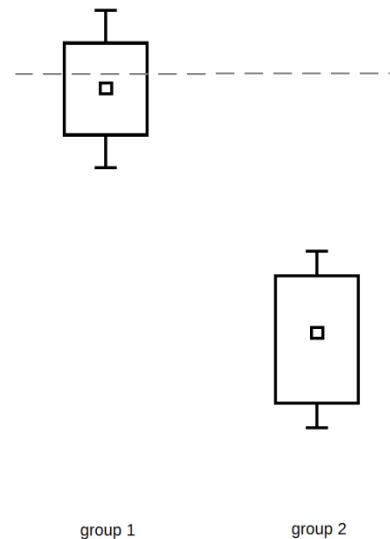


group 1 > 0 , group 2 ~ 0

Difference between groups – cool! But...



- Strengths of effect for group 1 and group 2, significant difference between groups, $g1 > g2$:

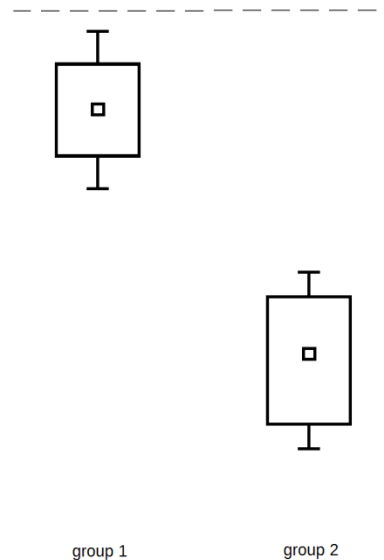


group 1 ~ 0, group 2 < 0

Difference between groups – cool! But...



- Strengths of effect for group 1 and group 2, significant difference between groups, $g1 > g2$:

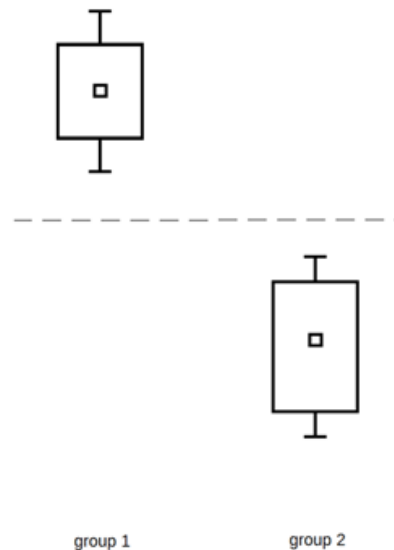


both groups < 0

Difference between groups – cool! But...



- Strengths of effect for group 1 and group 2, significant difference between groups, $g1 > g2$:



