Note: I'm not sure at all what's the proper way of compressing the 4-classification into a single statistic. Ask Martin C..

I've been running an MVPA on decoding response. It worked pretty well. I first ran a univariate analysis (GLM) on the responses and looked at contrasts like NW>SE, NE>SW, NS>EW.

From there, I found that two visual areas in occipital were most predictive. So I ran the MVPA with that mask :

LEVEL "east" significant  
d-prime        = +0.27 ± 0.11   
accuracy       = +0.56 ± 0.03   
**p-value        = 0.010**            
t-statistic    = +2.52           
LEVEL "north" not significant  
d-prime        = +0.10 ± 0.07   
accuracy       = +0.53 ± 0.02   
**p-value        = 0.080**            
t-statistic    = +1.46           
LEVEL "south" significant  
d-prime        = +0.17 ± 0.08   
accuracy       = +0.55 ± 0.03   
**p-value        = 0.030**            
t-statistic    = +2.00           
LEVEL "west" significant  
d-prime        = +0.28 ± 0.10   
accuracy       = +0.57 ± 0.03   
**p-value        = 0.006**            
t-statistic    = +2.75

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After that, I tried searchlight over the whole occipital (mask from xjview).

The result shows that global is significant, but not any of the actions individually. Maybe the calculation of the global statistic is wrong?

GLOBAL significant  
d-prime = +0.10 ± 0.05

accuracy = +0.53 ± 0.01

p-value = 0.030

t-statistic = +2.00

LEVEL "east" not significant  
d-prime = -0.05 ± 0.09

accuracy = +0.48 ± 0.03

p-value = 0.705

t-statistic = -0.55

LEVEL "north" not significant  
d-prime = +0.06 ± 0.08

accuracy = +0.52 ± 0.03

p-value = 0.234

t-statistic = +0.74

LEVEL "south" not significant  
d-prime = -Inf ± NaN

accuracy = +0.49 ± 0.04

p-value = NaN

t-statistic = NaN

LEVEL "west" not significant  
d-prime = -Inf ± NaN

accuracy = +0.51 ± 0.04

p-value = NaN

t-statistic = NaN