

# Neuroscienze Cognitive

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A.A. 2017-2018

LM-51 M-PSI/02

941PS 6CFU

## Orario

◦ GIOVEDÌ | 08:30 - 10:00

| 10:15 - 11:00

◦ VENERDÌ | 09:00 - 10:30

## Frequenza

- Caldamente suggerita ma NON-OBBLIGATORIA



## Esercitazioni

- SEMINARI
  - Fuori orario di lezione (avvisi su Moodle)
    - La prima è del Prof. F. Versace sulle dipendenze  
17 Ott ore 14:30 EdQ Aula Emiciclo
    - Durante le lezioni
      - Prof. P. Bernardis pros&cons dei metodi di imaging  
7-14-15 Dic





## Esercitazioni

### o SESSIONE DI MICROSCOPIA

- o 1 lezione "hands on"  
Tutankhamon, piano -1, aula di microscopia
- 1. familiarizzazione con vetrini di tessuto neuronale e atlante stereotassico
- 2. ricostruzione del volume di un'area con un software dedicato



## Esercitazioni

### o SESSIONE DI MICROSCOPIA

- o 1 lezione "hands on"  
Tutankhamon, piano -1, aula di microscopia
- o 2 turni, iscrizioni obbligatorie tramite liste aperte su Moodle2, entro la data di chiusura della lista
- o portare portatile, matita e matite colorate, gomma - a coppie



## Materiale

o MOODLE2

o Zanichelli



- o studiare cap. 3-4-5(solo visione)-6-7-8-12-14
- o 1-2 articoli pubblicati su Moodle2
- o identico per frequentanti e non-frequentati

## Esame

o SCRITTO

- o Nome, Cognome e Matricola sul retro
- o Identico per frequentanti e non-frequentati
- o Consiste di **5 domande** (mezza facciata per risposta)
- o **Solo risposte pertinenti**
- o **0-6pt** ciascuna
- o **No integrazione orale**
- o No differenza freq. e non-freq.
- o **NO ECCEZIONI**





# Falsi positivi

## Neural Correlates of Interspecies Perspective Taking in the Post-Mortem Atlantic Salmon: An Argument For Proper Multiple Comparisons Correction

Craig M. Bennett<sup>1\*</sup>, Abigail A. Baird<sup>2</sup>, Michael B. Miller<sup>1</sup> and George L. Wolford<sup>3</sup>

With the extreme dimensionality of functional neuroimaging data comes extreme risk for false positives. Across the 130,000 voxels in a typical fMRI volume the probability of a false positive is almost certain. Correction for multiple comparisons should be completed with these datasets, but is often ignored by investigators. To illustrate the magnitude of the problem we carried out a real experiment that demonstrates the danger of not correcting for chance properly.

## METHODS

**Subject.** One mature Atlantic Salmon (*Salmo salar*) participated in the fMRI study. The salmon was approximately 18 inches long, weighed 3.8 lbs, and was not alive at the time of scanning.

**Task.** The task administered to the salmon involved completing an open-ended mentalizing task. The salmon was shown a series of photographs depicting human individuals in social situations with a specified emotional valence. The salmon was asked to determine what emotion the individual in the photo must have been experiencing.

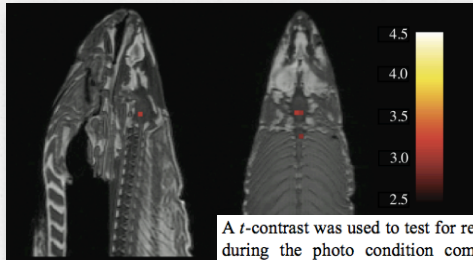
**Design.** Stimuli were presented in a block design with each photo presented for 10 seconds followed by 12 seconds of rest. A total of 15 photos were displayed. Total scan time was 5.5 minutes.

**Preprocessing.** Image processing was completed using SPM2. Preprocessing steps for the functional imaging data included a 6-parameter rigid-body affine realignment of the fMRI timeseries, coregistration of the data to a T<sub>1</sub>-weighted anatomical image, and 8 mm full-width at half-maximum (FWHM) Gaussian smoothing.

**Analysis.** Voxelwise statistics on the salmon data were calculated through an ordinary least-squares estimation of the general linear model (GLM). Predictors of the hemodynamic response were modeled by a boxcar function convolved with a canonical hemodynamic response. A temporal high pass filter of 128 seconds was included to account for low frequency drift. No autocorrelation correction was applied.

**Voxel Selection.** Two methods were used for the correction of multiple comparisons in the fMRI results. The first method controlled the overall false discovery rate (FDR) and was based on a method defined by Benjamini and Hochberg (1995). The second method controlled the overall familywise error rate (FWER) through the use of Gaussian random field theory. This was done using algorithms originally devised by Friston et al. (1994).

## Falsi positivi



A  $t$ -contrast was used to test for regions with significant BOLD signal change during the photo condition compared to rest. The parameters for this comparison were  $t(131) > 3.15$ ,  $p(\text{uncorrected}) < 0.001$ , 3 voxel extent threshold.

Several active voxels were discovered in a cluster located within the salmon's brain cavity (Figure 1, see above). The size of this cluster was  $81 \text{ mm}^3$  with a cluster-level significance of  $p = 0.001$ . Due to the coarse resolution of the echo-planar image acquisition and the relatively small size of the salmon brain further discrimination between brain regions could not be completed. Out of a search volume of 8064 voxels a total of 16 voxels were significant.

## Ig Nobel

**NEUROSCIENCE PRIZE:** Craig Bennett, Abigail Baird, Michael Miller, and George Wolford [USA], for demonstrating that brain researchers, by using complicated instruments and simple statistics, can see meaningful brain activity anywhere — even in a dead salmon.

REFERENCE: "Neural correlates of interspecies perspective taking in the post-mortem Atlantic Salmon: An argument for multiple comparisons correction," Craig M. Bennett, Abigail A. Baird, Michael B. Miller, and George L. Wolford, poster, 15th Annual Meeting of the Organization for Human Brain Mapping, San Francisco, CA, June 2009.

REFERENCE: "Neural Correlates of Interspecies Perspective Taking in the Post-Mortem Atlantic Salmon: An Argument For Multiple Comparisons Correction," Craig M. Bennett, Abigail A. Baird, Michael B. Miller, and George L. Wolford, *Journal of Serendipitous and Unexpected Results*, vol. 1, no. 1, 2010, pp. 1-5.

**CHEMISTRY PRIZE [GERMANY]** — Volkswagen, for solving the problem of excessive automobile pollution emissions by automatically, electromechanically producing fewer emissions whenever the cars are being tested.

REFERENCE: "EPA, California Notify Volkswagen of Clean Air Act Violations", U.S. Environmental Protection Agency news release, September 18, 2015.