$g1 > 0, g2 < 0$

Example 1 – Husarova et al. 2014



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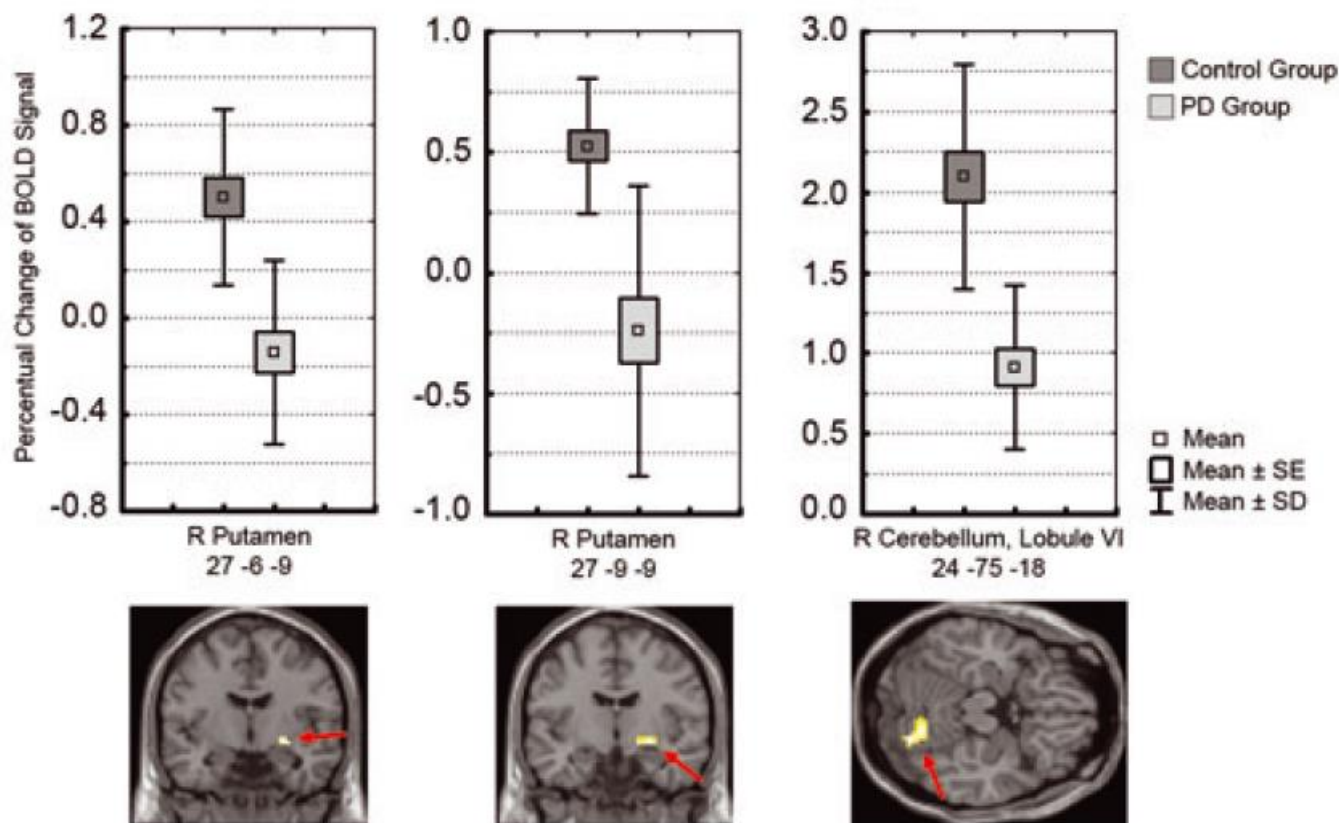
- BACKGROUND AND PURPOSE

The basal ganglia and the cerebellum have both emerged as important structures involved in the processing of temporal information.

- METHODS

We examined the roles of the cerebellum and striatum in predictive motor timing during a target interception task in healthy individuals (HC group; n = 21) and in patients with early Parkinson's disease (early stage PD group; n = 20) using functional magnetic resonance imaging.

Example 1 – Husarova et al. 2014



- Husárová I, Lungu OV, Mareček R, Mikl M, Gescheidt T, Krupa P, Bareš M. Functional Imaging of the Cerebellum and Basal Ganglia During Predictive Motor Timing in Early Parkinson's Disease *J Neuroimaging*. 2014; 24(1):45-53

Example 2 – Kasperek et al. 2012



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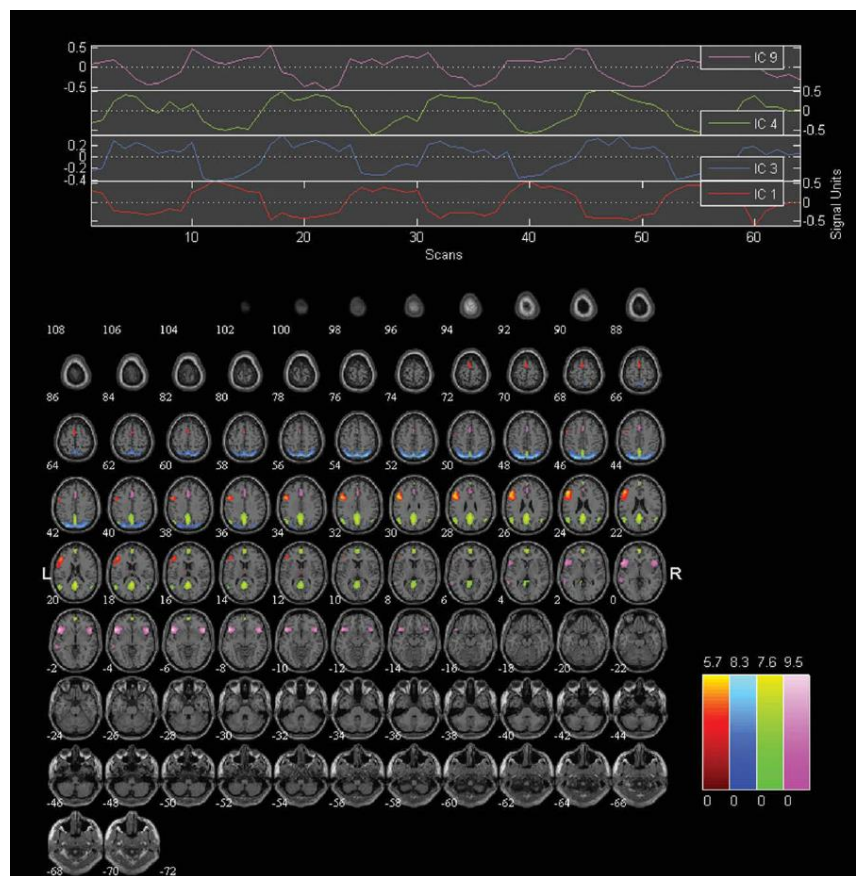
- Objectives:

