Cluster Analysis

-- Simultaneous inferences

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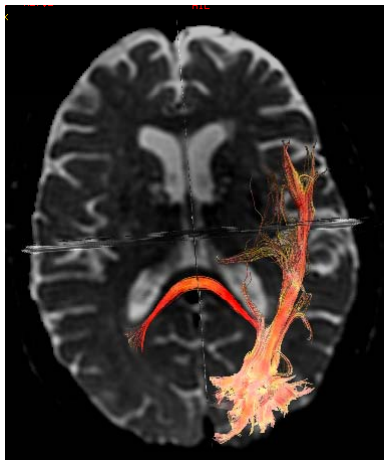
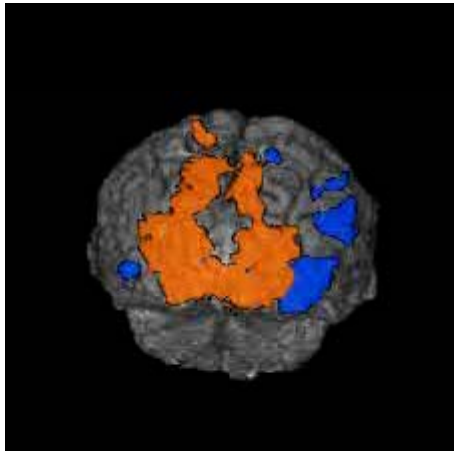
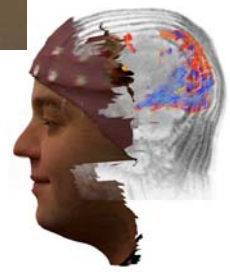
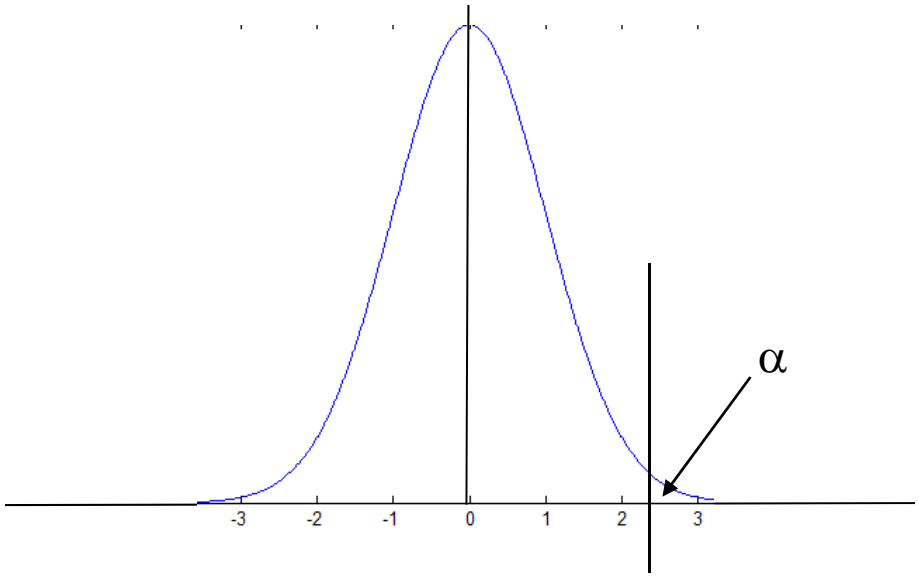
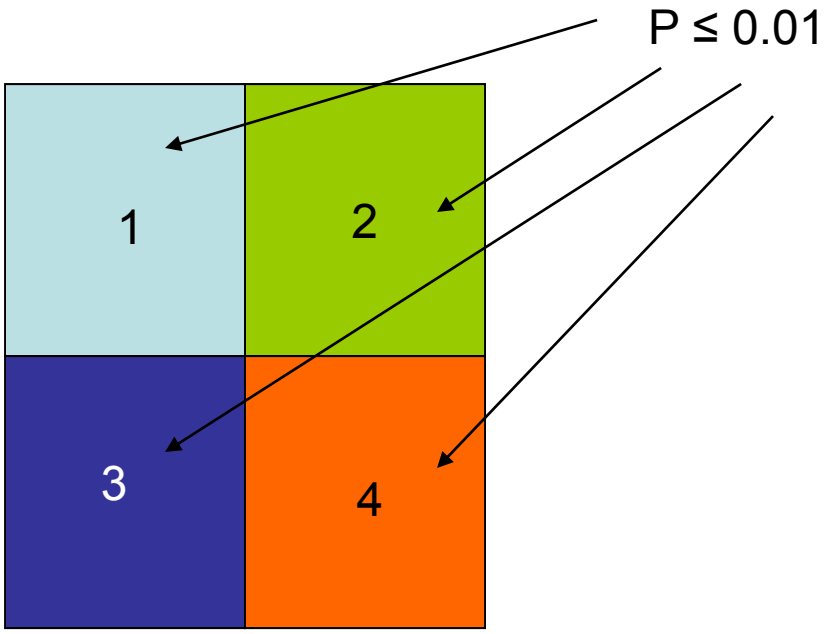