Abnormal task-related activation and connectivity is present in schizophrenia. The aim of this study was the analysis of functional networks in schizophrenia patients in remission after the first episode.

- Experimental design:

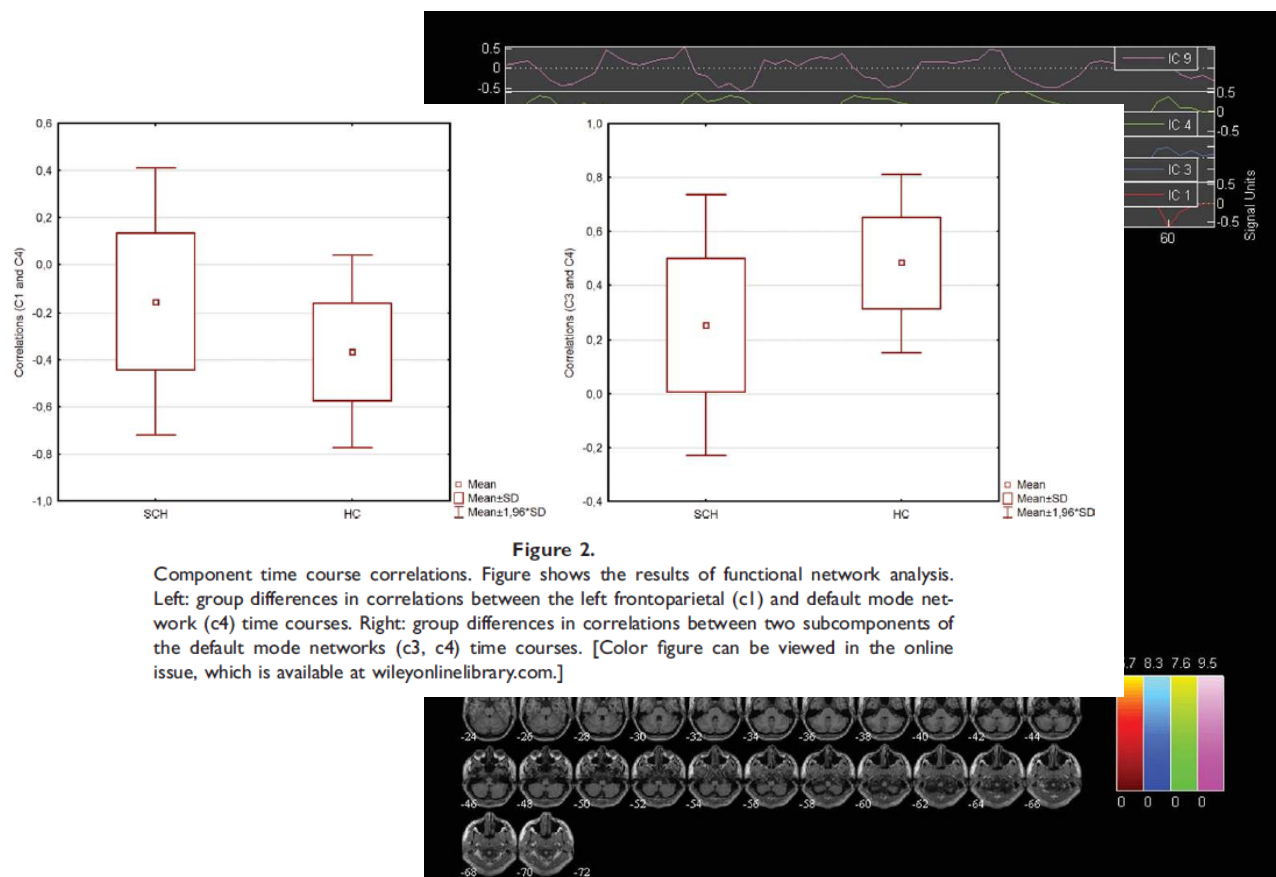
Twenty-nine male patients in remission after the first episode of schizophrenia and 22 healthy controls underwent examination by functional magnetic resonance during verbal fluency tasks (VFT). The functional connectivity of brain networks was analyzed using independent component analysis.

Example 2 – Kasperek et al. 2012



- Kasperek T., Prikryl R., Rehulova J., marecek R., Mikl M., Prikrylova H., Vanicek J., Ceskova E. Brain Functional Connectivity of Male Patients in Remission After the First Episode of Schizophrenia. *Hum Brain Mapp.* 2012; 34(3):726-37.. ISSN: 1065-9471.

Example 2 – Kasparek et al. 2012

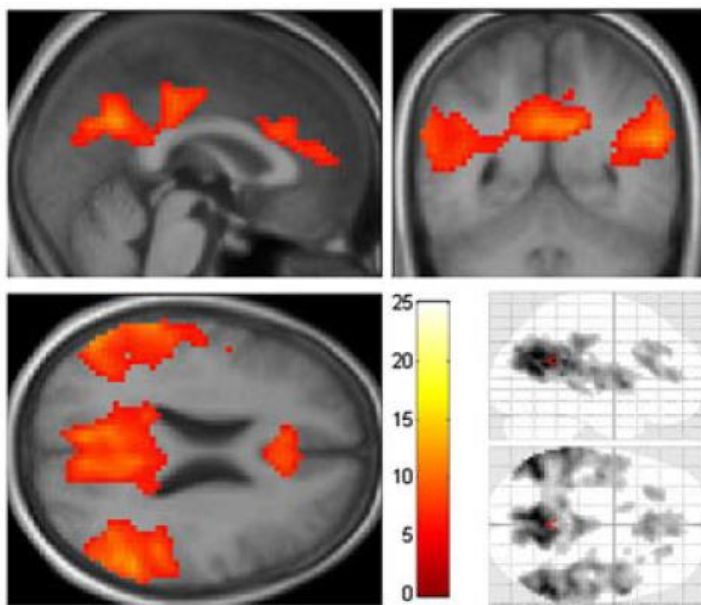


- Kasparek T., Prikryl R., Rehulova J., marecek R., Mikl M., Prikrylova H., Vanicek J., Ceskova E. Brain Functional Connectivity of Male Patients in Remission After the First Episode of Schizophrenia. *Hum Brain Mapp.* 2012; 34(3):726-37.. ISSN: 1065-9471.

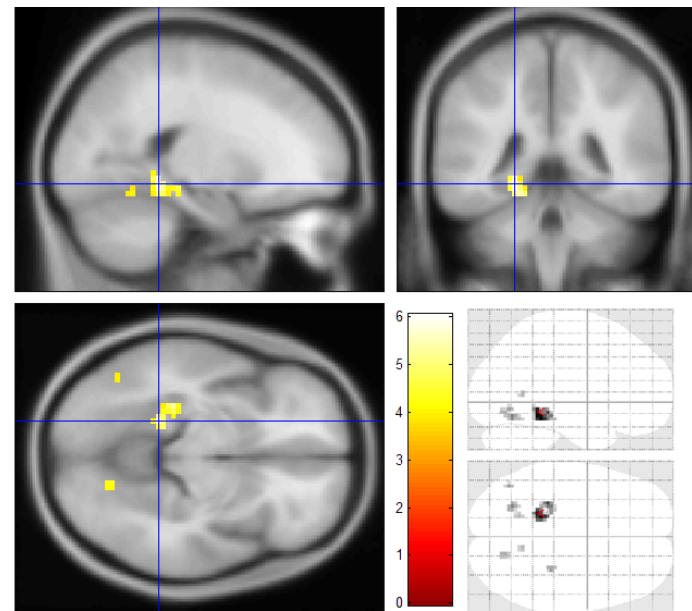
Example 3 – Krajcovicova et al. 2012, Data