For each voxel, α = 0.01, and
P (no Type I error) = P (true negative) = 1-α = 0.99

For all four voxels together,

P (no Type I error) = P (true negative) = 0.99^4 = 0.96

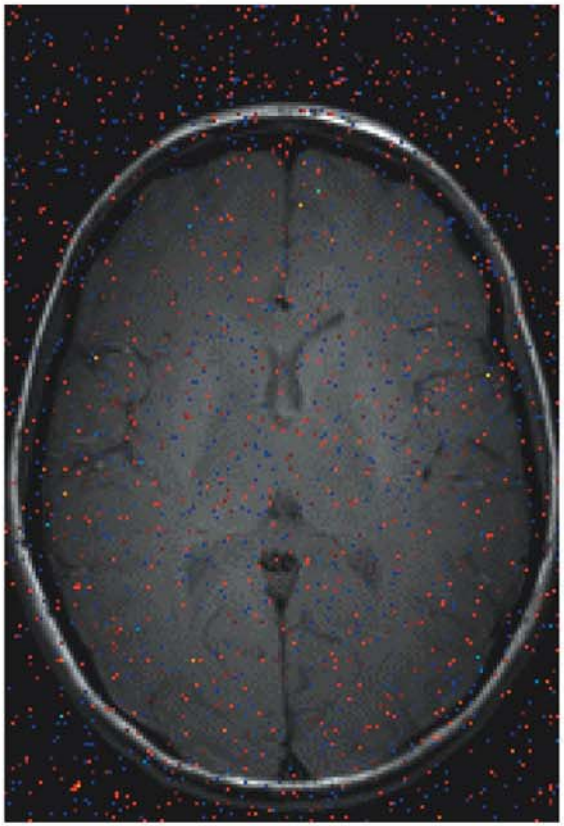
α= 1 – P (no Type I error) = 1 – 0.96 = 0.04 (the corrected P value)

If there are ~ 4000 voxels in the brain,

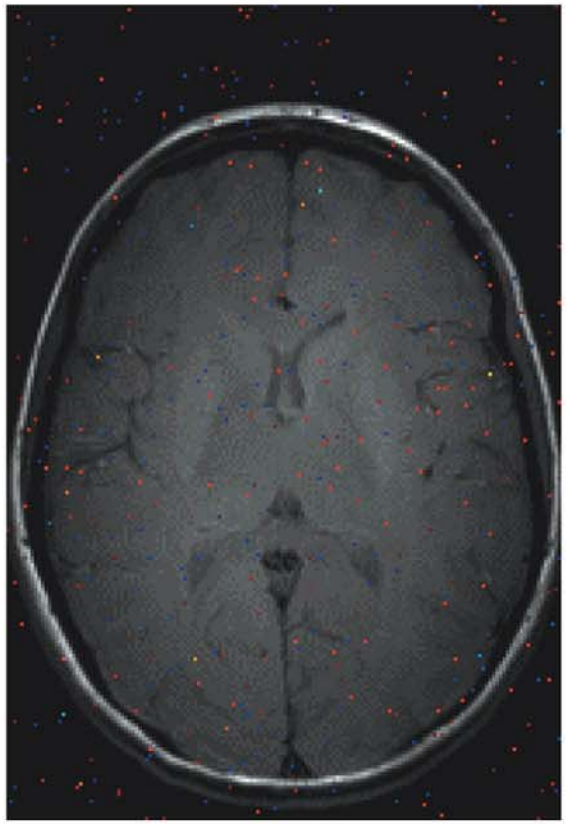
P (no Type I error) = P (true negative) = $(1-\alpha)^{4000}$ = 0.99^{4000} = 3.47 x 10^{-18}

α= 1 – P (no Type I error) = 1 – 3.47 x 10^{-18} = 1 (the corrected P value)

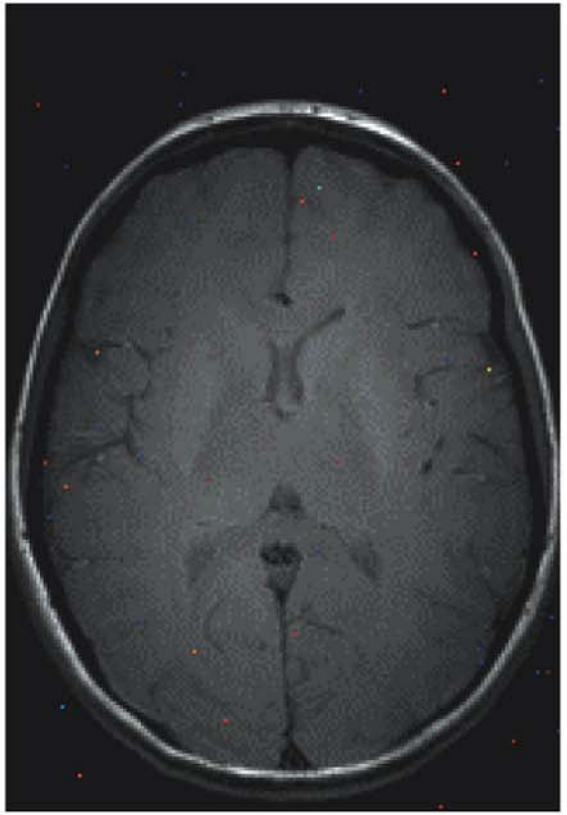
(A)