- Study with visual memory task, aimed to observation of DMN
- Cohort of 18 PD patients
- Group statistics of deactivation, correlated with LDOPA dose, + covariates – gender, age

deactivation



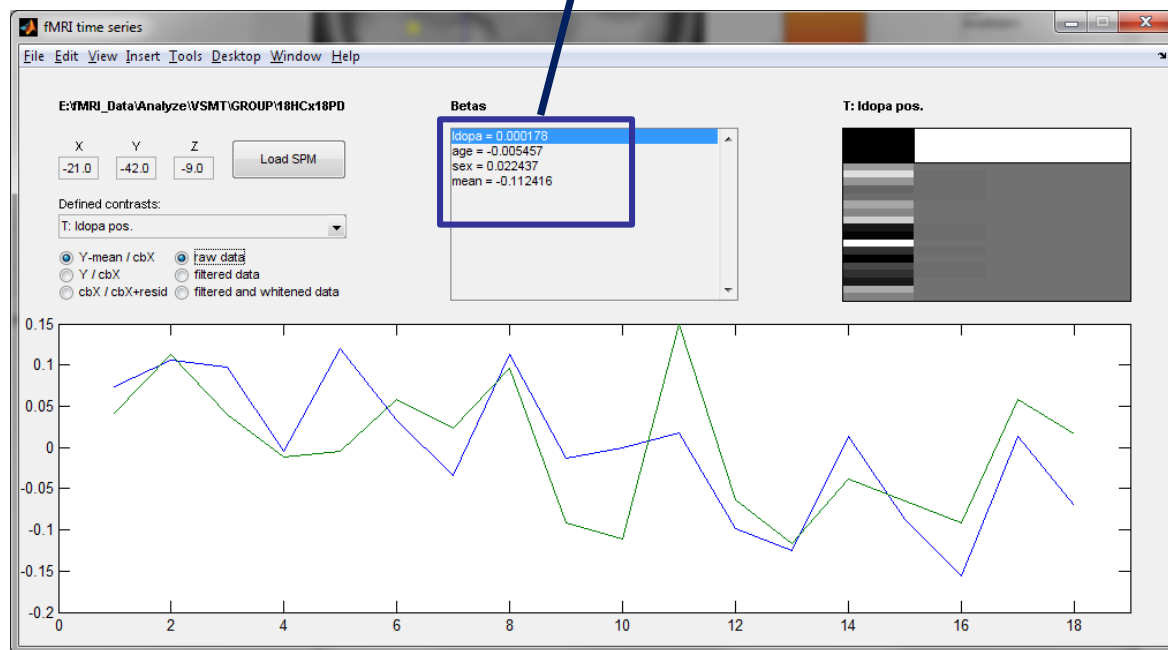
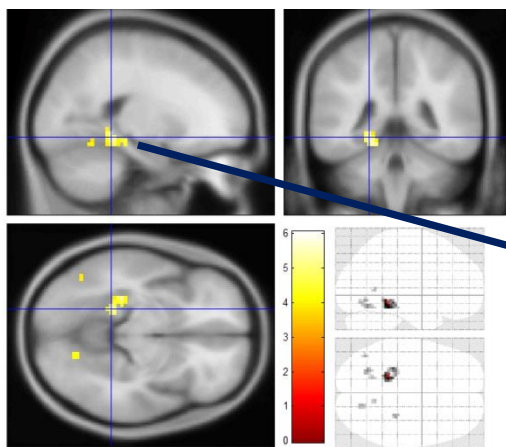
Correlation of deactivation with LDOPA



Example 3 – Krajcovicova et al. 2012, Interpretation of correlation with LDOPA

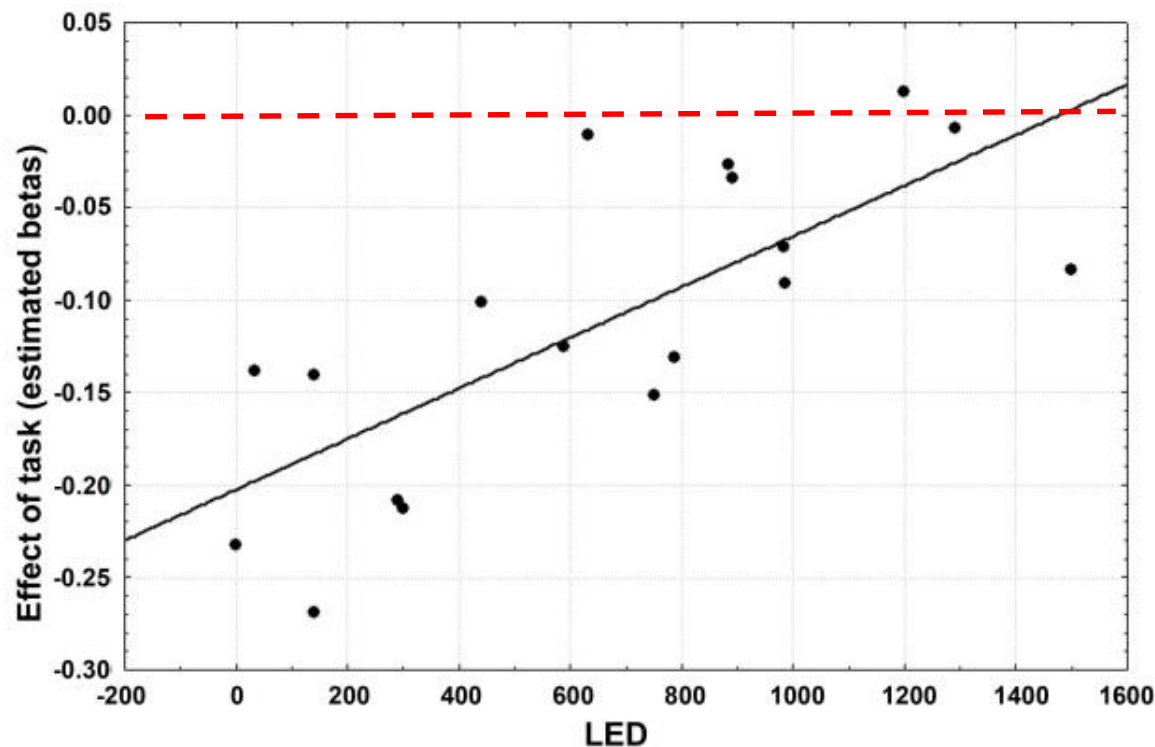
- Positive correlation between LDOPA and deactivation
- ? is interpretation correct ?