(B)



(C)

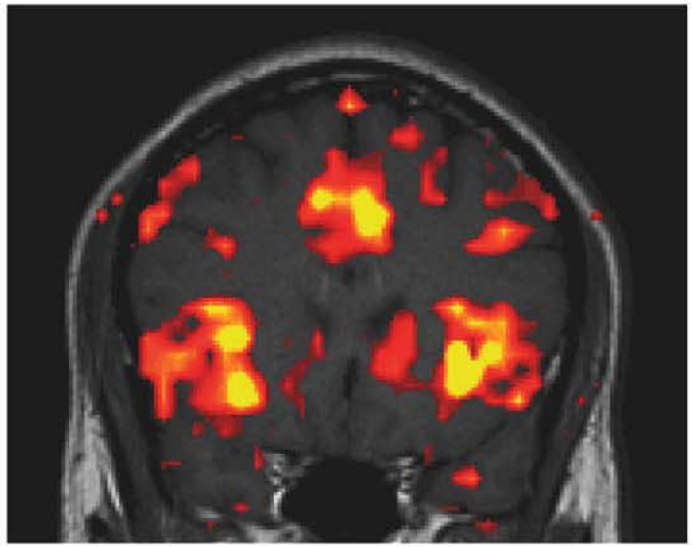


***FUNCTIONAL MAGNETIC RESONANCE IMAGING,* Figure 12.16**

Bonferroni Correction: Assuming independent volxels.

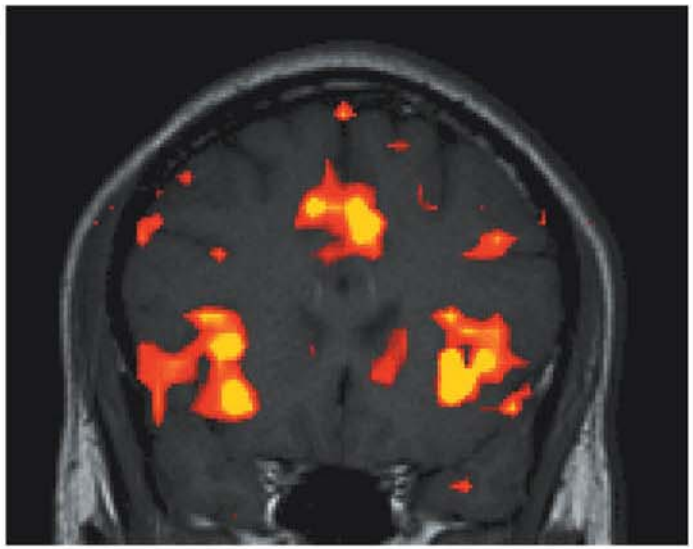
$\alpha_{bon} = \alpha/n$

(A)



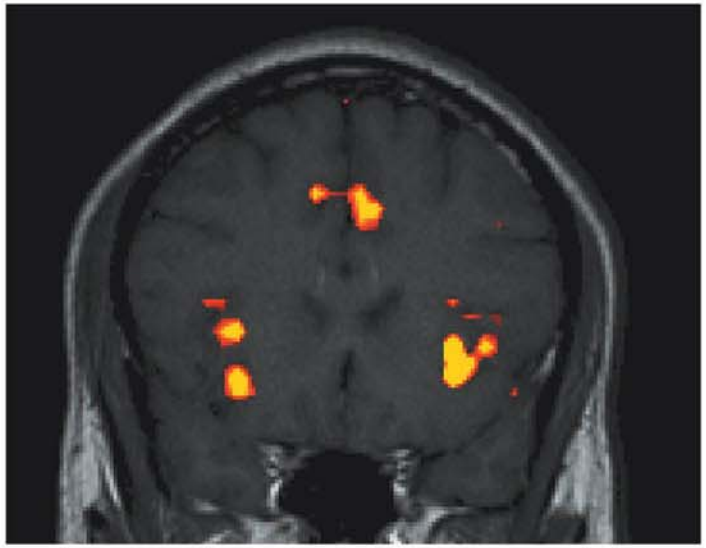
$t = 2.10$, $P < 0.05$ (uncorrected)

(B)



$t = 3.60$, $P < 0.001$ (uncorrected)

(C)



$t = 7.15$, $P < 0.05$ (Bonferroni corrected)

***FUNCTIONAL MAGNETIC RESONANCE IMAGING*, Figure 12.18**

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Monte Carlo Simulation