Correlation of deactivation with LDOPA

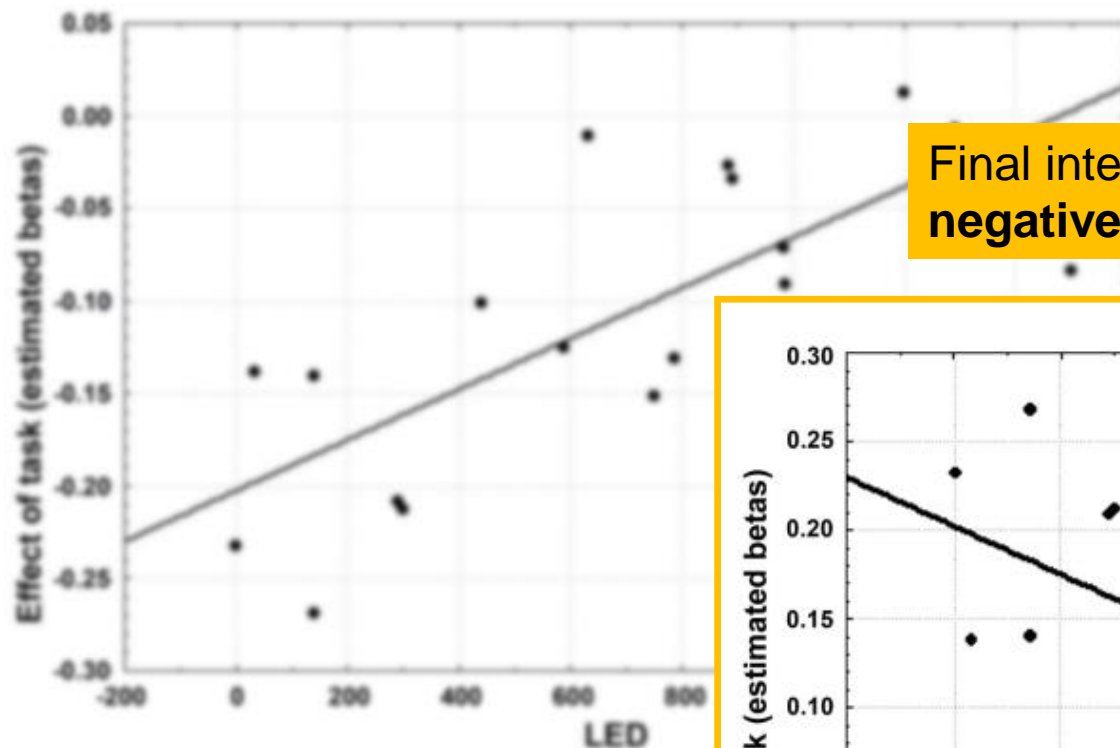


ldopa = 0.000178
age = -0.005457
sex = 0.022437
mean = -0.112416

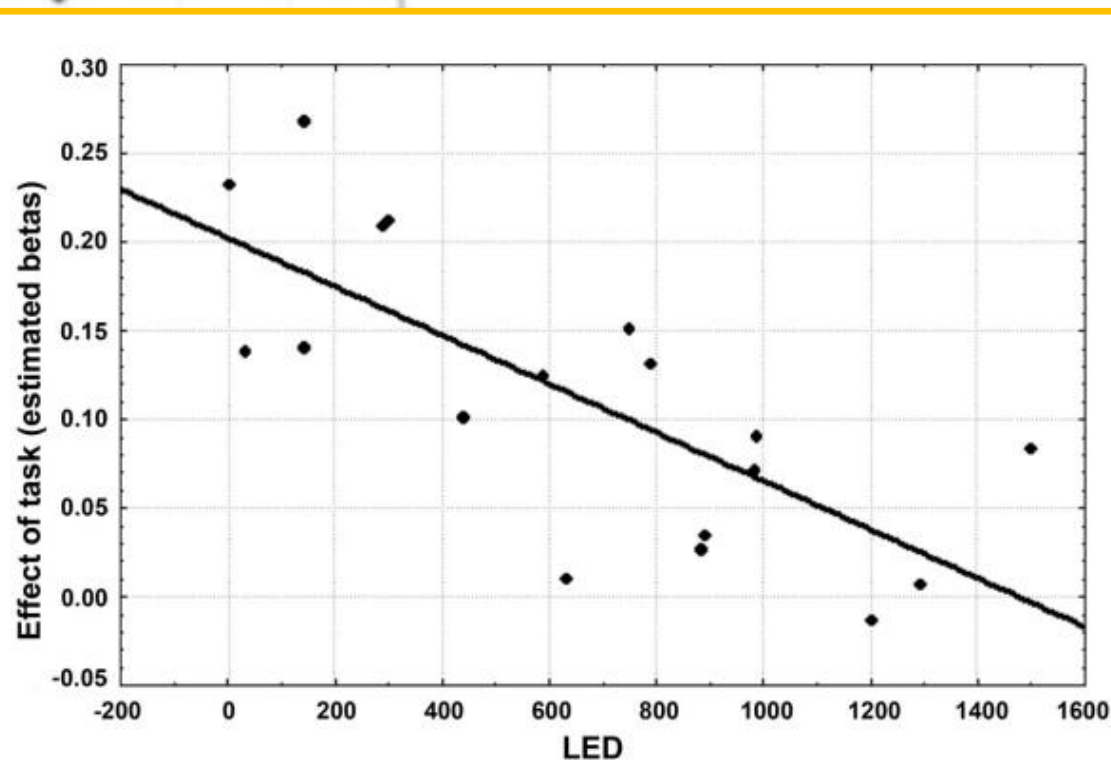
Example 3 – Krajcovicova et al. 2012, Interpretation of correlation with LDOPA



Example 3 – Krajcovicova et al. 2012, Interpretation of correlation with LDOPA



Final interpretation:
negative correlation LDOPA with **activation**



- PPIs – difference of connectivity between conditions
 - what are connectivity strengths
 - in condition 1?
 - in condition 2?
- Between group difference in PPIs
 - what are connectivity strengths
 - in condition 1 for group 1 and for group 2?
 - in condition 2 for group 1 and for group 2?



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